February 5, 2026

Jane Forbes
Division of Environmental Quality
City Hall
30 Church Street, Room 300B
Rochester, New York 14614

Michael Roux
10 Flint Street LLC
209 Shafter Street
Islandia, New York 11749

Re: Remedial Action Work Plan
Portion of Vacuum Oil Refinery Site
Site No.: C828190
City of Rochester, Monroe (C)

Dear Ms. Forbes and Mr. Roux:

The New York State Department of Environmental Conservation (NYSDEC or "The Department") in conjunction with New York State Department of Health (NYSDOH) have completed a review of the January 15, 2026 Remedial Action Work Plan (RAWP) for the Portion of Vacuum Oil Refinery site (Site) located in the City of Rochester. Based on the information presented in the RAWP and review of the Site's approved Decision Document, the Remedial Action Work Plan is conditionally approved with the following modifications and clarifications.

1. Executive Summary; Page x & Section 1.0; Introduction; Page 1: The Executive summary identifies the RAWP as a Report. The Department understands that the use of Report and Work Plan in the document is equivalent.

   The Brownfield Cleanup Agreement (BCA) Amendment adding 10 Flint Street LLC to the C828190 BCA was executed on September 12, 2025.

2. Executive Summary; Page xvi & Section 3.2; Selected Remedy; Page 19: Remedial Element #2 – Excavation will be as per the Site's Decision Document dated September 2023:
   - All soils in the upper two feet which exceed the restricted residential SCOs will be excavated and transported off-site for disposal.
   - Approximately 32,500 cubic yards of contaminated soil will be removed from the site.

3. Executive Summary; Page xvii & Section 3.2; Selected Remedy; Page 19: Remedial Element #3 – Backfill will be as per the Site's Decision Document dated September 2023. All references in Remedial Element #3 to cover system are referring to Remedial Element #4 of the Decision Document.

4. Executive Summary; Site Description/Physical Setting; Page x: The Department understands that the nearest intersection to the Site is Exchange Street and Flint Street.

5. Executive Summary; Surface Soil and Surface Cover; Page xiii: The Department understands that the lowest of the soil cleanup objectives – restricted residential or the protection of groundwater will be applied to the Site as appropriate.

6. Section 4.2.1; PDI Targeted Excavations Area Sampling; Page 23: The Department understands that if obstructions as indicated on this page are encountered, the Department will be notified. During excavation advancement to the Site boundary, if utilities or other obstructions prevent soils removal, the Department project manager will be notified for approval of the final delineation samples to be collected.

7. Section 4.4.1; Soil Screening Methods; Page 27: The Department understands that a PID screening level of 5 parts per million (ppm) will be used during field screening of soil/fill material.

8. Section 4.4.3; Materials Excavation and Load Out; Page 28; 9th Paragraph: Department project manager approval will be obtained prior to performing development-related grading cuts and fills.

9. Section 4.4.49; Backfill From Off-site Sources; Page 32-33: All materials imported to the Site referenced in this section also pertains to the beneficial use determination (BUD) material.

10. Section 4.4.11.1; Extreme Storm Preparedness and Response Contingency Plan; Storm Response; Page 34 & Storm Response Reporting; Page 35: The Department understands that the site inspection report will be submitted to the Department project manager.

11. Section 5.1.5.8; Surveying Firm; Page 45 and Appendix D; QAPP/FSP; Page 4: The Department understands that the NYS licensed surveying firm is Nussbaumer & Clarke, Inc.

12. Section 5.2.5; Site Security; Pages 49-50: The Department understands that any excavations left open overnight will be secured (e.g., temporary fencing) and signage will be posted such as “Authorized Personnel Only” and “No Trespassing.”

13. Section 5.3.2; Monitoring Well Decommissioning; Page 52: In addition to the groundwater monitoring wells listed in this section, the bedrock groundwater monitoring well with the identifier of BED1-100 will also need to be decommissioned in accordance with NYSDEC Commissioner Policy CP-43. The Department understands that the groundwater monitoring well material will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

14. Section 5.5.3; Erosion and Sedimentation Controls; Page 52-53: The Department understands that the erosion and sedimentation controls (e.g., straw bales, silt fence) implemented at the Site during remedy implementation will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

15. Section 5.3.7; Equipment and Material Staging; Page 55: A request to import will be prepared and submitted to the Department project manager for the import of stone material used in the construction of the equipment, import, and potential reuse areas of the Site. The Department understands that the geotextile fabric used for the construction of these areas will be the same as or equivalent to 12 oz. non-woven geotextile to be used for the construction of the entrance and decontamination pad/area.

16. Section 5.3.8; Decontamination Area; Page 55: The Department understands that the source of water at the Site will be City of Rochester municipal water.

17. Section 5.3.9; Demobilization; Page 55: The Department understands that in addition to the details presented in this section, the following will also be part of the demobilization phase of the remedy implementation:
    - The materials used to construct the equipment staging area, waste staging area, soil and material staging area for potential on-site reuse, soil and material staging area for off-site disposal, and the construction road material will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.
    - Note this comment is for all areas located on the C828190 site. These areas along with the decontamination pad and construction entrance, but not limited to, will be addressed under the plans specifically for the sites in which those items are located.

18. Section 5.3.10; Groundwater Performance Monitoring; Page 56: The initial groundwater performance monitoring event will occur in the subsequent quarter after the completion of the remedial excavation activities at the Site. The performance groundwater monitoring wells will be inspected prior to the initial sampling event. Redevelopment and repair/reinstallation of the groundwater monitoring wells will be contingent upon the inspection results.

    The Department understands that the performance groundwater monitoring will be sampled using the low-flow methodology as defined in ASTM D6771-21. The water quality field parameters will also include temperature and turbidity. The Department understands that the analytical data will also be submitted to EQuIS.

19. Section 5.4.1; Daily Reports; Pages 56-57: The daily reports provided to the NYSDEC and NYSDOH project managers will also include details and resolution actions of any unauthorized entries to the Site and issues encountered.

20. Section 7.1; Site Cover System; Page 60: The Site's cover system will be site-wide and will be free of any solid waste material/debris in the 0-2 foot interval. If solid waste material/debris is within the 0-2 foot interval then that material will be removed and disposed off-site in accordance with all applicable local, State, and Federal regulations and in accordance with the Department's guidance. The removal and disposal activities associated with the solid waste material/debris will be documented in the Site's Final Engineering Report (FER) and all supporting documentation will be included in the FER.

21. Section 9.1; Environmental Easement; Page 62: The Site consists of multiple properties. The recorded environmental easement for the Site will run with the controlled properties in perpetuity.

22. Section 9.2; Site Management Plan; Page 62-64: The property owners are responsible for ensuring that all site management responsibilities as defined in the Site Management Plan are performed.

    Page 63; 1.b; bullet #4 – The bullet in the RAWP is to match the Site's Decision Document and is to read as follows: *''descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;"*.

Page 64; 2.b – The item in the RAWP is to match the Site's Decision Document and is to read as follows: "*Monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above."*

23. Section 10.0; Final Engineering Report; Paragraph #3; Page 65: The Department understands that the Final Engineering Report (FER) will include a thorough summary of remaining contamination in soil at the Site that exists below the Site-wide cover system. The remaining contamination below the Site-wide cover system will also be represented on tables and Site figures.

    In addition to presenting beneficial use determination (BUD) material imported to the Site in the text of the FER, in appendices, and in tables, the Department is requesting the beneficial use determination (BUD) material imported to the Site is to be presented on as-built figures with PE stamp and signature in the FER. The FER figures will document each type of BUD material imported to the Site, the BUD placement location, the horizontal and vertical extent of the BUD material placement at the Site.

**TABLES:**

24. Table 7, Preservation, Holding Times, and Sample Containers and Appendix D; Table 3: The samples will be analyzed for USEPA target compound list (TCL) parameters.

25. Table 6, Pre-Design Investigation Soil Sampling Plan and Appendix D; QAPP/FSP; Table 2: The Department understands that the number of samples presented in the table are an estimation and site conditions and encountered impacts/contamination will dictate the number samples collected for laboratory analysis.

**FIGURES:**

26. Figure 10; Construction Specifications; Item #5: The Department understands that the geotextile referenced in this item will be 12 oz. non-woven geotextile or an equivalent approved by the Remedial Engineer and the Department project manager. The Department understands that the access road will have a thickness of 8 inches as detailed by the access road profile detail on Figure 10. The Department understands that the poly sheeting will be of appropriate thickness to prevent punctures and tears such that no liquids will be released. The Department understands that all decontamination liquids will be collected, containerized and disposed off-site at a permitted facility in accordance with all local, State, and Federal regulations.

**APPENDICES:**

27. Appendix D; Section 4.2; Site's Existing Cover System Delineation Sampling Areas; Page 7: The last paragraph – The Department understands that the need for any additional sampling in these areas will be evaluated based on the results of the delineation/evaluation samples and consultation with the NYSDEC and NYSDOH project managers.

28. Appendix D; Section 4.3; Offsite Backfill/On-site Reuse Soil Sampling; Page 7 & 8 and Section 5.3; Off-site Backfill/On-site Reuse Soil Sampling; Page 11: The Department understands that the sampling requirements for off-site backfill material and reuse of on-site material will be in accordance with the following:

    - Section 4.4.6, Materials Reuse On-site,

- Section 4.4.9, Backfill from Off-site Sources,
- Any associated conditional approval comments presented in this letter, and
- Current Department guidance and regulations.

29. Appendix D; Section 4.4; Groundwater Performance Monitoring; Page 9: The Department understands that the field parameters listed in Section 5.3.10 of the RAWP, any additional conditional approval comments in this letter, and current Department guidance and regulations will be adhered to for the performance monitoring. The Department understands that the data will be submitted to EQuIS.

30. Appendix D; Section 7.1; Decontamination; Page 15: The Department understands that all construction and drilling equipment as well as all sampling equipment will arrive at and leave the Site free of impacted material (i.e., decontaminated).

31. Appendix D; Section 7.2; Management of Investigation Derived Waste; Page 15: The Department understands that all fluids generated as part of the remedy implementation will be containerized, characterized, and disposed off-site at a permitted facility. This includes the dewatering of the excavations.

32. Appendix F; Erosion and Sediment Control Plan; Section 3.1.2; Page 5: The Department understands that earth disturbing activities also includes clearing, grubbing, and stump removal of the Site for the implementation of the Site's remedy.

33. Appendix G; Community Air Monitoring Plan; Page 1: The Department understand that soil/fill material handling includes but is not limited to stockpiling, loadout, backfilling.

34. Appendix G; Section 2.2.1; Potential Corrective Measures and VOC Suppression Techniques; Page 3: The Department understands that soil stockpiles will be covered with a minimum of 12 mil poly sheeting.

35. Appendix G; Section 2.3; Particulate Monitoring; Page 4: The Department understands that the particulate monitoring equipment will be calibrated and recalibrated in accordance with the manufacturer's specifications and recommendations.

36. Appendix G; Section 2.3.1; Potential Particulate Suppression Techniques; Page 4: The Department understands that no visible dust will be seen leaving the Site. Suppression techniques will be implemented at the Site if visible dust is observed at the Site boundaries.

37. The Department will receive 7-days advance notification of any fieldwork activities as per the Brownfield Cleanup Agreement such that Department oversight can be provided.

Within fifteen (15) days of the date of this letter and prior to any fieldwork activities, the Applicant must elect in writing (electronic notification is acceptable) one of the following options:

- Option A: Accept the modified work plan;
- Option B: Invoke dispute resolution as set forth in 6 NYCRR Part 35-1.5(b)(2); or
- Option C: Terminate the Brownfield Cleanup Agreement in accordance with 6 NYCRR Part 375-3.5.

If the Applicant chooses to accept Option A, then this letter becomes part of the approved Remedial Action Work Plan dated January 2026. Also, if Option A is chosen, then a copy of the approved Remedial Action Work Plan along with this letter attached must be placed in the document repository within 1 week of accepting Option A and prior to any fieldwork activities. Please provide notification to the Department that the Remedial Action Work Plan and a copy of this letter have been placed in the document repository (electronic notification is acceptable).

NYSDEC seeks to resolve outstanding differences in a mutually agreeable manner which addresses the requirements of the Brownfield Cleanup Agreement, Part 375, and all applicable laws, regulations, and guidance. If you or your technical team have any questions or concerns regarding this request, please contact me via email at charlotte.theobald@dec.ny.gov or at 585-226-5354. If your legal team have any questions or concerns regarding this request, please feel free to contact Deborah Gorman via e-mail at Deborah.Gorman@dec.ny.gov or at 518-402-9525 and Kyle Pero at kyle.pero@dec.ny.gov.

Sincerely,

Charlotte B. Theobald
Assistant Engineer

ec:
Noelle Clark (Roux Environmental Engineering & Geology, D.P.C.)
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Eric Runstrom (Roux Associates, Inc.)
Michael Hecker (Hodgson Russ LLP)
Anne Spaulding (City of Rochester)
Greg Andrus (Lu Engineering)
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David Pratt (NYSDEC)
Michael Ormanoski (NYSDEC)

# REMEDIAL ACTION WORK PLAN

Portion of the Former Vacuum Oil Refinery Site
Rochester, New York

January 15, 2026

Prepared for:

**10 Flint Street LLC & City of Rochester**

Prepared by:

**Roux Environmental Engineering and Geology, D.P.C.**
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F. Erosion and Sediment Control Plan (ESCP)
G. Community Air Monitoring Plan (CAMP)
H. SiteWise™ Model
I. Site Health and Safety Plan (HASP)
J. Professional Profiles
K. Citizen Participation Plan
L. Required Permits

# Certification

I, Noelle Clarke, certify that I am currently a NYS registered Professional Engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and Green Remediation (DER-31).

| Noelle Clarke | January 15, 2026 | |
|---|---|---|
| NYS Professional Engineer # 072491 | Date | Signature |

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

# Acronym List

| Acronym | Definition |
|---|---|
| ASP | Analytical Services Protocol |
| AWQSGVs | Ambient Water Quality Standards and Guidance Values |
| BCA | Brownfield Cleanup Agreement |
| BCP | Brownfield Cleanup Program |
| BOA | Brownfield Opportunity Areas |
| BUD | Beneficial Use Determination |
| CAMP | Community Air Monitoring Plan |
| COC | Contaminant of Concern |
| CPP | Community Participation Plan |
| CQAP | Construction Quality Assurance Plan |
| CSM | Conceptual Site Model |
| CVOCs | Chlorinated Volatile Organic Compounds |
| CY | Cubic Yards |
| DER-10 | NYSDEC DER 10 Technical Guidance for Site Investigation and Remediation |
| DUSR | Data Usability Summary Report |
| EC | Engineering Control |
| ECL | Environmental Conservation Law |
| EDD | Electronic Data Deliverable |
| ELAP | Environmental Laboratory Approval Program |
| ESA | Environmental Site Assessment |
| ESCP | Erosion and Sediment Control Plan |
| FEMA | Federal Emergency Management Agency |
| FER | Final Engineering Report |
| FSP | Field Sampling Plan |
| ft bgs | Feet Below Ground Surface |
| FMU | Flexible Mixed-Use |
| HASP | Health and Safety Plan |
| IC | Institutional Control |

| Acronym | Definition |
|---|---|
| INC | Incorporated |
| LLC | Limited Liability Company |
| MDL | Method Detection Limit |
| mg/kg | Milligrams per Kilogram |
| mg/l | Milligrams per liter |
| MTBE | Methyl Tert-butyl Ether |
| NYCRR | New York Codes, Rules and Regulations |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| O-EP | Environmental Protection Overlay District |
| PAHs | Polycyclic Aromatic Hydrocarbons |
| PBS | Petroleum Bulk Storage |
| PCBs | Polychlorinated Biphenyls |
| PDI | Pre-Design Investigation |
| PFAS | Per- and Polyfluoroalkyl Substances |
| PGSCO | Protection of Groundwater Soil Cleanup Objectives |
| PID | Photo Ionization Detector |
| PPE | Personal Protective Equipment |
| QAPP | Quality Assurance Project Plan |
| RAOs | Remedial Action Objectives |
| RAP | Remedial Action Plan |
| RAWP | Remedial Action Work Plan |
| RI | Remedial Investigation |
| RIR | Remedial Investigation Report |
| RIWP | Remedial Investigation Work Plan |
| QA | Quality Assurance |
| QC | Quality Control |
| QEP | Qualified Environmental Professional |

| Acronym | Definition |
|---|---|
| QHHEA | Qualitative Human Health Exposure Assessment |
| SCGs | Standards, Criteria and Guidance |
| SCO | Soil Cleanup Objective |
| SMP | Site Management Plan |
| SOE | Support of Excavation |
| SoMP | Soil/Materials Management Plan |
| SSO | Site Safety Officer |
| SVOCs | Semi-volatile Organic Compounds |
| SWPPP | Stormwater Pollution Prevention Plan |
| TAL | Target Analyte List |
| TCE | Trichloroethylene |
| TCL | Target Compound List |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TICs | Tentatively Identified Compounds |
| TOC | Top of Casing |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Society |
| UST | Underground Storage Tank |
| VOCs | Volatile Organic Compounds |
| ZAP | Zoning Alignment Project |

# Executive Summary

Roux Associates Inc. and Roux Environmental Engineering and Geology D.P.C. (collectively referred to as "Roux"), on behalf of 10 Flint Street LLC (referred to herein as 10 Flint) and the City of Rochester (referred to herein as City) has prepared the following Remedial Action Work Plan (RAWP, or Report) for a portion of the former Vacuum Oil Refinery Site (the "Site") BCP Site Number C828190. Both 10 Flint and the City are Volunteer applicants for BCP Site Number C828190. 10 Flint and City will be known as the Remedial Party. The Site is located on approximately 15.4-acres of City owned land, in the City of Rochester, New York. The City owned parcels include: 13, 31, 49 (formally part of 13), 69, and 75 Cottage Street, portions of 1 Cottage Street; 100 Riverview Place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) (**Figure 1**). The boundaries of the Site parcels are shown on **Figure 2**.

The Site was accepted in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) per Title 6 New York State Official Compilation of Codes, Rules, and Regulations (NYCRR) Part 375-3.4 (NYSDEC 2006) on April 6, 2015, as Site Number C828190. A BCA Amendment application was submitted to NYSDEC on March 11, 2025, requesting that 10 Flint be added as a Volunteer to the BCA. Per agreement between 10 Flint and the City, 10 Flint will be the entity undertaking the remedial activities at the Site; however, the City (or its agents) will have the opportunity to review and comment on work plans and reports regarding the remediation of the Site. Notwithstanding this agreement, both 10 Flint and the City will be responsible for maintaining compliance with the BCA, Department regulations, and guidance.

The NYSDEC Decision Document dated September 2023 (Decision Document) describes the NYSDEC-approved remedy for the Site that was selected in the Remedial Alternative Analysis Report, prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll) and submitted to NYSDEC in June 2023 (RAAR). The selected remedy is a Track 4: Restricted use with site-specific soil cleanup objectives remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria, and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements.

## Site Description/Physical Setting

A Site Location Map is included as **Figure 1**. **Figure** 2 presents the parcels that make up the Site.

| Site Location | |
|---|---|
| BCP Site Name: | Portion of the Former Vacuum Oil Refinery Site |
| Site Parcel Addresses: | 13, 31, 49, 69, and 75 Cottage Street, portions of 1 Cottage Street; 100 Riverview Place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street |
| Site Town, County, State: | Rochester, Monroe County, New York |
| Site Topographic Quadrangle: | USGS-Rochester East, New York |
| Nearest Intersection: | South Plymouth Avenue to the northwest |

| Site Location | |
|---|---|
| Surrounding Area Description: | The Site is bordered by the Genesee River and adjacent West River Wall to the east/southeast/south beyond a narrow strip of New York State-owned land, residential property to the west, vacant land (formerly a junkyard addressed as 15 Flint Street) to the northwest, and Flint Street with commercial land to the north across Flint Street. Property addressed as 5 Flint Street, containing a single, vacant three-story building (associated with the former Vacuum Oil Refinery) is also located near the north end of the Site. Although the 5 Flint Street parcel is located on the northern side of the Site, the Site also wraps around 5 Flint Street in a "U" shape. |

| Site Parcels Tax Identification: | | | |
|---|---|---|---|
| **Address** | **Section** | **Block** | **Lot** |
| 1 Cottage Street (a portion of) | 136 | 21-01-001 | -- |
| 10 Flint Street (a portion of) | 121 | 77-01-086 | 001 |
| 13 Cottage Street | 136 | 21-01-003 | 001 |
| 31 Cottage Street | 136 | 21-01-004 | -- |
| 49 Cottage Street | 136 | 21-01-003 | 002 |
| 69 Cottage Street | 135 | 28-02-045 | -- |
| 75 Cottage Street | 135 | 28-02-044 | -- |
| 100 Riverview Place | 136 | 21-01-002 | -- |
| 102 Violetta Street (a portion of) | 121 | 70-01-039 | 001 |
| 1320 S. Plymouth Avenue (a portion of) | 135 | 28-02-063 | -- |

| Site Information | |
|---|---|
| Site Size: | 15.4 acres |
| Site Shape: | Polygon |
| Site Property Use: | An asphalt-paved bike/pedestrian path runs from the north end of the 102 Violetta Street and 100 Riverview Place properties to the southwest end of the 1320 S Plymouth Avenue property and beyond in both directions. The path runs along the former Erie Railroad corridor. An approximate 1.2-acre grass-covered area is located on the eastern boundary of the Site, along the Genesee River. The remaining areas of the Site are undeveloped (except for the items mentioned above) and consist of vacant and undeveloped wooded and vegetative areas. |

## Summary of Proposed Redevelopment Plan

Although the redevelopment plan for the Site is not finalized, it is anticipated that when redevelopment is completed, the redevelopment plan will be consistent with the City master development plan for the Vacuum Oil Brownfield Opportunity Area (BOA). The BOA redevelopment plan includes multi-family residential, commercial/retail, and industrial facilities through a phased implementation. Although current zoning is R- 1 for low density residential, as part of the City's Zoning Alignment Project (ZAP), the zoning in the area will be rezoned to FMU (flexible mixed-use) once the ZAP is complete. In addition, the City will be imposing the Environmental Protection Overlay District (O-EP) in the area so that future development will be limited to restricted residential requirements.

## Summary of Environmental Findings

The Site was investigated in accordance with the scope of work presented in the NYSDEC conditionally approved (November 19, 2015) Remedial Investigation Work Plan (RIWP) dated October 2015, prepared by O'Brien & Gere Engineers, Inc. (OBG), now part of Ramboll, and various historical investigation and data collection efforts conducted in 1999-2001, 2008, 2008-2009 and 2012. The Remedial Investigation (RI) was conducted between 2015 and 2018. The November 2019 Remedial Investigation Report (RI Report), prepared by OBG, summarizes findings of the RI and was approved with the issuance of the Site's Decision Document September 2023. The purpose of the RI was to determine the nature and extent of contamination at the Site, characterize environmental media, qualitatively assess the potential exposure of receptors to Site contaminants, and develop any other additional data necessary to support the development of a RAWP. Soil, groundwater, and soil vapor analytical data collected during previous Site investigations were also evaluated during the RIWP preparation and RI implementation. Further details regarding the previous Site investigations are summarized in OBG's report titled Phase 1 Environmental Site Assessment Report, 1, 13, 31, 69, and 75 Cottage Street, 100 Riverview Place, 102 Violetta Street, and 1315 S. Plymouth Avenue, Rochester, New York, dated December 2012 (OBG 2012).

The following is a summary of the geological and hydrogeological findings, the soil and groundwater data generated during the RI and previous Site investigations. The NYSDEC and NYSDOH have determined that the Site does not pose a significant threat to human health and the environment.

### Local Geology and Stratigraphy

The overburden at the Site consists of both native and fill materials. Fill consisting of predominantly fine sand and silt mixed with various amounts of cinders, brick, concrete, glass, and wood was encountered in many locations across the Site. In several locations, a black granular material (i.e., bone black) was also encountered. Native soils underlying the fill consist of fine sand and silt which are alluvial in origin.

According to information provided in the RAAR, bedrock was generally encountered at approximately 10 feet (ft) to 25 ft below ground surface (bgs), with an average depth of 19.5 ft bgs and a maximum depth of 61 ft bgs. Bedrock quality encountered ranged from massive/slightly fractured to highly fractured; observed fractures were also lightly weathered to moderately weathered. Stratigraphically, the bedrock units in the Site area as described in Brett et al. (1995) include the middle Silurian Lockport Group underlined by the Clinton Group. The Lockport Group is subdivided into the Eramosa Dolomite Formation and Penfield Formation.

### Site Hydrogeologic Setting

According to Section 2.3.2 of the RAAR, depth to the water table at the Site ranges from 3 to 4 ft bgs on the west side of the Site within the former canal to 10 to 12 ft bgs in wells on the eastern boundary adjacent to the river. Section 2.3.2 of the RAAR further states "Groundwater flow direction and elevations suggest that the groundwater is fed by the river water on the south end of the site and flows northward. On the northern side of the Site the gradient is relatively flat and more than 5 ft lower than the river level. The groundwater elevations in overburden wells at or near the river are also more than 5 ft lower than the river level. This large difference suggests that there is some limitation in the hydraulic connection between the river and the overburden groundwater in this area of the site. As discussed in the RI Report, the existing segment of the western Genesee River concrete wall (also referred to herein as the West River Wall [WRW]) that borders the Site extends to bedrock and is limiting the hydraulic connection between the Site groundwater and the river.

As stated in the Decision Document, groundwater data and flow direction does not indicate a potential for off-site impacts in groundwater. Groundwater contour maps from the RI Report are included in Appendix C.

## Soil, Groundwater, and Soil Vapor Quality

### Surface Soil and Surface Cover

Surface soil (0-2 inch) and surface cover (0-2 feet) were evaluated together to identify potential direct exposure risks at the Site. Based on a comparison to applicable Site soil cleanup objectives (SCOs), Site-related contaminants of concern (COCs) in surface soil and surface cover were limited to semi-volatile organic compounds (SVOCs) and metals (arsenic and mercury). While less prevalent, polychlorinated biphenyls (PCBs), copper, lead, barium, and cadmium were also detected above Restricted Residential Soil Cleanup Objectives (RRSCOs) in some samples and are also considered COCs. Volatile organic compounds (VOCs) were not identified above RRSCOs in surface soil or surface cover samples. SVOCs and metals were the constituents identified most frequently above RRSCOs in surface soil or surface cover samples. Results of surface soil or surface cover sampling indicate:

- SVOCs, specifically, one or more of the polycyclic aromatic hydrocarbon (PAH) compounds (anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were identified above RRSCOs. The majority of surface soil and surface cover samples exceeding RRSCOs for SVOCs were located on the 13 Cottage Street parcel, the former canal area of the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) parcel, and the 102 Violetta Street parcel near the bike path. Four locations (SS-112, SS-142, SS-141, and SS-147) on the 13 and 49 Cottage Street parcels contained total SVOCs greater than 100 ppm. There was evidence of on-Site dumping including parts cleaner, metal shavings debris, and concrete/brick debris in the vicinity of some of these sample locations.
- Arsenic was observed above RRSCOs in approximately half of the surface soil and surface cover samples analyzed, although the maximum concentration was much less than that observed in subsurface soil samples. The predominant locations of surface soil and surface cover samples where arsenic was present above Restricted- Residential SCOs are on the southern portion of the Site (south of the adjoining 5 Flint Street parcel). Mercury was detected above the RRSCOs in five samples.
- Surface soil and surface cover samples were screened using a photoionization detector (PID), and field observations including the presence of odors, staining, and discoloration were recorded. Sheens, staining, and/or petroleum-type odors were not encountered during surface soil and surface cover sampling.

### Subsurface Soil

Similar to surface soil and surface cover samples, SVOCs and metals were identified most frequently above applicable Site SCOs in subsurface soil. Results of subsurface soil sampling indicate:

- SVOCs detected in subsurface soil samples above RRSCOs, and Protection of Groundwater Soil Cleanup Objectives (PGSCOs) were PAH compounds (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene). The locations with the highest concentrations of total SVOCs are near the center of the Site on the 13 Cottage Street parcel and the 10 Flint Street parcel.
- Arsenic was identified above RRSCOs and PGSCOs in 27 of the 123 locations analyzed for metals. Samples containing arsenic were located south of the adjoining 5 Flint Street Parcel on both the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) and the 13 and 49 Cottage Street parcels. Three of the samples containing the highest concentrations of arsenic were located in the northern end of the former canal on the 10 Flint Street parcel near Flint Street.

- VOCs were detected above PGSCOs at one sample location, OVR-117 (7-7.6 ft bgs), located on the 13 Cottage Street parcel. Subsurface soil samples were screened using a PID for indications of potential VOCs, and field observations including the presence of odors, staining, and discoloration were recorded. The sheens, staining, and odors generally correlate to the areas also observed to have the highest PID readings, on the northern side of the Site in the former canal on 10 Flint Street, on the east and west sides of the adjoining 5 Flint Street parcel, and the 13 Cottage Street parcel, south of the adjoining 5 Flint Street parcel. Fill and waste materials including observations of fragmented bricks, cinders, coal ash, slag, and black granular material (bone black) were also noted in many of these locations.

### Groundwater

Analytical results for groundwater were compared to Class GA Standards and Guidance Values (SGVs) provided in NYSDEC's Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (SGVs; NYSDEC 1998). Results of groundwater sampling indicate:

- Groundwater samples obtained during the RI identified VOCs and SVOCs (primarily PAHs) exceeding Class GA SGVs. VOCs detected in the groundwater include petroleum- related VOCs, chlorinated VOCs, and ketone compounds. Petroleum-related VOCs and chlorinated VOCs were present in wells bordering the 5 Flint Street parcel. SVOCs were detected in the groundwater above Class GA SGVs in three overburden wells located on the north end of the 10 Flint Street parcel and the 13 Cottage Street parcel.
- As previously discussed, although iron, manganese, magnesium, and sodium were detected above Class GA SGVs, these constituents are considered to be naturally occurring and not related to historic site operations. Arsenic was detected in the groundwater above Class GA SGVs in seven overburden wells located on the north end of the 10 Flint Street parcel between the adjoining 5 Flint Street and 15 Flint Street parcels and the 102 Violetta Street parcel, east of the adjoining 5 Flint Street parcel.

### Soil Vapor

As discussed in the RI Report, soil vapor samples collected during the RI were located along the perimeter of the Site to assess the potential for off-site migration of soil vapor in the direction of adjoining western residential properties and to evaluate the potential for vapor intrusion. Results of soil vapor sampling indicate:

- Petroleum related VOCs and CVOCs are present in soil vapor at the Site, consistent with contaminants found in soil (petroleum VOCs/SVOCs) and groundwater (petroleum VOCs/SVOCs and CVOCs) at the Site. However, as discussed in the RI Report, the concentrations were low and do not suggest off-Site migration. In addition, the low concentrations of constituents detected in soil vapor suggest the probability for vapor intrusion into existing off-Site buildings is low. Constituents in nearby soil and groundwater samples were generally non-detect. Although there are low concentrations of VOCs identified in some of the groundwater samples collected from lower elevations, the limited constituents detected and the relative horizontal and vertical distance from the soil vapor sample locations suggests that these detections are not related to those identified in the soil vapor.

## Qualitative Human Health Exposure Assessment

Potential exposure pathways associated with human receptor scenarios at the Site include:

- Current/future adolescent and adult recreators and trespassers that may be exposed to COCs in Site surface soils through incidental ingestion, dermal contact, and inhalation of fugitive dust.
- Current/future utility workers that may be exposed to COCs in Site surface and subsurface soils through incidental ingestion, dermal contact, and inhalation of fugitive dust, and to COCs in Site groundwater through inhalation of groundwater-derived ambient vapors, incidental ingestion, or dermal contact.

- Future construction workers that may be exposed to COCs in Site surface and subsurface soils through incidental ingestion, dermal contact, and inhalation of fugitive dust, and to COCs in Site groundwater through inhalation of groundwater-derived ambient vapors, incidental ingestion, or dermal contact.
- Future commercial/industrial workers that may be exposed to COCs in Site surface soils through incidental ingestion, dermal contact, or inhalation of fugitive dust.
- Current/future commercial/industrial workers that may be exposed to COCs in indoor air through inhalation of soil and/or groundwater-derived vapors.
- Future residents that may be exposed to COCs in Site surface soils through incidental ingestion, dermal contact, inhalation of fugitive dust, and to COCs in indoor air through inhalation of soil and/or groundwater-derived vapors.

Future human health exposure scenarios would be mitigated through institutional and engineering controls.

## Summary of Selected Remedial Actions

The September 2023 Decision Document describes the NYSDEC-approved remedy for the Site. The selected remedy (RAAR Alternative 2) is a Track 4: Restricted use with site-specific soil cleanup objectives remedy. The elements of the selected remedy for the Site, as presented in the Decision Document, are summarized below.

1. Remedial Design:

   A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

   - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
   - Reducing direct and indirect greenhouse gases and other emissions;
   - Increasing energy efficiency and minimizing use of non-renewable energy;
   - Conserving and efficiently managing resources and materials;
   - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
   - Maximizing habitat value and creating habitat when possible;
   - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
   - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
   - Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial design program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA

(Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWise(TM) (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial design program, as appropriate. The project design specifications will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial design program.

Additionally, the remedial design program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial design program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. Excavation:

   Excavation and off-site disposal of contaminant source areas, including:

   - grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
   - concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1);
   - non-aqueous phase liquids;
   - soil with visual waste material or non-aqueous phase liquid;
   - soil containing total SVOCs exceeding 500 ppm;
   - soils which exceed the protection of groundwater soil cleanup objectives (PGSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and
   - soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Excavation and removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination.

Collection and analysis of confirmation samples at the remedial excavation depth will be used to verify that the above excavation goals have been achieved. If confirmation sampling indicates that these goals were not achieved at the stated remedial depth, the Applicant must notify DEC, submit the sample results and in consultation with DEC, determine if further remedial excavation is necessary. Further excavation for development will proceed after confirmation samples demonstrate that the above excavation goals have been achieved.

To ensure proper handling and disposal of excavated material, waste characterization sampling will be completed for all identified contaminated site material. Waste characterization sampling will be performed exclusively for the purposes of off-site disposal in a manner suitable to receiving facilities and in conformance with applicable federal, state, and local laws, rules, and regulations and facility-specific permits.

3. Backfill:

   - On-site soil which does not exceed the above excavation may be used below the cover system to backfill the excavation to the extent that a sufficient volume of on-site soil is available and to establish the designed grades at the site.
   - On-site soil which does not exceed the above excavation criteria or the PGSCOs for any constituent may be used anywhere beneath the cover system, including below the water table, to backfill the excavation or re-grade the site.
   - Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and to complete the backfilling of the excavation and establish the designed grades at the site.
   - The site will be re-graded to accommodate installation of a cover system.

4. Cover System:

   A site cover will be required in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for future restricted residential use of the site. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

5. Engineering and Institutional Controls

   Imposition of an institutional control in the form of an Environmental Easement and a Site Management Plan, as described below, will be required. The remedy will achieve a Track 4 restricted residential cleanup at a minimum.

   Institutional Control

   Imposition of an institutional control in the form of an Environmental Easement for the controlled property which will:

   - require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
   - allow the use and development of the controlled property for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
   - restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or the Monroe County Health Department; and
   - require compliance with the Department approved Site Management Plan.

6. Site Management Plan

   A Site Management Plan is required, which includes the following:

   A. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in remedy element 5 above.

Engineering Controls: The cover system discussed in remedy element 4.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the Department. Based on the investigation results and the Department determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment.
- a provision should redevelopment occur to ensure no soil exceeding protection of groundwater concentrations will remain below storm water retention basin or infiltration structures.
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any occupied buildings on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- a provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in remedy element 4 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

B. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- Monitoring of groundwater to assess the performance and effectiveness of the remedy.
- A schedule of monitoring and frequency of submittals to the Department.
- Monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

# 1.0 INTRODUCTION

Roux Associates Inc. and Roux Environmental Engineering and Geology D.P.C. (collectively referred to as "Roux"), on behalf of 10 Flint Street LLC (referred to herein as 10 Flint) and the City of Rochester (referred to herein as City) has prepared the following Remedial Action Work Plan (RAWP, or Report) for a portion of the former Vacuum Oil Refinery Site (the "Site") BCP Site Number C828190. Both 10 Flint and the City are Volunteer applicants for BCP Site Number C828190. 10 Flint and City will be known as the Remedial Party. The Site is located on approximately 15.4-acres of City owned land, in the City of Rochester, New York. The City owned parcels include: 13, 31, 49 (formally part of 13), 69, and 75 Cottage Street, portions of 1 Cottage Street; 100 Riverview Place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) (**Figure 1**). The boundaries of the Site parcels are shown on **Figure 2**.

The Site was accepted in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) per Title 6 New York State Official Compilation of Codes, Rules, and Regulations (NYCRR) Part 375-3.4 (NYSDEC 2006) on April 6, 2015, as Site Number C828190. A BCA Amendment application was submitted to NYSDEC on March 11, 2025, requesting that 10 Flint be added as a Volunteer to the BCA. Per agreement between 10 Flint and the City, 10 Flint will be the entity undertaking the remedial activities at the Site; however, the City (or its agents) will have the opportunity to review and comment on work plans and reports regarding the remediation of the Site. Notwithstanding this agreement, both 10 Flint and the City will be responsible for maintaining compliance with the BCA, Department regulations, and guidance.

This RAWP summarizes the nature and extent of contamination as determined from historical investigation and data collection efforts since the 1990's, but primarily the Remedial Investigation (RI) Activities conducted between 2015 and 2018. Various environmental investigations performed by ExxonMobil, the NYSDEC, and the City have taken place at the Site in 1999-2001, 2008, 2008-2009 and 2012, including RI activities conducted between 2015 and 2018. A summary of previous investigations completed at the Site is presented in the RI Report, prepared by O'Brien & Gere Engineers, Inc. (OBG), dated November 2019 (RI Report). This RAWP also provides a summary of the Remedial Alternative Analysis Report, prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll) and submitted to NYSDEC in June 2023 (RAAR), and the NYSDEC Decision Document dated September 2023 (Decision Document), which describes the NYSDEC-approved remedy for the Site.

The remedy described in this document is consistent with the procedures defined in DER-10, DER-31, and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements as well as the Site's Decision Document dated September 2023. As discussed in **Section 2.2** below, the NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does not pose a significant threat to human health and the environment. As discussed in **Section 2.6.2** below, the RI for this Site did identify fish and wildlife resources. Per DER-10 Section 3.10, a Fish and Wildlife Resources Impact Analysis (FWRIA) has been performed and can be found in Appendix S of the *RI Report* for the Site. As discussed in Section 2.6.2, this RAWP includes appropriate measures for delineating and protecting the identified resources and for monitoring construction related impacts consistent with DER-10 FWRIA Part 3. These resources are identified on remedial drawings. The NYSDEC Division of Fish and Wildlife and/or Division of Marine Resources and the NYS Natural Heritage Program have been contacted, as defined in DER-10, and

necessary measures and methods for the delineation and protection of the identified resources or habitats have been taken and applicable resource related permits have been obtained, as listed in **Table 1** and discussed below. All substantive technical requirements for applicable resource related permits (e.g., 6 NYCRR Parts 608, 661, 663) will be met.

A formal Remedial Design document will not be prepared.

## 1.1 Site Location and Description

The Site is located in the County of Monroe, City of Rochester, New York and encompasses 15.4-acres, comprised of 10 City owned parcels including, 13, 31, 49 (formally part of 13), 69, and 75 Cottage Street, portions of 1 Cottage Street; 100 Riverview Place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) (**Figure 2**). These 10 City owned parcels are identified on the Rochester Tax Map as:

| Address | Section | Block | Lot |
|---|---|---|---|
| 1 Cottage Street (a portion of) | 136 | 21- | -- |
| 10 Flint Street (a portion of) | 121 | 77- | 001 |
| 13 Cottage Street | 136 | 21- | 001 |
| 31 Cottage Street | 136 | 21- | -- |
| 49 Cottage Street | 136 | 21- | 002 |
| 69 Cottage Street | 135 | 28- | -- |
| 75 Cottage Street | 135 | 28- | -- |
| 100 Riverview Place | 136 | 21- | -- |
| 102 Violetta Street (a portion of) | 121 | 70- | 001 |
| 1320 S. Plymouth Avenue (a portion of) | 135 | 28- | -- |

Tax and Surrounding Properties Map is provided as **Figure 3**. As shown on **Figure 3**, the Site is currently zoned R-1 Low Density Residential, while surrounding properties are currently zoned as R-1 Low Density Residential, R-3 High Density Residential, and M-1 Industrial. Although current zoning is R-1 for low density residential, as part of the City's Zoning Alignment Project (ZAP), the zoning in the area will be rezoned to FMU (flexible mixed-use) once the ZAP is complete. In addition, the City will be imposing the Environmental Protection Overlay District (O-EP) in the area so that future development will be limited to restricted-residential requirements, consistent with 6 NYCRR Part 375-1.8(g). When completed, anticipated future use of the Site is for multi-family restricted residential mixed use, consistent with surrounding property use and the master development plan for the Vacuum Oil Brownfield Opportunity Area (BOA).[1] Refer to the Brownfield Cleanup Program (BCP) application for additional details for anticipated redevelopment of the Site.

**Figure 2** presents the current Site features and configuration. As shown, an asphalt-paved bike/pedestrian path runs from the north end of the 102 Violetta Street and 100 Riverview Place properties to the southwest end of the 1320 S Plymouth Avenue property and beyond in both directions. The path runs along the former Erie Railroad corridor. An approximate 1.2-acre grass-covered area is located on the eastern boundary of the Site, along the Genesee River. The remaining areas of the Site are undeveloped (except for the items mentioned above) and consist of vacant and undeveloped wooded and vegetative areas.

[1] City Vacuum Oil - South Genesee River Corridor Brownfield Opportunity Area (BOA). Additional information on this BOA can be found online: https://www.cityofrochester.gov/VacuumOilBOA/

The Site is generally located adjacent to a steep uphill topographic gradient to the west, with surface water runoff generally draining to on-Site wetlands and drainage ditches. These low-lying areas are generally isolated; however, portions are connected to each other and to the Genesee River via an unnamed tributary (drainage ditch).[2] This tributary begins at a culvert outflow on the 102 Violetta Street portion of the Site and flows towards the southwest to the Genesee River. Portions of the Site are also situated within the Genesee River Federal Emergency Management Agency (FEMA) 100-year Floodplain. As discussed in **Section 1.3**, the Site is bordered by the Genesee River and adjacent western Genesee River concrete wall (also referred to herein as the West River Wall [WRW]). Details regarding the influence of the WRW on groundwater flow in the Site area are discussed in **Section 2.4.2**.

Four federal jurisdictional wetlands areas have been identified on the Site. These wetlands are identified within the *Final Wetland Assessment and Delineation, Ecological Screening & Invasive Species Report* (Shumaker 2017) and updated in the *US Army Corps of Engineers (USACE) – Buffalo District NYSDEC – Region 8 Joint Permit Application*, prepared by Bergmann for the City of Rochester Vacuum Oil BOA & IRM Project (Bergmann 2022). As shown on **Figure 2**, three of these four wetlands (located on 10 Flint Street, 102 Violetta Street and 100 Riverview place) are located within excavation areas or areas requiring the placement of a soil cover (or other Department approved substitution materials) as part of the Site-wide cover system for the NYSDEC approved Site remedy. The USACE issued a Nationwide Permit (# LRB-2010-01497) to the City on November 3, 2023, requiring the City to purchase wetland credits as compensatory mitigation for the permanent and unavoidable loss of these three federal jurisdictional wetlands (totaling 0.44 acres). A portion of the fourth wetland area is located within a portion of the 31 Cottage Street parcel where existing soil in the top two feet meets Restricted-Residential SCOs and would be considered the Site-wide cover system in this area (as outlined in Section 4.2.2 below). The City obtained the wetland mitigation credits through the Ducks Unlimited In-Lieu Fee Mitigation Program, as documented in the April 16, 2024 Credit Sale Letter verifying acceptance of full payment for the appropriate credits (**Appendix A**).

According to the FWRIA, the Site is located in an urban setting and is not a significant habitat for terrestrial wildlife. Due primarily to the surrounding residential, commercial, industrial, institutional and utility right-of-way land uses, the Site is not part of a larger corridor that is linked to other significant wildlife habitats. However, the Site likely offers a refuge to transient wildlife (primarily birds) as they migrate along the Genesee River corridor and utilize the forested Site areas. The ecological receptors present within the FWRIA study area include floral and faunal terrestrial species that inhabit, forage, or otherwise require a mix of forested and open habitats for their life requirements. Terrestrial plants, soil invertebrates, some herptiles (frogs, turtles, snakes), and mammals are documented within the FWRIA study area from prior investigations and were observed during RI field activities. Additionally, transient birds such as songbirds, buteos (*e.g.*, hawks), herons and some shorebird species may utilize the Site. The Site is primarily covered by low-lying vegetation and mature trees, in addition to one vacant building. According to the US Fish and Wildlife Service (USFWS), the Northern Long-eared Bat is the only federally listed threatened[3] or endangered mammal listed as potentially present in forested communities (e.g., floodplain forest and successional northern hardwoods) within the Site area. Additional details on the FWRIA developed for the Site are included in **Section 2.6.2**.

[2] The unnamed tributary is identified as an ephemeral channel (drainage ditch) in the *Final Wetland Assessment and Delineation, Ecological Screening & Invasive Species Report*, prepared by Shumaker Consulting Engineering & Land Surveying, D.P.C., dated June 2017, which is provided as Exhibit D in the *RI Report* (OBG 2019).

[3] Threatened; A species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

A boundary map is attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. A full metes and bounds survey will be included in the FER and the SMP and will include a global positioning system coordinate for the starting point.

## 1.2 Contemplated Redevelopment Plan

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the selected remedy for the Site. The contemplated future use of the Site will be in accordance zoning and Site use restrictions as detailed in the Site's environmental easement. The Remedial Action completed under this RAWP will be implemented independent of the proposed future redevelopment plan. Any redevelopment of the Site will not interfere with, or prohibit, the implementation of the Site's selected remedy and will not occur until the remedial actions are completed to the satisfaction of NYSDEC and NYSDOH. A 60-day Change of Use notification presenting details associated with the redevelopment of the Site will be submitted to the Department prior to any redevelopment.

Although the redevelopment plan for the Site is not finalized, it is anticipated that when redevelopment is completed, the redevelopment plan will be consistent with the City master development plan for the Vacuum Oil BOA, the Site's environmental easement use restrictions, and City zoning. The BOA redevelopment plan includes multi-family residential, commercial/retail, and industrial facilities through a phased implementation. Future use also consists of rezoning a portion of parkland to Open Space as proposed via a NYS Assembly Bill Change in Use for approximately 5.27 acres to become dedicated parkland, a portion of which intersects with the Site. A proposed Site plan, depicting contemplated parkland and future development parcels, is provided in Appendix A of the RAAR for the Site.

## 1.3 Description of Surrounding Property

The Site is bordered by the Genesee River and adjacent West River Wall to the east/southeast/south beyond a narrow strip of New York State-owned land, residential property to the west, vacant land to the northwest, and Flint Street with commercial land to the north across Flint Street.. Property addressed as 5 Flint Street, containing a single, vacant three-story building (associated with the former Vacuum Oil Refinery) is also located near the north end of the Site. Although the 5 Flint Street parcel is located on the northern side of the Site, the Site also wraps around 5 Flint Street in a "U" shape.

The remainder of this RAWP document is divided into the following sections:

- **Section 2 –** Describes the previous remedial investigation field work activities conducted at the Site; Site history; the Conceptual Site Model of Site contamination; environmental and public health assessments; and remedial action objections (RAOs) of the Site;
- **Section 3 –** Describes the Remedial Action plan, including a summary of the RAAR and the Decision Document, which describe the NYSDEC-approved remedy for the Site;
- **Section 4 –** Provides a discussion of the Remedial Action Implementation at the Site; including the soil cleanup objectives, the pre-design investigation (PDI) sampling plan, and the soil/ materials management plan;
- **Section 5 –** Describes the Remedial Action program for the Site;
- **Section 6 –** Provides a description of the residual contamination to remain on Site;
- **Section 7 –** Provides a discussion engineering controls that will be implemented at the Site;

- **Section 8 –** Provides the criteria for completion of remediation and termination of remediation systems including the Site cover system and vapor intrusion mitigation systems;
- **Section 9 –** Provides a discussion of the institutional controls required at the site under the selected remedy including an environmental easement and a Site Management Plan (SMP);
- **Section 10 –** Provides a description of the Final Engineering Report (FER) that will be prepared once the work is completed; and
- **Section 11 –** Provides a description of the reporting schedule and structure.

# 2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC conditionally-approved (November 19, 2015) Remedial Investigation Work Plan (RIWP) dated October 2015, prepared by OBG, part of Ramboll (OBG), and various historical investigation and data collection efforts conducted in 1999-2001, 2008, 2008-2009 and 2012. The RI was conducted between 2015 and 2018. The RI Report was submitted to NYSDEC in November 2019 and approved by NYSDEC on September 2023 with the issuance of the Decision Document.

## 2.1 Summary of BCP and Historical Remedial Investigations Performed

The Site has been the subject of historical investigation and data collection efforts since the 1990's. Various environmental investigations performed by ExxonMobil, the NYSDEC, and the City have taken place at the Site including the following:

Historical Investigations:

- Site Investigation Activities – 1999-2001
- Field Investigation Activities – 2008
- Subsurface Investigation – 2008-2009
- Phase I Environmental Site Assessment (ESA) Activities – 2012

Brownfield Cleanup Program Investigation:

- Remedial Investigation (RI) Activities – 2015-2018

A summary and findings of previous investigations completed at the Site is presented in the RI Report. Further details regarding the previous Site investigations are summarized in OBG's report titled *Phase 1 Environmental Site Assessment Report, 1, 13, 31, 69, and 75 Cottage Street, 100 Riverview Place, 102 Violetta Street, and 1315 S. Plymouth Avenue, Rochester, New York,* dated December 2012 (OBG 2012).

## 2.2 Significant Threat

The NYSDEC and NYSDOH have determined based on the environmental data collected to date that this Site does not pose a significant threat to human health and the environment. Notice of that determination has been provided for public review. A copy of the notice is included in **Appendix B**.

## 2.3 Site History

The Site was historically operated as part of a petroleum refinery, blending, and bulk oil storage facility from approximately 1866 to approximately 1930 that encompassed approximately 40-acres with a footprint spanning both north and south of Flint Street. The Vacuum Oil Company Refinery operated the petroleum refinery, blending operations, and bulk storage at portions of the Site (including several adjoining properties) from approximately 1866 to around the early 1890s. From the early 1890s until its closure in 1935, the Site operated as a blending facility. While most of the above-grade structures have been demolished and removed, some remnants of former structures remain. Since the time of refinery closure, the Site has remained vacant.

Crude oil, kerosene, naphtha, finished lubricants, and containers for these products (*e.g.*, wooden barrels, tin cans, and drums) were manufactured and stored on-Site. Operations and facilities that formerly occupied the Site include canal beds, rail yard, barrel manufacturing and storage, and underground facilities that previously serviced manufacturing operations (e.g., utilities, sewers, and piping). The former canal was in operation from approximately 1840 to 1877. In approximately 1878, the canal was drained and was converted to a railbed. The railroad line was decommissioned in approximately 1971. Two former railroad lines ran through the Site, including the Erie Railroad located along the former canal approximately 200 feet (ft) to 400 ft northwest of the Genesee River and the Pennsylvania Railroad located approximately 100 ft northwest of the Genesee River. An overview of historic Vacuum Oil Refinery features within current Site features/area are presented on **Figure 4**.

## 2.4 Geologic and Hydrogeologic Conditions

The following sections provide a description of the geological and hydrogeological findings at the Site based on information provided in RI Report and RAAR for the Site.

### 2.4.1 Site Geology

The overburden at the Site consists of both native and fill materials. Fill consisting of predominantly fine sand and silt mixed with various amounts of cinders, brick, concrete, glass, and wood was encountered in many locations across the Site. In several locations, a black granular material (i.e., bone black) was also encountered. Native soils underlying the fill consist of fine sand and silt which are alluvial in origin.

According to Section 2.3.1 of the RAAR “Bedrock was generally encountered at approximately 10 feet (ft) to 25 ft below ground surface (bgs), with an average depth of 19.5 ft bgs and a maximum depth of 61 ft bgs. Bedrock quality encountered ranged from massive/slightly fractured to highly fractured; observed fractures were also lightly weathered to moderately weathered.” Stratigraphically the bedrock units in the Site area as described in Brett *et al*. (1995) include the middle Silurian Lockport Group underlined by the Clinton Group. The Lockport Group is subdivided into the Eramosa Dolomite (Formation) and Penfield Formation.

### 2.4.2 Site Hydrogeologic Setting

According to Section 2.3.2 of the RAAR, depth to the water table at the Site ranges from 3 to 4 ft bgs on the west side of the Site within the former canal to 10 to 12 ft bgs in wells on the eastern boundary adjacent to the river.

Section 2.3.2 of the RAAR further states “Groundwater flow direction and elevations suggest that the groundwater is fed by the river water on the south end of the site and flows northward. On the northern side of the Site the gradient is relatively flat and more than 5 ft lower than the river level. The groundwater elevations in overburden wells at or near the river are also more than 5 ft lower than the river level. This large difference suggests that there is some limitation in the hydraulic connection between the river and the overburden groundwater in this area of the site. As discussed in the RI Report, the existing segment of the WRW that borders the Site extends to bedrock and is limiting the hydraulic connection between the Site groundwater and the river. As stated in the Decision Document, groundwater data and flow direction does not indicate a potential for off-site impacts in groundwater. Groundwater contour maps for the Site from the RI Report are included in Appendix C.

The City is currently designing modifications to the WRW of the Genesee River, bordering the eastern boundary of the facility footprint, as part of a rehabilitation program. These modifications will result in lowering the top of the wall to allow for river water to enter the western portion of the facility footprint. According to Appendix B of the *RAAR*, "it is concluded that the WRW modifications will not result in changes to the groundwater flow or the nature and extent of impacts at the Site". Groundwater flow maps for the Site are provided in the RI Report.

## 2.5 Contamination Conditions

The following sections describe the nature and extent of contamination in soil, groundwater, and soil vapor observed at the Site during RI activities at the Site. Further information regarding contaminants of concern (COCs) for the Site is provided below.

### 2.5.1 Conceptual Model of Site Contamination

A Conceptual Site Model (CSM) for the Site was developed in the RI Work Plan (OBG 2015) and updated in the RI Report. The updated CSM in the RI Report identified COCs in surface soil, surface cover, subsurface soil, groundwater across portions of the Site. Surface soil refers to the top two inches (in) of soil, while surface cover refers to the top two ft of soil. The specific source of the COCs is not known but has been inferred to be the result of various historical operations at the Site, described above in **Section 2.3 Site History.** Details regarding Site COCs are discussed in **Section 2.5.2** below.

### 2.5.2 Description of Areas of Concern

As described in the *RAAR*, information generated during the RI was used to evaluate the nature and extent of contamination at the Site. Section 5 of the *RI Report* presents the results of the data collected during the RI and is summarized in the subsections below. Sample locations included in the *RI Report* are presented on **Figure 5**. Based on the findings related to historical use of the Site and historical and the BCP environmental investigations, the following COCs were identified in the RAAR as being present at the Site (naturally occurring metals are not considered COCs):

1. Surface Soil: metals (arsenic, barium, copper, lead, and mercury), semi-volatile organic compounds (SVOCs; primarily polycyclic aromatic hydrocarbons [PAHs]), PCBs, and petroleum (in the form of grossly contaminated soil).
2. Subsurface Soil: volatile organic compounds (benzene, ethylbenzene, toluene, xylene mixed, 1,2,4- and 1,3,5-trimethylbenzene); semi-volatile organic compounds (PAHs, fluoranthene, naphthalene); metals (arsenic, copper, lead, and mercury).
3. Groundwater: Metals (arsenic, copper, lead, chromium, thallium)[4], VOCs (benzene, chloroethane, 1,1-dichloroethane, trichloroethene, 1,2,4- and 1,3,5-trimethylbenzene, toluene, xylenes mixed, PFAS ); and semi-volatile organic compounds (PAHs, chrysene, naphthalene).

The Decision Document identified the following COCs at the Site:

- benzo(a)pyrene
- benzo(a)anthracene
- benzo(b)fluoranthene
- polychlorinated biphenyls (PCB)
- arsenic
- copper
- lead
- mercury
- naphthalene
- benzene
- xylene (mixed)
- toluene
- 1,1-dichloroethane

[4] Although iron, manganese, magnesium, and sodium were detected above Class GA SGVs, these constituents are considered to be naturally occurring and not related to historic site operations.

The Decision Document did not indicate which media the COCs were present in but did indicate the COCs exceeded the applicable SCGs for soil and groundwater. Although Per-and Polyfluoroalkly Substances (PFAS) were identified in overburden groundwater at the Site, the Decision Document did not identify PFAS compounds as COCs for the Site and these compounds will not be discussed further in this RAWP.

### 2.5.3 Identification of Standards, Criteria and Guidance

Standards, Criteria and Guidance (SCGs) are promulgated requirements ("standards" and "criteria") and non-promulgated guidance ("guidance") that govern activities that may affect the environment and are used by the NYSDEC at various stages in the investigation and remediation of a site. The following table provides a list of SCGs potentially applicable to the Site. Key SCGs are discussed in greater detail below.

| Citation | Title | Regulatory Agency |
|---|---|---|
| **General** | | |
| 6 NYCRR Part 375 | Environmental Remediation Programs | NYSDEC |
| 29 CFR 1910.120 | Hazardous Waste Operations and Emergency Response | US Department of Labor, OSHA |
| 29 CFR 1926 | Safety and Health Regulations for Construction | US Department of Labor, OSHA |
| No Citation | Analytical Services Protocol | NYSDEC |
| | | |
| DER-10 | Technical Guidance for Site Investigation and Remediation (2010) | NYSDEC |
| DER-23 | Citizen Participation Handbook for Remedial Programs (2010) | NYSDEC |
| DER-31 | Green Remediation (2010) | NYSDEC |
| | | |
| DER-33 | Guide to Drafting and Recording Institutional Controls (2010) | NYSDEC |
| CP-49 | Climate Change and DEC Action (2022) | NYSDEC |
| **Soil** | | |
| 6 NYCRR Part 375 | Environmental Remediation Programs | NYSDEC |
| CP-51 | Soil Cleanup Guidance (2010) | NYSDEC |
| **Groundwater** | | |
| 6 NYCRR Part 700-705 | Surface Water and Ground Water Classification Standards | NYSDEC |
| TOGS 1.1.1 | AWQSGVs | NYSDEC |
| **Air** | | |
| DER-13 | Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York (2006) | NYSDOH |
| No Citation | Final – Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006) | NYSDOH |

| Citation | Title | Regulatory Agency |
|---|---|---|
| **Solid Waste** | | |
| 6 NYCRR 360 | Solid Waste Management Facilities | NYSDEC |
| 6 NYCRR 364 | Waste Transporters | NYSDEC |
| **Hazardous Waste** | | |
| 6 NYCRR Part 371 | Identification and Listing of Hazardous Wastes | NYSDEC |
| 6 NYCRR 372 | Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities | NYSDEC |
| 6 NYCRR 376 | Land Disposal Restrictions | NYSDEC |
| **Site Management** | | |
| No Citation | New York State Standards and Specifications for Erosion and Sediment Control (2016) | NYSDEC |
| CP-43 | Groundwater Monitoring Well Decommissioning Procedures (December 2009) | NYSDEC |

**Legend:**

| | |
|---|---|
| SCG: | Standards, Criteria and Guidance |
| NYCRR: | New York Code of Rules and Regulations |
| NYSDEC: | New York State Department of Environmental Conservation |
| NYSDOH: | New York State Department of Health |
| OSHA: | Occupational Safety and Health Administration |
| TOGS: | Technical Operational Guidance Series |

SCGs for Soil

SCGs for soil at the Site are based on the numerical soil cleanup objectives (SCOs) presented 6 NYCRR Part 375 and NYSDEC Soil Cleanup Guidance CP-51. The soil cleanup objectives are categorized into unrestricted use criteria and restricted use (residential, restricted-residential, commercial, or industrial) criteria, as well as criteria for protection of groundwater and ecological resources (which can also be satisfied by application of the unrestricted use criteria). The applicability of each category of soil cleanup objectives is determined based upon the current and reasonably anticipated future use of the Site, as well as cleanup tracks being evaluated.

The Restricted Residential Soil Cleanup Objectives (RRSCOs) are appropriate for the Site based upon the proposed future land use as discussed in **Section 1.1** above. The Protection of Groundwater SCOs (PGSCOs) are applicable to those parameters that are present in soil and in groundwater exceeding the applicable Class GA groundwater standard presented below.

SCGs for Groundwater

The document entitled “Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations,” issued by the NYSDEC in June 1998 and as amended in 2000, 2004 and 2023, presents the guidelines that were used to evaluate potential groundwater issues for the Site. The SCGs for groundwater are compared to the NYSDEC AWQSGVs (NYSDEC TOGS 1.1.1) for Class GA groundwater. However, it

should be noted that, although the groundwater beneath the Site is classified as Class GA, the groundwater is not used for drinking water in this area. The City restricts the installation of drinking water wells within the City limits. In addition, the EE will restrict the use of groundwater. Drinking water is, instead, supplied by the local municipality (City of Rochester) through another source.

SCG for Soil Vapor

The Final "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," (NYSDOH SVI Guidance) issued by the NYSDOH in October 2006 and updated in May 2017 and February 2024, presents the guidelines that were used to evaluate potential soil vapor intrusion issues for the Site. The potential for soil vapor intrusion into any future buildings constructed on-Site will be evaluated as per the SMP after the remedial action is complete through the collection of soil vapor intrusion monitoring data. The soil vapor intrusion monitoring data will be evaluated by the Department and NYSDOH using the NYSDOH SVI Guidance and any other applicable regulation and/or guidance documents in effect at the time of the sampling.

### 2.5.4 Soil/Fill Contamination

The information generated during the RI was used to evaluate the nature and extent of contamination at the Site. Section 5 of the RI Report presents the results of the data collected during the RI and is summarized in the subsections below. Surface soil (0-2 in) and surface soil cover (0-2 ft) were assessed to determine human exposures and to identify if existing 0-2 foot interval of soil at the Site met the restricted residential SCOs for all constituents. Subsurface soils (deeper than 2 ft bgs) were evaluated to delineate the horizontal and vertical extent of contamination beneath the Site.

#### 2.5.4.1 Summary of Surface Soil and Surface Cover Data and Comparison With SCGS

Based on a comparison to applicable Site SCOs, Site-related COCs in surface soil and surface cover were limited to semi-volatile organic compounds (SVOCs) and metals (arsenic and mercury). While less prevalent, polychlorinated biphenyls (PCBs), copper, lead, barium, and cadmium were also detected above RRSCOs in some samples and are also considered COCs. VOCs were not identified above RRSCOs in surface soil or surface cover samples. SVOCs and metals were the constituents identified most frequently above RRSCOs in surface soil or surface cover samples.

SVOCs, specifically, one or more of the polycyclic aromatic hydrocarbon (PAH) compounds (anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were identified above RRSCOs. The majority of surface soil and surface cover samples exceeding RRSCOs for SVOCs were located on the 13 Cottage Street parcel, the former canal area of the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) parcel, and the 102 Violetta Street parcel near the bike path. Four locations (SS-112, SS-142, SS-141, and SS-147) on the 13 and 49 Cottage Street parcels contained total SVOCs greater than 100 ppm. While there was evidence of on-Site dumping including parts cleaner, metal shavings debris, and concrete/brick debris in the vicinity of some of these sample locations, these areas will be addressed during remedy implementation.

Arsenic was observed above RRSCOs in approximately half of the surface soil and surface cover samples analyzed, although the maximum concentration was much less than that observed in subsurface soil samples. The predominant locations of surface soil and surface cover samples where arsenic was present above Restricted- Residential SCOs are on the southern portion of the Site (south of the adjoining 5 Flint Street parcel). Mercury was detected above the RRSCOs in five samples.

Surface soil and surface cover samples were screened using a photoionization detector (PID), and field observations including the presence of odors, staining, and discoloration were recorded. Sheens, staining, and/or petroleum-type odors were not encountered during surface soil and surface cover sampling.

#### 2.5.4.2 Summary of Subsurface Soil/Fill Data and Comparison With SCGS

Similar to surface soil and surface cover samples, SVOCs and metals were identified most frequently above applicable Site SCOs in subsurface soil.

SVOCs detected in subsurface soil samples above RRSCOs and PGSCOs were PAH compounds (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene). The locations with the highest concentrations of total SVOCs are near the center of the Site on the 13 Cottage Street parcel and the 10 Flint Street parcel.

Arsenic was identified above RRSCOs and PGSCOs in 27 of the 123 locations analyzed for metals. Samples containing arsenic were located on both the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) and the 13 and 49 Cottage Street parcels. Three of the samples containing the highest concentrations of arsenic were located in the northern end of the former canal on the 10 Flint Street parcel near Flint Street.

VOCs were detected above PGSCOs at one sample location, OVR-117 (7-7.6 ft bgs), located on the 13 Cottage Street parcel. Subsurface soil samples were screened using a PID for indications of potential VOCs, and field observations including the presence of odors, staining, and discoloration were recorded. The sheens, staining, and odors generally correlate to the areas also observed to have the highest PID readings, on the northern side of the Site in the former canal on 10 Flint Street, on the east and west sides of the adjoining 5 Flint Street parcel, and the 13 Cottage Street parcel. Fill and waste materials including observations of fragmented bricks, cinders, coal ash, slag, and black granular material (i.e., bone black) were also noted in many of these locations.

### 2.5.5 Summary of Groundwater Contamination and Comparison With SCGS

Analytical results for groundwater were compared to Class GA Standards and Guidance Values (SGVs) provided in NYSDEC's Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (NYSDEC 1998). Groundwater samples obtained during the RI identified VOCs and SVOCs (primarily PAHs) exceeding Class GA SGVs. VOCs detected in the groundwater include petroleum- related VOCs, chlorinated VOCs, and ketone compounds. Petroleum-related VOCs and chlorinated VOCs were present in wells bordering the 5 Flint Street parcel. SVOCs were detected in the groundwater above Class GA SGVs in three overburden wells located on the north end of the 10 Flint Street parcel and the 13 Cottage Street parcel.

As previously discussed, although iron, manganese, magnesium, and sodium were detected above Class GA SGVs, these constituents are considered to be naturally occurring and not related to historic site operations. Arsenic was detected in the groundwater above Class GA SGVs in seven overburden wells located on the north end of the 10 Flint Street parcel and the 102 Violetta Street parcel.

### 2.5.6 Soil Vapor and Air Quality

As discussed in the *RI Report*, soil vapor samples collected during the RI were located along the perimeter of the Site to assess the potential for off-site migration of soil vapor in the direction of adjoining western residential properties. Based on sampling results reported in the *RI Report*, petroleum VOCs and CVOCs are present in soil vapor at the Site, consistent with contaminants found in soil (petroleum VOCs/SVOCs) and groundwater (petroleum VOCs/SVOCs and CVOCs) at the Site. However, as discussed in the *RI Report*, the concentrations were low and do not suggest off-Site migration. In addition, the low concentrations of constituents detected in soil vapor suggest the probability for vapor intrusion into existing off-Site buildings is low. Constituents in nearby soil and groundwater samples were generally non-detect. Although there are low concentrations of VOCs identified in some of the groundwater samples collected from lower elevations, the limited constituents detected and the relative horizontal and vertical distance from the soil vapor sample locations suggests that these detections are not related to those identified in the soil vapor.

RI soil vapor data indicate that the vapor intrusion pathway could potentially be complete under the probable future use scenarios depending on the location of the building. Future workers and residents could inhale vapors that may enter the interior of future commercial or residential structures from sub-slab soil gas. The potential for soil vapor intrusion into any future buildings constructed on-Site will be evaluated after the remedial action is complete as per the Site's SMP.

## 2.6 Environmental and Public Health Assessments

### 2.6.1 Qualitative Human Health Exposure Assessment

*As described in Appendix 3B of DER-10, "The overall purpose of the Qualitative Human Health Exposure Assessment (or the exposure assessment) is to evaluate and document how people might be exposed to site related contaminants, and to identify and characterize the potentially exposed population(s) now and under the reasonably anticipated future use of the site."* A Qualitative Human Health Exposure Assessment (QHHEA) was completed for the Site to evaluate and document the potential exposure routes and pathways, and to identify and characterize the potentially exposed populations currently and under reasonable anticipated future use of the Site. Environmental media assessed in the RI for potential impacts from historical Site operations and practices and potential human exposure include soil, groundwater, and soil vapor. The following presents the conclusions resulting from the QHHEA process. The full QHHEA is presented in Section 7 of the *RI Report* (OBG 2019).

A summary of the environmental media, exposure pathways, and potential human receptors relevant to the Site QHHEA are presented in the following table from the *RI Report*.

| Environmental Media and Exposure Pathway | Potential Receptors | Human Exposure Assessment |
|---|---|---|
| **Direct contact with surface soils (0 ft to 2 ft bgs) via incidental ingestion, dermal contact, inhalation of soil dust.** | • Current/future recreator<br>• Current/future trespasser<br>• Current/future utility worker<br>• Future construction worker<br>• Future commercial/industrial worker<br>• Future resident | • Current/future recreators and trespassers may be exposed to COCs in surface soils while traversing the Site through a publicly accessible trail (i.e., Genesee Riverway Trail) or by venturing off-trail into nearby vegetated areas.<br>• During underground utility line inspection, servicing, and maintenance activities, current/future utility workers could encounter COCs in surface soil.<br>• Future construction activities associated with redevelopment of the Site to support residential housing are presumed to occur on the Site, potentially exposing the construction worker to COCs in surface soil.<br>• Under a hypothetical future use scenario (BOA Master Plan) exposure to surface soil by future commercial/ industrial workers and residents is possible. |
| **Direct contact with subsurface soils (2 ft to 12 ft bgs) via incidental ingestion, dermal contact, inhalation of soil dust.** | • Current/future utility worker<br>• Future construction worker | • During underground utility line inspection, servicing, and maintenance activities, current/future utility workers could come into contact with subsurface soil through incidental ingestion, dermal contact, and inhalation of soil dust.<br>• Future construction workers may be exposed to subsurface soil during excavation/construction activities that may result in exposure via incidental ingestion, dermal contact, and inhalation of soil dust. |
| **Inhalation of groundwater derived ambient vapors.** | • Current/future utility worker<br>• Future construction worker | • During utility line inspection, servicing, and maintenance activities, current/future utility workers could inhale VOC vapors migrating from shallow groundwater to outdoor air.<br>• Future construction workers may be indirectly exposed to volatile COCs migrating from shallow groundwater to outdoor air during excavation/construction activities via inhalation of VOC vapors. |
| **Direct contact with groundwater via incidental ingestion and dermal contact.** | • Current/future utility worker<br>• Future construction worker | • Utility line inspection, servicing, and maintenance activities could occur at or below the water table. Current/future utility workers could come into contact with groundwater through dermal contact and incidental ingestion.<br>• Future construction workers may be exposed to shallow groundwater during excavation/construction activities via dermal contact and incidental ingestion. |
| **Inhalation of soil and/or groundwater derived vapors in indoor air** | • Current/future commercial/industrial worker<br>• Future resident | • RI soil vapor data indicate that the vapor intrusion pathway could potentially be complete under the probable future use scenarios depending on the location of the building. Future commercial/industrial workers and residents could inhale vapors that may enter the interior of a commercial or residential structure from sub-slab soil gas. If identified, the potential infiltration of VOCs to the interior space of a future Site building could be mitigated by a properly designed vapor barrier or other mitigation system. |

Future human health exposure scenarios will be mitigated through institutional and engineering controls implemented at the Site.

### 2.6.2 Fish and Wildlife Remedial Impact Analysis

A FWRIA was developed for this Site to describe the terrestrial and aquatic environments in the study area in terms of topography, vegetative cover types, fish and wildlife resources and their value, and to identify the actual or potential impacts to fish and wildlife resources from potential exposure to site related contaminants. The following presents the summary and conclusions section from the FWRIA. The full FWRIA dated May 2019 is included as Appendix S of the November 2019 *RI Report*.

#### 2.6.2.1 Summary and Conclusions of the FWRIA

As stated in the summary and conclusions section of the FWRIA developed for the Site, the Site is located in an urban setting and is not a significant habitat for terrestrial wildlife. Due primarily to the surrounding residential, commercial, industrial, institutional and utility right-of- way land uses, the Site is not part of a larger corridor that is linked to other significant wildlife habitats. However, the Site likely offers a refuge to transient wildlife (primarily birds) as they migrate along the Genesee River corridor and utilize the forested Site areas. The ecological receptors present within the study area include floral and faunal terrestrial species that inhabit, forage, or otherwise require a mix of forested and open habitats for their life requirements. These include terrestrial plants, soil invertebrates, some herptiles (frogs, turtles, snakes), and mammals. These organisms are potentially exposed to affected surface soil through direct contact, incidental ingestion, and/or consumption of affected prey.

Semi-aquatic birds may utilize the Site for roosting; however, it is likely that most ecological receptors of the Genesee River may be unable to access the Site due to the WRW present along the Site boundary with the river. Excepting the intermittent presence of surface water within delineated emergent and scrub-shrub wetlands, aquatic pathways are not present on the Site. The presence of trail/flood-protection berm and the wall along the shoreline likely prohibit surface runoff from flowing directly from the Site to the river and shallow groundwater does not appear to be migrating directly to the river which also minimizes the potential for impacts to off-site aquatic life.

Sheens and petroleum odors have been observed in shallow groundwater wells at the Site, including along the river. However, shallow groundwater does not appear to be migrating directly toward the river thereby minimizing the potential for impacts to off-Site aquatic life. However, if the wall is to be removed, further evaluation of shallow groundwater flow and quality is recommended to evaluate potential impacts to ecological receptors of the river.[5]

The most significant wildlife exposure pathway is potentially through direct contact, incidental ingestion, and/or bioaccumulation of sporadic COCs in shallow soil. SVOCs (acenaphthene, benzo(a)pyrene, di-n-butyl phthalate, and fluorene), pesticides (4-4-DDE, 4-4-DDT, and dieldrin), PCBs and metals (aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, lead, mercury, nickel, and zinc) were detected in shallow soils at concentrations that exceed SCOs for the protection of ecological resources.

[5] It is noted that only the above-grade portion of the wall is anticipated to be removed as part of Site redevelopment, thus the current groundwater conditions are not expected to change, and contaminant migration into the Genesee River is unlikely.

Although there is currently a potential exposure pathway for ecological receptors to COCs in surface and shallow soil, these exposures would likely be mitigated by the Site-wide cover system for the Site.

#### 2.6.2.2 Significant Habitats and Rare, Threatened, or Endangered Species

According to the FWRIA, the presence of significant habitats and rare, threatened, or endangered species within one-half mile of the Site was evaluated through contact with the New York Natural Heritage Program (NYNHP), search of the NYSDEC Environmental Resource Mapper website, and a search of the of the USFWS Endangered Species – Ecological Services website (IPaC, USFWS).

According to NYNHP and NYSDEC (NYNHP 2015 and NYSDEC 2015), no significant habitats are present on or within the search distance of the Site (see Appendix A of the FWRIA). No surface waters within the study area are designated as Wild, Scenic or Recreational in accordance with the Wild, Scenic and Recreational Rivers Act. No records of rare, threatened, or endangered species were identified at or in the vicinity of the Site.

According to the USFWS, the Northern Long-eared Bat is the only federally listed threatened[6] or endangered mammal listed as potentially present in forested communities (e.g., floodplain forest and successional northern hardwoods) within the Site area (USFWS Information for Planning and Consultation Online System). According to the USFWS online system, the Northern Long-eared Bat habitat may be present within the western portion of the Site.

#### 2.6.2.3 Methods Taken to Protect Identified Fish and Wildlife Resources

All work activities within the western portion of the Site (where the Northern Long-eared Bat is potentially present) will be conducted in adherence to bat-related conservation measures, as outlined in the USACE Nationwide permit number LRB-2010-01497, issued to the City on November 3, 2023 and NYSDEC guidance measures as outlined on the dec.ny.gov website.[7] Specifically, all tree (woody stems > 3 inches Diameter at Breast Height) clearing conducted within the western portion of the Site will be conducted during the hibernation period between November 1 and March 31.

## 2.7 Remedial Action Objectives

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified in the Site's Decision Document.

### 2.7.1 Groundwater

*RAOs for Public Health Protection*

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

[6] Threatened: A species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
[7] https://dec.ny.gov/nature/animals-fish-plants/biodiversity-species-conservation/endangeredspecies/northern-long-eared-bats-protection

*RAOs for Environmental Protection*

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

### 2.7.2 Soil

*RAOs for Public Health Protection*

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

*RAOs for Environmental Protection*

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

### 2.7.3 Soil Vapor

*RAOs for Public Health Protection*

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the Site.

# 3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

The following sections describe the Remedial Action plan including a summary of the *RAAR* and the NYSDEC Decision Document, which describe the NYSDEC-approved remedy for the Site.

## 3.1 Remedial Alternatives Analysis Report Summary

As described in Section 1, a RAAR was submitted to NYSDEC for the Site in June 2023. The RAAR provides findings of the remedial investigation activities described above in **Section 2.1**, the nature and extent of contamination at the Site, and a proposed remedy for the Site. The RAAR included a Remedial Alternatives Analysis to select a remedial approach for the Site using the Remedy Selection Evaluation Criteria identified in 6 NYCRR Part 375-1.8(f) and Section 4.2 of DER-10. As required by NYSDEC, in addition to the evaluation of the likely scenario, a Track 1 unrestricted use alternative was evaluated (considered under NYCRR Part 375 to be representative of cleanup to pre-disposal conditions). Three alternatives were developed and evaluated as part of the RAAR:

- Alternative 1: No Action;
- Alternative 2: Restricted Residential Use Track 4 Excavation; and
- Alternative 3: Unrestricted Use Track 1 Excavation.

Based on the detailed evaluation of the alternatives, Alternative 2 was recommended as the selected remedy for the Site and was approved by NYSDEC and memorialized in the Decision Document. Alternative 2 would provide the best balance of the evaluation criteria while achieving the RAOs set forth in the RAAR and would be consistent with current and anticipated redevelopment plans.

Additional details regarding the Remedial Alternatives Analysis performed for the Site can be found in Sections 4 and 5 of the RAAR.

### 3.1.1 Source Area Delineation and Definition of Excavation Areas

As discussed in the RAAR, one of the remedial goals of the selected remedy for the Site was the excavation and off-site disposal of contaminant source areas. Specifically, excavation of soil exhibiting indicators of potential soil impacts including grossly contaminated media (GCM), sheens, staining, odors, elevated PID readings, and/or elevated COCs concentrations. The areas and volumes of soil proposed for excavation in the RAAR (and accepted in the Decision Document) were delineated based on RI analytical data and field observations. To further define the extents of the excavation areas, a PDI will be implemented as outlined in **Section 4.2.1** below.

## 3.2 Selected Remedy

The September 2023 Decision Document describes the NYSDEC-approved remedy for the Site. The selected remedy (RAAR Alternative 2) is a Track 4: Restricted use with site-specific soil cleanup objectives remedy. The elements of the selected remedy for the Site, as presented in the Decision Document, are summarized below.

1. Remedial Design:

   A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

   - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
   - Reducing direct and indirect greenhouse gases and other emissions;
   - Increasing energy efficiency and minimizing use of non-renewable energy;
   - Conserving and efficiently managing resources and materials;
   - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
   - Maximizing habitat value and creating habitat when possible;
   - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
   - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
   - Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial design program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWise(TM) (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial design program, as appropriate. The project design specifications will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial design program.

Additionally, the remedial design program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial design program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. Excavation:

   Excavation and off-site disposal of contaminant source areas, including:

   - grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
   - concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1);
   - non-aqueous phase liquids;
   - soil with visual waste material or non-aqueous phase liquid;
   - soil containing total SVOCs exceeding 500 ppm;
   - soils which exceed the protection of groundwater soil cleanup objectives (PGSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and
   - soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Excavation and removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination.

Collection and analysis of confirmation samples at the remedial excavation depth will be used to verify that the above excavation goals have been achieved. If confirmation sampling indicates that these goals were not achieved at the stated remedial depth, the Applicant must notify DEC, submit the sample results and in consultation with DEC, determine if further remedial excavation is necessary. Further excavation for development will proceed after confirmation samples demonstrate that the above excavation goals have been achieved.

To ensure proper handling and disposal of excavated material, waste characterization sampling will be completed for all identified contaminated site material. Waste characterization sampling will be performed exclusively for the purposes of off-site disposal in a manner suitable to receiving facilities and in conformance with applicable federal, state, and local laws, rules, and regulations and facility-specific permits.

3. Backfill:

   - On-site soil which does not exceed the above excavation criteria may be used below the cover system to backfill the excavation to the extent that a sufficient volume of on-site soil is available and to establish the designed grades at the site.
   - On-site soil which does not exceed the above excavation criteria or the PGSCOs for any constituent may be used anywhere beneath the cover system, including below the water table, to backfill the excavation or re-grade the site.
   - Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and to complete the backfilling of the excavation and establish the designed grades at the site.
   - The site will be re-graded to accommodate installation of a cover system.

4. Cover System:

   A site cover will be required in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for future restricted residential use of the site. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6

NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

5. Engineering and Institutional Controls

Imposition of an institutional control in the form of an Environmental Easement and a Site Management Plan, as described below, will be required. The remedy will achieve a Track 4 restricted residential cleanup at a minimum.

Institutional Control

Imposition of an institutional control in the form of an Environmental Easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or the Monroe County Health Department; and
- require compliance with the Department approved Site Management Plan.

6. Site Management Plan

A Site Management Plan is required, which includes the following:

A. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in remedy element 5 above.

Engineering Controls: The cover system discussed in remedy element 4.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the Department. Based on the investigation results and the Department determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment.
- a provision should redevelopment occur to ensure no soil exceeding protection of groundwater concentrations will remain below storm water retention basin or infiltration structures.

- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any occupied buildings on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- a provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in remedy element 4 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

B. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- Monitoring of groundwater to assess the performance and effectiveness of the remedy.
- A schedule of monitoring and frequency of submittals to the Department.
- Monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Decision Document. All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the FER.

# 4.0 PRE-DESIGN INVESTIGATION

This section describes the PDI that will determine the extent of the remedial measures (e.g. excavation, cover system) detailed in this RAWP to be implemented at the Site.

## 4.1 Soil Cleanup Objectives

The RRSCOs have been selected for the Site based upon the current and proposed future land use. The PGSCOs are applicable to those parameters that are present in both soil and groundwater exceeding the applicable standard presented below. The Soil Cleanup Objectives for this Site are listed in **Table 4.** Soil and fill material management on-Site and off-Site will be conducted in accordance with the Soil/Materials Management Plan as described below. UST closures (if conducted) will, at a minimum, be completed in accordance with DER-10 Section 5.5, regulations and guidance.

## 4.2 Pre-Design Investigation Sampling

As discussed in the RAAR a PDI will be implemented to refine the extent of targeted soil excavation areas, which are part of the accepted Remedial Alternative for the Site (Alternative 2) discussed in **Section 3.1**. The PDI is proposed to further define the extent of contaminant source areas, as defined in Element #2 of the Site's Decision Document, for targeted excavations included in the accepted Remedial Alternative for the Site and as shown in the Decision Document.

As shown on **Figure 6**, the proposed the following four areas for targeted excavation:

- 13 Cottage Street Excavation: located on the 13 Cottage Street parcel in the area surrounding OVR-117 (assumes excavation up to 13.4 ft);
- 102 Violetta Street EB-169 Excavation: located on the 102 Violetta Street parcel in the area surrounding SB-169 (assumes excavation up to 21 ft);
- 102 Violetta Street EB-138 Excavation: located on the 102 Violetta Street parcel in the area surrounding SB-138 (assumes excavation up to 21 ft);
- 10 Flint Street Excavation: located on the northern end of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) parcel (assumes excavation up to 11 ft).

A PDI will also further delineate the extent of the site-wide cover system. Details regarding the PDI sampling for each of these areas are described below.

### 4.2.1 PDI Targeted Excavation Area Sampling

PDI soil sampling is proposed to refine the extent of the four targeted soil excavation areas identified in the Decision Document. Soil borings will be advanced using a Geoprobe direct-push drill rig or an excavator to bedrock (or refusal) at anticipated depths between 8 and 21 ft bg. At each borehole location utility clearances will be performed prior to advancement of soil borings using hand tools and/or vacuum excavation to a minimum of five ft bg to confirm that no subsurface utilities are present (the depth of utility clearance will be increased to eight ft bg in areas in close proximity to known utilities or other infrastructure). Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated with concurrence from the NYSDEC project manager.

Soil borings will be advanced at intervals of every 30-feet around the perimeter of each excavation area and at every 900-square feet of surface area within targeted excavation areas; as shown on **Figure 6.** Soil borings located at the Site boundaries will only be advanced, and sidewall samples collected, if subsurface utilities or other obstructions are anticipated to prevent the removal of all on-Site soil in the area. No sidewall end point samples will be collected for a targeted excavation area if the corresponding sidewall extends to the Site boundary and no soil is anticipated to remain on-Site after excavation. In the event utilities or other obstructions prevent removal of soils during excavation advancement to the Site boundary, final delineation samples of the remaining soil will be collected at that time.

Soil samples will be collected continuously during boring advancement and field screened to assist in verifying that the excavation goals identified in the Decision Document (Excavation Goals) will be met. Field screening will include visually inspecting soil samples for the presence of petroleum impact, screened (5 ppm) using a calibrated photoionization detector (PID), characterized for visual and odor impacts, and textural classifications based on the Unified Soil Classification System (USCS). In addition, any observations regarding staining, odor and/or sheen in/on the soil will be noted. A soil boring log will be generated for each boring.

If conditions not meeting the Excavation Goals are identified during field screening in soil samples collected from excavation perimeter soil borings, an additional soil boring will be advanced at a minimum distance of 10-feet from the perimeter soil boring until field screening results meet Excavation Goals or the excavation area is extended to the Site boundaries. Once field screening of soil samples collected from soil borings advanced around the perimeter of the excavation areas meet Excavation Goals, sidewall final delineation samples will be collected for laboratory analysis from soils exhibiting the highest PID response, or other field screening impacts, at each of the perimeter soil borings. If multiple layers of contamination are identified, sidewall samples will be collected from each layer of contamination identified.

Field screening results from soil samples collected from soil borings advanced within the interior of the excavation areas will be assessed to determine if there are intervals extending up from bedrock which meet Excavation Goals. If such intervals are identified, soil samples will be collected for laboratory analysis at the top of this interval.

All samples will be submitted for laboratory analysis of:

- Part 375 Target Compound List (TCL) VOC's by EPA Method 8260D including tentatively identified compounds (TICs);
- Part 375 TCL SVOCs by EPA Method 8270E including TICs; and
- Part 375 Target Analyte List (TAL) metals by USEPA Methods 6010D/7470A.

Soil samples submitted for laboratory analysis from soils samples located adjacent to subsurface utilities or other obstructions which will prevent further excavation will be considered Confirmation samples if their results meet Excavation Goals; otherwise, these soil samples will be considered Documentation samples to document the level of contamination remaining.

Soil samples submitted for laboratory analysis will be used to assist in determining if Excavation Goals have been achieved, or if further delineation is required. Soil samples collected to assess vertical excavation extents will be considered Confirmation samples and will be used as final delineation samples if their analytical results meet Excavation Goals. Otherwise, either additional sampling will be completed at deeper

depths, or the excavation will be advanced to bedrock.[8] Soil samples collected to assess horizontal excavation extents will be considered Confirmation samples and will be used as final delineation samples if their analytical results meet Excavation Goals. If soil sample results do not meet Excavation Goals, additional soil boring(s) will be advanced at a minimum distance of 10-feet from the corresponding soil boring until both field screening and laboratory results meet Excavation Goals in the additional soil boring, or the excavation area is extended to the Site boundaries.

Soil cuttings generated during the advancement of soil boring to facilitate PDI soil sampling will be placed back in the soil boring location (as possible) unless such soil is determined to be GCM per 6 NYCRR 375-1.2(u). Soil which cannot be placed back in the soil boring, or is determined to be GCM, will be stored in DOT rated drums in a designated waste storage area (identified on **Figure 7 – Site Layout Plan)** for subsequent characterization and off-Site disposal. In addition, soil planned to be excavated within the limits of the delineation borings will be characterized for off-Site disposal.

### 4.2.2 Site Cover System Delineation Sampling Areas

As discussed in **Section 3** above, the *RAAR* included a site cover system across portions of the Site as part of the selected and approved remedial alternative to allow for future restricted residential use of the Site. To refine the required extent of the cover system, PDI sampling is proposed to delineate Site areas where existing soil in the top two feet meet Restricted-Residential SCOs (not requiring the installation of a cover system – the existing 2 feet of material would be considered the cover system), from soils in the top two feet exceeding Restricted-Residential SCOs (requiring the installation of a cover system). As shown on **Figure 8**, soil borings are proposed to determine the extent of the site cover system within two Potential Site Cover areas. The first area, consisting of approximately 2.0 acres, is the approximate area of the 100 Riverview Place Site parcel. The second area, consisting of approximately 1.3 acres, is located on or near portions of the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) parcel and various Cottage Street parcels. The quantity and distribution of the soil boring locations are based on the draft NYSDEC Soil Screening Guidance dated August 2017 (Soil Screening Guidance).

Soil borings will be advanced to two ft bgs at each location. Soil samples will be collected continuously from each boring and visually inspected for the presence of petroleum impact, screened using a calibrated PID, and characterized for visual and textural classifications based on the USCS. In addition, any observations regarding staining, odor and/or sheen in/on the soil will be noted. Soil samples will be submitted from each soil boring for laboratory analysis based on the Soil Screening Guidance for the following depth intervals and analyses:

[8] Please note that only soil will be collected for laboratory analysis, no rock/bedrock samples will be collected.

| Laboratory Analysis | Depth Intervals (bgs) |
|---|---|
| Part 375 TCL VOC's by EPA Method 8260D including TICs | 2 to 6 inches & 12 to 24 inches |
| Part 375 TCL SVOCs by EPA Method 8270E including TICs; | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| Part 375 TAL metals (including hexavalent chromium) by USEPA Methods 6010D/7470A/7196A; | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| Part 375 TCL Pesticides by USEPA Method 8081B | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| Part 375 TCL PCBs by USEPA Method 8082A | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| Total Cyanide by USEPA 9010C/9012B, SM4500CN-CE | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| Emerging Contaminants[9], PFAS by USEPA Methods 1633/537 and 1,4 dioxane by USEPA Method 8270E | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |

Analytical results of the cover system PDI sampling will be evaluated to determine if samples meet applicable SCOs to allow for future restricted residential use of the Site. If sample results identify exceedances of applicable SCOs, the extent of the cover system will be revised to include areas of exceedances, and the locations of the exceedances will be assessed to develop a sampling plan to further delineate the extents of exceedances within existing soil in the top two feet of the Site. Additional samples will be collected 10-feet from primary delineation samples in the direction(s) where other sample results meet applicable SCOs; however; some sample locations where results meet applicable SCOs may be included under the cover system, depending on the on the locations and distribution of exceedances in the surrounding samples. Additional delineation samples will be assessed with the same process outlined above and additional sampling will be conducted, as needed, until exceedances to applicable SCOs are sufficiently delineated by samples meeting applicable SCOs, and the extents of the cover system are sufficient to ensure that soils within the top two feet of the Site meet Restricted-Residential SCOs.

### 4.2.3 Methodology

PDI samples, collected to further define the horizontal and vertical extents of the excavation areas or the horizontal extents of the Site cover system will be considered Confirmation samples [per DER-10 Section 1.3(b)3] if they are used to provide evidence that the Site's soil cleanup objectives were obtained through remedy implementation. PDI samples collected in excavation areas limited by the presence of sub-surface utilities or other obstructions, which do not meet the Site's soil cleanup objectives, will be considered Documentation samples [per DER-10 Section 1.3(b)12] used to document the level of contamination remaining at the Site boundary. Each sample will be collected in accordance with DER-10 Section 5.4(b), and field screened for visual evidence (e.g., staining, sheen) of impacts, odor impacts, and with a PID with a screening level of 5 ppm. Samples to be submitted for analysis will be placed in a laboratory sample jar, placed in an iced cooler, and transported to the laboratory. The laboratory will have the appropriate ELAP method certifications to conduct the analysis.

[9] Emerging Contaminants (ECs) list includes 1,4-Dioxane and the 40 Per- and Polyfluoroalkyl Substances (PFAS) which include the 40 compounds listed in the most recent April 2023 NYSDEC guidance Sampling, Analysis, and Assessment of Per-and Polufluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs (NYSDEC April 2023 Guidance) is included as an attachment to the QAPP/FSP.

### 4.2.4 Analytical Reporting of Results

The laboratory will report analytical results for endpoint samples in Analytical Services Protocol (ASP) Category B deliverable packages. An EDD in the required NYSDEC format will also be provided by the laboratory. A data usability summary report will be generated in accordance with the Department's guidance.

All PDI data generated will be logged in a database and organized to facilitate data review and evaluation.

### 4.2.5 QA/QC

QA/QC samples serve as checks on both the sampling and measurement systems and assist in determining the overall data quality with regard to representation, accuracy, and precision. The QAPP, included as **Appendix D** to this RAWP, describes QA/QC procedures and sampling for the project.

### 4.2.6 DUSR

A DUSR will be prepared to evaluate the PDI data by a party independent from the laboratory performing the analysis and the project team in accordance with DER-10 Chapter 2 and Appendix 2B of DER-10. The QAPP included as **Appendix D** to this RAWP, describes the DUSR to be prepared for the project. As discussed in Section 6.4 of the QAPP, James Hauri of Roux MA, who is independent from the project team, will be the Data Validator and will review the analytical data for quality assurance and quality control in accordance with NYSDEC standards.

### 4.2.7 Reporting PDI Sampling Data in Interim Report and FER

Chemical laboratories used for all PDI samples (cover system and excavation areas final delineation samples that also act to document quality of the remaining soil) will be NYSDOH ELAP certified for the analytical methods. Final delineation sampling, including bottom and side-wall sampling, will be performed in accordance with DER-10 sample frequency requirements. Side-wall samples will be collected a minimum of every 30 linear feet. Bottom samples will be collected at a rate of one for every 900 square feet from the base of the proposed remedial excavation.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). A Data Usability Summary Report (DUSR) will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for the remedial action. Additionally, electronic data deliverables of all validated laboratory data will be electronically submitted to the NYSDEC maintained state database.

An interim report documenting the PDI sampling data, the actions completed to obtain the data, and the proposed final remedial excavations and cover system area extents will be submitted to the NYSDEC and NYSDOH PMs for review and approval. This interim report will provide a tabular and map summary of all PDI sample results and exceedances of SCOs, which will also be included in the FER.

## 4.3 Estimated Material Removal Quantities

The estimated quantity of material expected to be disposed off-Site will be determined after completion of the PDI, discussed in **Section 4.2** above and will be provided in the PDI Report submitted to the NYSDEC and NYSDOH project managers.

## 4.4 Soil/Materials Management Plan

The following sections provide the SoMP to be implemented during the Remedial Action.

### 4.4.1 Soil Screening Methods

Field screening (visual, olfactory, and PID soil screening) and assessment will be performed by a qualified environmental professional [defined 375-1.2(ak)] or experienced field geologist/scientist under the direction of the Remedial Engineer during all remedial excavations. Soil screening will be performed during all ground intrusive field work completed at the Site – prior and post-Certificate of Completion issuance including but not limited to excavations for remedy implementation.

All primary contaminant sources (including but not limited to tanks and targeted excavation areas) identified during the Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the FER.

Field screening will be performed by a qualified environmental professional or experienced field geologist/scientist under the direction of the Remedial Engineer. Resumes/Professional Profiles will be provided for all personnel responsible for field screening (i.e., those representing the Remedial Engineer and are direct reports to the Remedial Engineer) of ground intrusive work during all remediation work.

### 4.4.2 Stockpile Methods

Stockpiles, if any, will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. Judgement will be used to evaluate water infiltration, nearby waterbodies where runoff is likely to occur, and engineering controls that may be affected by storm events.

Stockpiles, if any, will always be kept covered with appropriately anchored tarps. A minimum of 12 mil poly sheeting will be used. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced.

Soil stockpiles, if any, will be continuously encircled with silt fences or straw bales/socks. straw bales will be used as needed near catch basins and other discharge points.

Water will be available on-Site at suitable supply and pressure for use in dust control.

### 4.4.3 Materials Excavation and Load Out

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE (Remedial Engineer) who is licensed and registered in New York State, or a qualified person who directly reports to a PE (Remedial Engineer) who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of all excavated material.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. Planned work under this RAWP include excavation activities in the vicinity of a sewer line located within the 10 Flint Street parcel, and water and potential gas lines located in the vicinity of excavation activities on the northeastern end of the 102 Violetta Street parcel within the Site area. Additional info on the presence of known and suspected Site related utilities is included in Section 5.3.5.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). Trucks transporting contaminated soil/fill material must have either tight-fitting opaque covers that are secured on the sides and/or back or opaque covers that are locked on all sides.

Vehicles leaving the Site will not be overloaded. The qualified environmental professional, the Remedial Engineer, or a qualified individual that is a direct report to the Remedial Engineer will ensure that vehicles are not loaded beyond the NYSDOT weight rating and that all material is secured beneath the truck bed cover.

A truck wash will be operated on-Site. The Remedial Engineer, the qualified environmental profession, or a qualified individual that this a direct report to the Remedial Engineer will be responsible for ensuring that all outbound trucks are clean of soil/fill material or other materials derived from the site.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site soil/fill material tracking.

The Remedial Engineer, qualified environmental professional, or a qualified individual that is a direct report to the Remedial Engineer will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other site materials derived from the Site during ground intrusive activities, Site remediation, and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site–derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

The Remedial Party and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as adjacent building foundations). All excavation activities will be in accordance with 29 CFR 1926 Subpart P.

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP.

Each targeted excavation area and structures to be remediated (USTs, vaults and associated piping, etc., if identified during remedial activities) will be removed and Confirmation sampling will be used to provide evidence that the Site's soil cleanup objectives were obtained where feasible, or Documentation sampling will be conducted in areas where Site boundaries, utilities or other obstructions prevent further excavation, to document the level of contamination remaining.

As discussed Site related development will not be conducted at the Site until remedial actions are complete. Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

All primary contaminant sources (including but not limited to tanks and targeted excavation areas, if any) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the FER.

### 4.4.4 Materials Transport Off-Site

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Truck transport routes are as described in **Section 5.2.6**. All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

Proposed in-bound and out-bound truck routes to the Site are shown in **Figure 9**. These are the most appropriate routes and consider: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation.

Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

Material transported by trucks exiting the Site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the Site. Washing of trucks prior to exiting the Site is discussed in **Section 4.4.3** above.

### 4.4.5 Materials Disposal Off-Site

The disposal locations will be determined prior to implementation of the remedial action and will be reported to the NYSDEC Project Manager. The total quantity of material expected to be disposed off-Site will be determined based on the results of the PDI, discussed in **Section 4.2** above.

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC Project Manager. Unregulated off-Site management of materials from this Site is will not occur without prior formal NYSDEC project manager approval.

Material including historical fill material and contaminated soils that does not meet unrestricted SCOs is prohibited from being taken to a New York State C&D recycling facility (6NYCRR Part 360.5 registered or permitted facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a waste profile signed by the Remedial Party submitted to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This profile will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The profile will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents along with but not limited to all manifests, weigh tickets, etc. will be included in the FER.

A contained-in determination from NYSDEC may allow soil/fill material to be disposed off-site at a permitted landfill facility as non- hazardous waste. A contained-in determination will need to be obtained from the NYSDEC. Contained-in determination requests must be sent to the NYSDEC Division of Materials Management (DMM) dedicated mailbox, Contained-InRequest@dec.ny.gov, with a copy to Division of Environmental Remediation (DER) project manager and their supervisor.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled with 6 NYCRR Parts 360, 361, 362, 363, 364, and 365. The Remedial Engineer is responsible for assuring that site related material is properly characterized and is disposed off-site at a permitted facility based on the characterization results and in accordance with all applicable local, State, and Federal regulations.

All soil/fill material excavated and removed from the Site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from the Site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this Site will not occur without prior formal (written) NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified and provided to the NYSDEC project manager prior to the start of remedy implementation at the Site. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and associated documentation will be reported in the FER. The documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

The FER will include an accounting of the destination of all Site material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all Site material must also include records/manifests/weight tickets and approvals for receipt of the material. This information will also be presented in a tabular form as well as an appendix in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in and will be an appendix in the FER.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations. A contained-in determination will be obtained from the NYSDEC.

Appropriately Part 364 licensed haulers will be used for Site soil/fill material removed/transported from this Site and will be in full compliance with all applicable local, State and Federal regulations.

Waste characterization sampling will be performed for the purposes of off-Site soil disposal at permitted facilities and in conformance with applicable federal, state and local laws rules and regulations and facility-specific permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC associated with waste characterization activities will be reported in the FER. All data available for soil/material to be disposed at a permitted facility must be submitted to the permitted disposal facility with suitable explanation prior to shipment and receipt. Waste characterization data will be used solely for complying with requirements for off-site disposal at a permitted facility. Waste Characterization sampling cannot be utilized for:

- Delineating the extent of contamination required for remediation at a Site.
- Replacing or substituting data collected as part of Site Characterization and/or Remedial Investigation.
- Replacing or substituting confirmation or documentation sampling as described in NYSDEC DER-10, Section 5.4.
- To modify remedial decisions as formalized in a NYSDEC approved Decision Document or Record of Decision.

### 4.4.6 Materials Reuse On-Site

On-site soil may be reused for backfill on the Site with prior approval obtained from the NYSDEC project manager prior to placement. Soil/fill material that exhibits impacts based on field screening must be staged separately from soil/fill material proposed to be reused on the Site. On-site soil/fill material proposed to be reused on the Site will be sampled to ensure that the soil/fill material meets the Site's SCOs as presented in **Table 4**. The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.

A "Request to Import/Reuse Fill Material" form will be submitted to the NYSDEC project manager for review and approval prior to material reuse/placement on the Site. A copy of the form is presented in **Appendix E**. Any demolition material proposed for reuse on-Site will be sampled for asbestos and the results will be reported to the NYSDEC project manager for approval prior to reuse at the Site. Concrete crushing or processing on-Site is prohibited without NYSDEC project manager approval. On-site reuse of demolition material will require NYSDEC project manager approval prior to reuse at the Site. Organic matter (e.g., wood, roots, stumps) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site and may only be reused on-site with written prior approval from the NYSDEC project manager. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface with NYSDEC project manager approval, and will not be reused within the cover system or within landscaping berms. Contaminated on-Site material may only be used beneath the Site's cover as backfill for subsurface utility lines with prior approval from the NYSDEC project manager.

Since remedial measures on the Portion of the Former Vacuum Oil Refinery Site (C828190) are anticipated to occur concurrently with 5 (C828162B) and 15 (C828192C) Flint Street remedial measures, and since fill material and soil on these three BCP sites is similar, material may be reused across the three BCP sites in accordance with NYDEC issued Beneficial Use Determination (BUD). If the soil/fill material reuse across the three BCP sites is requested, Roux will coordinate with the NYSDEC project manager regarding the specifics of the BUDs for these three sites. The NYSDEC DER BUD will need to be issued prior to any of the soil/fill material from the 3 sites to be reused across the 3 sites. At the time of this RAWP, no Site related BUD has been approved or issued by the Department. However, a BUD request has been submitted for reuse of uncontaminated concrete, concrete block and brick from the demolition of the building on 5 Flint Street (C828162B) within C828190.

### 4.4.7 Fluids Management

All liquids to be removed from the Site, including excavation dewatering, decontamination waters, and groundwater monitoring well purge and redevelopment waters, will be handled, transported, and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Site fluids will be containerized, characterized, and disposed off-site. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the Site and will be managed off-site unless prior approval is obtained from the NYSDEC project manager. Site fluids may be discharged into the municipal sewer system through an approved Monroe County DES Discharge Permit. A copy of the permit will be submitted to the NYSDEC project manager prior to the discharge of any fluids under the permit. The NYSDEC project manager will receive notification of the discharge at least 24 hours in advance.

Discharge of water generated during large scale construction activities and remedial construction to surface waters (i.e. a local pond, stream, river and/or storm sewer) is prohibited without a NYSDEC issued SPDES permit.

### 4.4.8 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. In areas of the Site where contaminated soil will remain, the survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the remaining contamination. The SMP, in particular the EWP, for the Site will detail the procedures to be adhered to if the Site-wide cover system is breached or the Site-wide cover system is altered. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the remaining contamination in the SMP. A map showing the survey results will be included in the FER and the SMP.

### 4.4.9 Backfill from Off-Site Sources

All materials to be imported to the Site will be approved by the Remedial Engineer and NYSDEC project manager prior to importation to the Site. A “Request to Import/Reuse Fill Material” form with all the necessary supporting data (e.g., sieve analysis, laboratory analytical data) will be submitted to the NYSDEC project manager for review and approval prior to importation of any backfill to the Site. The NYSDEC project manager will be allowed a minimum of 5 business days for review. A copy of the form is presented in **Appendix E**.

Materials will be imported to the Site to be used to backfill the four excavation areas and to establish the Sites cover system in areas where the upper two feet of exposed surface soil exceeds the Site's SCOs. Based on the extents of planned excavation areas and cover system presented in the Decision Document for the Site, approximately 32,000 $yd^3$ of fill material will be imported for use as excavation backfill, and approximately 37,300 $yd^3$ of fill material and 12,500 $yd^3$ of top soil will be imported for use as site cover.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site. Solid waste will not be imported onto the Site.

All imported soils will meet NYSDEC approved backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for restricted residential. Also see **Table 4** of the RAWP**.** Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Soil sampling frequency will be in accordance with DER-10 Table 5.4(e) unless prior approval for modification of sampling frequency is obtained from the NYSDEC project manager.

Backfill material that may be used for this Site includes soil, gravel, or stone. Non-soil material must pass the 100-sieve analysis.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

### 4.4.10 Stormwater Pollution Prevention

As discussed in **Section 5.1.7**, an ESCP is included in **Appendix F** of this report. Erosion and sediment control measures will be installed and inspected once a week and after every storm event in accordance with the Site-specific ESCP. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC project manager. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and straw bale check functional. All undercutting or erosion of silt fence toe anchors shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for the installation and replacement silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the RAWP/ESCP shall be observed to ensure that they are operating correctly. Discharge locations or points (if present) shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

### 4.4.11 Excavation Contingency Plan

In the unlikely event underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation, sampling will be performed on product, sediment and surrounding soils, etc. in accordance with DER-10. The NYSDEC project manager will be promptly notified of the discovery. Chemical analytical work will be for full scan parameters (TAL metals; cyanide, TCL volatiles and semi-volatiles, TCL pesticides, PCBs, 1,4-dioxane, and PFAS). Analyses will not be otherwise limited without prior NYSDEC project manager approval. Discovery of unknown USTs will be handled in accordance with NYSDEC DER-10, Section 5.5 and will be closed in accordance with NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by field screening during invasive Site work will be promptly communicated by phone within 2 hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in daily and monthly progress reports and in the FER.

#### 4.4.11.1 Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the Remedial Party will undertake the following steps for site preparedness prior to the event and response after the event.

*Storm Preparedness*

Preparations in advance of an extreme storm event (e.g. hurricane, tropical storm or other high rain or wind event) will include the following: containerized hazardous materials will be disposed at a permitted landfill facility and fuels will be removed from the site; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the site to high ground or removed from the site; an inventory of the site with photographs will be performed to establish conditions for the site and equipment prior to the extreme storm event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be disposed off-site at a permitted facility; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

*Storm Response*

At the conclusion of an extreme storm event, as soon as it is safe to access the site, a complete inspection of the site will be performed. A site inspection report will be submitted to NYSDEC at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and stockpiled material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911.

Petroleum spills will be reported to NYSDEC Spills Hotline within 2 hours of identification and consistent with State regulations and guidance. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed.

Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary.

If soil and/or fill materials are discharged off site to adjacent properties, property owners and NYSDEC NYSDOH project managers will be notified immediately, and corrective action work plan designed to remove and clean dislocated material will be submitted to NYSDEC and NYSDOH project managers. The corrective action work plan will be implemented following approval by NYSDEC and NYSDOH project managers. The Remedial Party will be responsible for obtaining access from the impacted property owner. Impacted offsite areas will need to be addressed and characterization under the corrective action work plan.

If onsite petroleum spills are identified, a qualified environmental professional or the Remedial Engineer will determine the nature and extent of the spill (reportable quantities) and report to NYSDEC's spill hotline at (800) 457- 7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it will be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYSDEC.

*Storm Response Reporting*

A site inspection report will be submitted to NYSDEC at the completion of site inspection. Site conditions will be compared to the inventory of site conditions and stockpiled material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the NYSDEC and NYSDOH project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number.

Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and corrective action work plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYSDEC Spills Hotline; description of corrective actions; schedule for submittal of correction action work plan and implementation of corrective actions.

This report will be completed and submitted to NYSDEC and NYSDOH project manager with photographs within 24 hours of the time of safe entry to the site after the storm event.

### 4.4.12 Community Air Monitoring Plan

CAMP will be conducted during any ground intrusive activities and activities involves the movement of soil/fill material (e.g., stumping/grubbing, grading, load-out) at the Site. Monitoring will include particulate and VOCs. Fugitive dust/visible dust will be mitigated immediately. The CAMP is included as **Appendix G**. A map showing the location of mobile sampling stations will be provided in each daily CAMP report. The Special CAMP will be implemented as needed at the Site.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers within 24 hours and included in the Daily Report which will detail the correction actions taken to resolve the exceedance.

### 4.4.13 Odor, Dust, and Nuisance Control Plan

#### 4.4.13.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site. Specific odor control methods to be used on a routine basis will include limiting open excavation areas and covering excavated soil (e.g., with polyethylene sheeting or in covered roll off containers, spraying of odor suppressant). If nuisance odors are identified or odor complaints received, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. The Remedial Party will notify the NYSDEC and NYSDOH project managers of all odor events and of all other complaints about the project and will be documented in the Daily Report. Implementation of all odor controls, including the halt of work, will be the responsibility of the Remedial Engineer.

All necessary means will be employed to prevent on- and off-Site nuisance odors. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams or other odor suppressant materials to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors at the Site boundaries and in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

#### 4.4.13.2 Dust Control Plan

A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below and will comply with NYSDEC DER-10 Appendix 1B – Fugitive Dust Control. No visible dust will leave the Site during remedy implementation.

- Dust suppression will be achieved through the use of available on-site water at suitable supply and pressure for use in dust control.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water spraying.

#### 4.4.13.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work. The plan for rodents has and will continue include consultation and contracting (as needed) of a NYS licensed pest control professional (Town and Country Solutions of Rochester, NY) to ensure Site clearing and Site grubbing, and remedial work does not cause off-Site migration of pests.

A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to any applicable municipal noise control standards. This plan will include adherence to City Municipal Code Chapter 75, Noise, Section 10, Construction Activities. As such, on-Site activities will occur only between the hours of 7:00 a.m. and 10:00 p.m. If noise complaints are received Roux will confer with the City and NYSDEC to determine appropriate actions. Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to the City noise ordinance.[10]

[10] City of Rochester, NY Municipal Chapter 75, Section 10. https://ecode360.com/8676945

# 5.0 REMEDIAL ACTION PROGRAM

The following sections describe the Remedial Action program for the implementation of the Site's selected remedy as well as the associated reporting.

## 5.1 Governing Documents

The following Governing Documents are included as part of this RAWP and discussed below:

- Site Specific Health and Safety Plan (HASP)
- Community Air Monitoring Plan (CAMP)
- Quality Assurance Project Plan and Field Sampling Plan (QAPP/FSP)
- Construction Quality Assurance Plan (CQAP)
- Soil/Materials Management Plan (SoMP)
- Erosion and Sediment Control Plan (ESCP)
- Contractors Site Operations Plan (SOP)
- Citizens Participation Plan (CPP)

### 5.1.1 Standards, Criteria and Guidance (SCGS)

A table listing SCGs which are potentially applicable to the Site is provided in **Section 2.5.3** above and will be consulted and adhered to as applicable.

#### 5.1.1.1 Green and Sustainable Remediation and Climate Resiliency

Project design specifications have been incorporated into the remedial design program and include detailed requirements to achieve the Green and Sustainable Remediation (GSR) goals. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major GSR components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Reduction in vehicle idling, including both on and off-road vehicles and construction equipment;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing beneficial reuse of materials which would otherwise be considered a waste (i.e., use of Beneficial Use Determination [BUD] soils);
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial design program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis was completed. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use were estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, have been incorporated into the remedial design program, as appropriate. SiteWise™ Model spreadsheets were used to develop an environmental footprint analysis and estimate environmental impacts associated with the selected remedy for the Site. Specific inputs and outputs to the SiteWise model are presented in **Appendix H**. SiteWise™ results indicate that the selected remedy for the Site produces 1,364 tons of greenhouse gas emissions, 5.16 metric tons of NOx (nitric oxide and nitrogen dioxide) emissions and 10.57 metric tons of total dust emissions and uses 22,113 million metric British thermal units of energy and 57,530 tons of non-hazardous landfill space.

The Site is located within an environmental justice area that works to address environmental issues and concerns that affect primarily low income and minority communities through grant opportunities, enforcement of environmental laws and regulations, consultation, guidance, and enhance public participation.

Additionally, the remedial design includes climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise have been identified, and the measures to minimize the impact of climate change on potential identified vulnerabilities are summarized below:

| Project Hazard | Potential Implications |
|---|---|
| Sea Level Rise and Floodplain | **Current FEMA Flood Zones Maps:** Portions of the Site are located within the current 100-year flood plain or 500-year flood plain. The FEMA coastal flooding risk rating is relatively low, with a risk index score of 34.10 out of 100.<br>The FEMA coastal flooding risk rating is very low, with a risk index score of 42.1 out of 100. |
| Precipitation | **2035:** 0.9% to 5.% change in average annual precipitation.<br>**2060:** 1.9% to 10.3% change in average annual precipitation. |
| Extreme Heat | Historical average 1 day over 100 F.<br>**2035:** 0 days over 100 F.<br>**2060:** 1 to 2 days over 100 F<br>The FEMA risk index rating for heat waves is relatively moderate, with a risk index score of 89.7 out of 100.<br>The FEMA risk index rating for drought is very low, with a risk index score of 40.2 out of 100 (based on Agricultural [crop only] impacts). |
| Extreme Weather Events | **2035:** 4.3% to 10.7% change in 100-year storm intensity.<br>**2060:** 8.4% to 20.9% change in 100-year storm intensity. |
| Seismic Activity | The potential impact due to seismic activity in the Site area is relatively low, with a risk index of 84.4 out of 100. |
| Hazardous Material/Toxic Chemical Spills | The NYSPILLS database does not indicate any onsite spill or releases. It is not anticipated that any petroleum bulk storage (PBS) will be included as part of remediation. |

| Project Hazard | Potential Implications |
|---|---|
| Wildfire | The USEPA Wildfire Conditions & Risk Map for Water Utilities reports fires larger than 1,000 acres throughout the period of 1984 through 2019. No wildfires have been reported within Monroe County during this time period.<br>The FEMA risk index rating for wildfire is very low, with a risk index score of 60.8 out of 100. |
| Landslide | The United States Geological Survey (USGS) Landslide Inventory summarized the landslide confidence levels from High confidence in extent or nature of landslide through possible landslide. The Site is not located within any of the landslide confidence areas. |

Notes:

1.) The FEMA Risk Ratings are a comparison of the risk factors for the Site area to the rest of the United States.
2.) The FEMA Risk Index scores are calculated using data for a single hazard type and reflect an area's relative risk for that hazard type.
3.) The 2035 and 2060 scenarios are based on the USEPA Climate Scenarios Projection Maps. These scenarios define a range of future climate conditions that can be considered for each time period (short- and long-term), from the hottest (and driest) to the wettest model results. All climate models project warming, the extent of warming varies per scenario. Note that due to the inherent uncertainty in using models to project future climate conditions, all scenarios have been considered to evaluate the resilience to impacts that could result from possible future climates and high impact/low probability events.

Additionally, the American Society for Testing and Materials (ASTM) Standard Guide for Greener Cleanups will be taken into consideration during remediation implementation to minimize total energy use, air pollutants and greenhouse gas emissions, water use and impacts to water resources, recycling of materials and waste, and promote the protection of land and ecosystems.

Progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the FER, including a comparison to the goals established in the remedial design program.

### 5.1.2 Site Specific Health and Safety Plan (HASP)

The Site-specific HASP is included in **Appendix I**. All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by the Federal Occupational Safety and Health Administration (OSHA).

The Remedial Party as well as associated parties preparing the remedial documents submitted to the State and those performing the construction work are completely responsible for the preparation of an appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.

The HASP and requirements defined in this RAWP pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

The Site Safety Coordinator will be Nicholas Suraci. A professional profile has been provided to NYSDEC project manager and included in **Appendix J.**

All individuals involved with the implementation of the remedial actions will have 40 Hr. HAZWOPER certifications with certification of current 8 Hr. refresher. The certifications will be made available upon request from the Department and NYSDOH.

Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

### 5.1.3 Community Air Monitoring Plan (CAMP)

The Site-specific CAMP is included in **Appendix G.** The CAMP has been prepared to ensure the subsurface investigation and remediation activities to be performed at the Site do not adversely affect the residents and downwind community, and to preclude or minimize airborne migration of Site contaminants. Compliance with the CAMP is required during all intrusive activities and all soil/fill material movement activities – monitoring for particulate matter and volatile organic compounds (VOCs).

The CAMP is consistent with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan, which is included as Appendix 1A of the New York State Department of Environmental Conservation (NYSDEC) "DER-10 Technical Guidance of Site Investigation and Remediation" (DER-10), dated May 3, 2010.

### 5.1.4 Quality Assurance Project Plan (QAPP)

The QAPP/FSP (**Appendix D**) includes all procedures to be followed for quality assurance and quality control as well as sampling and analysis. The QAPP/FSP includes all requirements outlined in DER-10 Section 2.4.

### 5.1.5 Construction Quality Assurance Plan (CQAP)

Quality assurance/quality control procedures for all construction activities associated with implementation of the RAWP are established in the Construction Quality Assurance Plan (CQAP), which is set forth in this section of the RAWP. The CQAP describes the Site-specific construction quality assurance and control measures that will be implemented at the Site during implementation of the RAWP. The CQAP includes a program for construction observation and testing to verify performance of the remedial construction in accordance with the RAWP.

#### 5.1.5.1 Organization / Personnel

The implementation of the remedial construction will be sequenced based on construction requirements, environmental considerations, and logistics based on entry points and staging areas. The project team is comprised of the Remedial Party, and the construction manager, contractors, and consultants specializing in one or more critical aspects of the project. It is understood by the project team that close coordination and proper sequencing of all activities occurring on the Site will be crucial to the success of the remediation. The project team and associated responsibilities are as follows. If changes are made to the project team, the CQAP will be amended and the NYSDEC project manager will be notified.

| Company | Project Role | Name (title) | Contact Info (email or phone) |
|---|---|---|---|
| City of Rochester | Property Owner / Volunteer | Jane MH Forbes, MPA (Associate Environmental Specialist) | jane.forbes@cityofrochester.gov (585) 428-7892 |
| 10 Flint Street LLC | Volunteer | Michael Roux | mroux@rouxinc.com (631) 630-2425 |
| Roux D.P.C. | Environmental Consultant (working under the COA) | Noelle Clarke, P.E. (Remedial Engineer PE of Record for the Site) | nclarke@rouxinc.com (631) 232-2600 |
| | | Nicholas Suraci (Qualified Person, SSO) | nsuraci@rouxinc.com (716) 725-6969 |
| | | Alex Wirth (Quality Assurance Officer) | awirth@rouxinc.com (585) 895-4957 |
| Roux MA | Environmental Consultant (not working under the COA) | Ian Reed (Project Principal) | ireed@rouxinc.com (781) 569-4000 |
| | | Eric Runstrom (Project Manager) | erunstrom@rouxinc.com (781) 569-4000 |
| Roux D.P.C. (Contractor) | Remedial Contractor | Michael Lesakowski | mlesakowski@rouxinc.com (716) 856-0599 |
| | | John Deth (Field Manager) | jdeth@rouxinc.com (716) 725-6952 |
| Alpha Analytical, a Pace® Analytical Services Laboratory | Environmental Laboratory | Jennifer Byrnes (Project Manager) | jbyrnes@alphalab.com (508) 898-9220 |

#### 5.1.5.2 10 Flint Street, LLC (Volunteer) – General Site Remediation Oversight

*Michael Roux, Site Remediation Project Executive*

As 10 Flint's project executive for the Site, Mr. Michael Roux will provide high level general oversight of all aspects of the remediation. Direct communication with regulatory agencies will be the Roux MA Project Manager (Eric Runstrom) or the Remedial Engineer, Noelle Clarke. As discussed, 10 Flint will be the primary entity undertaking the remedial activities at the Site. 10 Flint or its designated representative, Roux DPC will be responsible for the review and submission of all documents, reports, correspondence, etc., required by the RAWP and/or the BCA with the NYSDEC.

The Remedial Party or its designated representatives, Roux MA and Roux DPC will be responsible for community notifications and addressing concerns with the adjacent property owners and local community on all remediation-related issues. The Remedial Party will be immediately notified by the on-Site team of any complaints or concerns regarding the work raised by the adjacent property owners and or the general public. In addition, the Remedial Party or its designated representatives (Roux MA and Roux DPC) will provide notice to the Department of issues raised by adjacent property owners and the general public.

### 5.1.5.3 City of Rochester (Volunteer) – Site Remediation Oversight and Regulatory Interaction

*Jane MH Forbes, MPA, Associate Environmental Specialist*

As the City's Project Representative for the Site, Jane Forbes will coordinate communications with regulatory agencies and will provide high level general oversight of all aspects of the remediation. As discussed, 10 Flint will be the primary entity undertaking the remedial activities at the Site; however, the City will provide oversight of Site remediation and will participate in regulatory interactions. The City will review documents, reports, correspondence, etc., required by the RAWP and/or the BCA with the NYSDEC.

### 5.1.5.4 Roux Environmental Engineering and Geology, D.P.C. - Remedial Engineer, Remedial Compliance and SSO

*Noelle Clarke, P.E. – Remedial Engineer*
*Nicholas Suraci – Qualified Person, Site Safety Officer (SSO)*
*Alex Wirth – Quality Assurance Officer*

Roux Environmental Engineering and Geology, D.P.C. (Roux DPC) will provide continual review of all quality control measures implemented by the contractors to ensure compliance with the Site's remedial objectives. As such, Roux will provide oversight services for the duration of the remedial activities and will have a Qualified Person who is a direct report to the Remedial Engineer on-Site at all times. Roux will be responsible for managing the transportation and disposal of contaminated waste and materials generated during the construction/remedy implementation at permitted facilities and in accordance with all applicable local, State, and Federal regulations. Material for disposal could include:

- fill/soil/spoils;
- contaminated pipe, concrete, bricks or other construction debris;
- personal protective equipment and other miscellaneous debris; and
- construction wastewater which includes but not limited to decontamination liquids, excavation dewatering, etc.

*Noelle Clarke, P.E., Remedial Engineer*

The Remedial Engineer (i.e., P.E. of Record) for this project/Site will be Noelle M. Clarke of Roux DPC. Roux DPC holds a Certificated of Authorization to conduct engineering work in NYS. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site (BCP Site No. C828190). The Remedial Engineer will certify in the FER that the remedial activities were observed by qualified environmental professional [as defined Part 375-1.2(ak)] and was under her direct supervision. The Remedial Engineer will also certify that the remediation requirements set forth in the Department approved Remedial Action Work Plan and any other relevant provisions of New York Environmental Conservation Law (NYECL) Section 27-1419 have been achieved in full conformance with the RAWP. Additional Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will coordinate and oversee the work of the contractors and subcontractors involved in all aspects of remedy implementation including but not limited to remedial construction, including soil excavation, stockpiling, characterization, removal, and disposal, air monitoring, emergency spill response services, import of backfill material, and management of waste transport and disposal. The Remedial Engineer or the Roux MA project manager will be responsible for all communication with NYSDEC and NYSDOH project managers.

The Remedial Engineer will review all remedial plans submitted by contractors for compliance with this Remedial Action Work Plan and will certify compliance in the FER. Additionally, Ms. Noelle Clarke, the "Remedial Engineer," a professional engineer licensed in the State of New York, will be responsible for certifying that the remediation construction was completed in substantial conformance with the NYSDEC-approved RAWP, NYSDEC-issued Decision Document, and/or any NYSDEC approved field changes. In addition, the Remedial Engineer will provide P.E. stamped and signed as-built drawings to be included in the FER.

*Nicholas Suraci – Qualified Person, Site Safety Officer (SSO)*

Nicholas Suraci will act as a Qualified Person who is a direct report to the Remedial Engineer and the Qualified Person or, another similar qualified person, will be on-Site at all times. The Qualified Person will report directly to the Remedial Engineer to coordinate all Site activities being implemented to achieve the remedial objectives defined in the RAWP. Nicholas Suraci will also act as the SSO and implement the CAMP. Nicholas will provide continual review of all quality control measures implemented by the contractors to ensure compliance with the Site-specific HASP. CAMP monitoring data will be reported daily to the SSO and will be maintained on-Site. Action level exceedances will be reported to the SSO, and appropriate communication and corrective actions taken. All CAMP monitoring records will be included in the overall FER that will be submitted to the NYSDEC and NYSDOH project managers and will include all the CAMP data collected, daily monitoring station location maps, and copies of the action limit reports with corrective action details. If an action limit report is generated due to VOC or particulate exceedances, the NYSDEC, NYSDOH as well as the City Project Representative will be notified within 12 hours of the exceedance and what corrective actions were taken to mitigate the exceedance.

*Alex Wirth - Quality Assurance Officer*

The Quality Assurance Officer is responsible for conducting periodic reviews, inspections, and audits to ensure the data collection is conducted in accordance with the QAPP and FSP. The Quality Assurance Officer's responsibilities range from ensuring effective field equipment decontamination procedures and proper sample collection to the review of all laboratory analytical data for completeness and usefulness. The Quality Assurance Officer reports to the Remedial Engineer and makes independent recommendations to the field team.

#### 5.1.5.5 Roux MA – Environmental Consultant

*Ian Reed – Project Principal*
*Eric Runstrom– Project Manager*

Roux MA, along with the Remedial Engineer, will communicate with NYSDEC and NYSDOH project managers, and the City's Project Representative, as a designated representative of the Remedial Party. Roux MA will coordinate with Roux DPC to ensure all planning and execution of Site related activities, including tasks completed, remedial measures achieved, and any issues of concern, are communicated to NYSDEC and NYSDOH project managers and City representatives, and will provide notice to the Department of issues raised by adjacent property owners and the general public. Roux MA will provide support to the Remedial Engineer and Roux DPC to ensure all quality control measures implemented by the contractors to ensure compliance with the Site's remedial objectives.

### 5.1.5.5 Roux DPC (Contractor)-Remedial Contractor

*Michael Lesakowski – Remedial Contractor*
*John Deth– Field Manager*

Roux DPC (Contractor) a NYS licensed contractor, will be contracted to execute all earthwork, including debris removal and demolition, excavation, backfill, compaction, loading of material for disposal, grading, and restoration. Zoladz, a NYS licensed contractor, will be subcontracted to perform tree clearing and grubbing. All subcontractors and their key personnel will be interviewed and vetted by Roux the Remedial Party to ensure sufficient experience and competency with the relevant remedial technologies are available to the crew(s) implementing the RAWP.

*John Deth - Field Manager*

John Deth will act as the Field Manager and will be the on-Site representation of the Remedial Contractor. He will coordinate with Qualified Person for all Site activities being implemented to achieve the remedial objectives defined in the RAWP.

### 5.1.5.7 Environmental Laboratory

Alpha Analytical Laboratories (Alpha) will be utilized for all remediation action-related analytical requirements. If needed, Eurofins Environment Testing America Laboratories (Eurofins) will be maintained as an alternative laboratory for this project. Eurofins and Alpha are NYSDOH ELAP certified laboratories for the analytical methods to be used for the analysis. All results will be reported in EDDs prepared in accordance with NYSDEC requirements. Formal laboratory qualifications and QA/QC information packages for the analytical laboratories proposed for the project will be submitted to the NYSDEC project manager. See Attachment 4 of the QAPP (**Appendix D**) for the laboratory qualifications and information packages.

### 5.1.5.8 Surveying Firm

*Gregory J. Koester, PLS – Construction Quality Control*

Nussaumer & Clarke, Inc., a NYS licensed surveying firm, will be contracted to provide lines, grades, boundaries, benchmarks, topographic surveys, as built drawings, and any other survey work required for the proper execution and documentation of the work as required by the RAWP.

### 5.1.5.9 Waste Transporters and Disposal Facilities

Waste from the Site will be transported to permitted waste/landfill disposal facilities. Currently, Site remedial waste including excavated soils are planned to be disposed at Waste Management – Mill Seat Landfill of Bergen, NY (Facility ID: 8264800014). This CQAP will be updated with the names of the facility or facilities, as required. If any is generated, non-impacted (i.e., no evidence of impacts such as odors, visual, PID) construction debris (concrete, concrete block, brick) will be transported to a registered construction and demolition disposal facility.

As required, a qualifications package will be provided by each vendor contracted to transport waste from the Site to permitted disposal facilities. The package will include the following:

- Proof of insurance and all current NYS waste transport permits (Part 364 permitted haulers) for the waste type(s) being transported.
- Letters of Commitment or other appropriate documentation from all waste haulers and from all permitted transfer, treatment, storage, and disposal facilities to be used for the project. The letters of commitment shall specifically identify the types and quantities of waste that the facility will be able

to accept, the permit numbers for all facilities at which the waste will be accepted and all waste characterization requirements, if additional to waste characterization samples already collected. In the event that a permitted facility (such as a privately owned treatment works) is prohibited from issuing a letter of commitment without a sample of the waste, a conditional-type letter will be acceptable. Such a conditional letter shall specifically state what types and quantities of waste the facility will accept.

- For each permitted waste hauler.
  - Name and federal and state identification numbers, as applicable.
  - Address.
  - Name of responsible contact for the hauler.
  - Telephone number for the contact.
  - List of types and sizes of all transport vehicles and equipment to be used.
  - A description of proposed transportation route, method, and procedures for hauling waste material, including type of vehicles that will be used for each type of waste.
  - Copies of any and all necessary permits and authorizations for each type of waste transported.
- For each permitted transfer, treatment, storage and disposal facility, the Contractor shall submit the following information.
  - Facility name and federal and state identification numbers.
  - Facility location.
  - Name of responsible contact for the facility.
  - Telephone number for contact.
  - Signed letter of agreement to accept waste.
  - Unit of measure utilized at facility for costing purposes.
  - Copies of all permits, licenses, letters of approval, and other authorizations to operate, held by the proposed facility as they pertain to receipt, and management of waste derived from this Contract.

#### 5.1.5.10 Construction Quality Control Testing

Implementation of quality control testing and measurement will be performed by the contractors conducting the specific Site tasks, as required. The quality control officer as listed in Section 5.1.5.4 will be responsible for providing documentation of all testing and measurement results to the Remedial Engineer. The Remedial Engineer will be responsible for verifying that all quality control testing has been conducted in compliance with the RAWP and as specified herein.

Prior to initial quality control testing procedures, the quality control officer will:

1. Verify that the testing procedures are within the manufacturer's recommendations.
2. Verify that the facilities' testing equipment are available and comply with testing standards.
3. Check testing instrument calibrations against certified standards.
4. Verify the recording forms, including all the test documentation requirements have been prepared.

Qualifications of all independent environmental testing firms and laboratories will be submitted to the Remedial Party for approval prior to any quality control testing and/or lab analysis as an obligation of this CQAP.

Specific task-driven testing/certification obligations as they relate to environmental aspects of the project are as follows:

- A New York State-licensed surveyor will conduct all of the necessary measurements associated with the targeted excavations, sampling locations, extent of the site cover system, the grade covered by the demarcation layer, and the grade of cover soils.
- Final delineation samples will be collected as part of PDI activities to provide evidence that the extents of the remedial excavations and Site cover system are sufficient to achieve the Site's soil cleanup objectives (Confirmation samples) or document the level of contamination remaining (Documentation samples). Final delineation samples will be submitted to a laboratory with the appropriate ELAP method certifications to conduct the analysis. An interim report documenting the PDI sampling data will be submitted to the NYSDEC and NYSDOH PMs for review.
- Groundwater samples will be collected as part of groundwater performance monitoring after the remedy has been completed and prior to the issuance of the Certificate of Completion. samples will be submitted to a laboratory with the appropriate ELAP method certifications to conduct the analysis. Groundwater sampling data collected as part of groundwater performance monitoring will be submitted to the NYSDEC and NYSDOH PMs for review.
- Soil and fill designated for off-Site disposal will require waste characterization analyses. Waste characterization sampling and analysis may be conducted in-Situ prior to excavation or ex-Situ. Ex-Situ waste characterization samples will be collected from individual stockpiles, and no soil will be added or removed from the stockpile once the samples have been collected. Waste characterization analysis parameters and frequency for any additional samples are determined by the waste disposal facility's acceptance requirements. As required, excavated soils will be tested in accordance with the soil disposal facility's analytical acceptance requirements that will be provided to NYSDEC project manager when available. Waste characterization results will be provided to the disposal facility for review and will be included in the FER.
- The CAMP requires continuous, real-time monitoring of VOCs and particulates during all ground intrusive and all soil/fill material movement activities at the Site. The air monitoring equipment will be inspected periodically throughout each workday with ground intrusive and soil/fill material movement activities to check and manually record the concentrations of VOCs and particulates and to ensure that the equipment is working properly. The air monitoring equipment will be repaired, recalibrated, and/or replaced, as necessary. These air monitoring data will be collected and logged for review daily by Roux and made available for NYSDEC and NYSDOH review. Action Limit Reports will be completed to document any and all action level exceedances and corrective action completed and will be submitted to NYSDEC and NYSDOH project managers, as described in the CAMP.
- All testing data will be managed in accordance with the above requirements and will be included in the FER. The FER will be prepared by the Remedial Party upon completion of all remedial objectives defined in the NYSDEC-approved RAWP and NYSDEC-issued Decision Document.

#### 5.1.5.11 Project Coordination

During implementation of the remedial action construction, progress meetings/conference calls will be conducted periodically to assess the progress of the work, overall progress to date, quality control requirements, environmental and construction health and safety requirements, and future progress expectations. Those in attendance will include representatives from the Remedial Party, Roux, NYSDEC and NYSDOH project managers, NYSDEC field technicians/inspectors, and other subcontractors, as necessary. This will provide the opportunity for all Site tasks to be integrated and discussed collectively and provide for coordination of all Site activities to maintain the overall construction schedule. Routine task meetings will also be conducted on an as needed basis to insure proper communication between the contractors, tradesman, and supervisory personnel.

### 5.1.6 Soil/Materials Management Plan (SoMP)

The SoMP is included in **Section 4.4** of this RAWP.

### 5.1.7 Erosion and Sediment Control Plan (ESCP)

An Erosion and Sediment Control Plan (ESCP) for the Site is included in **Appendix F**.[11] Erosion and sediment control measures (i.e., silt sock, straw bales, silt fence) will be put in place to ensure no potentially contaminated stormwater is discharged from the Site in conformance with requirements presented in the New York State Standards and Specifications for Erosion and Sediment Control.

### 5.1.8 Contractors Site Operations Plan (SOP)

The Remedial Party including the Remedial Engineer has reviewed or will review all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms, or will confirm, that they are in compliance with this RAWP. The Remedial Engineer is responsible for ensuring that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH project managers in a timely manner and prior to the start of any field work.

### 5.1.9 Citizen Participation Plan

A certification of mailing will be sent by the Remedial Party to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on [specific date] and that it contained all of applicable project documents. No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

The approved Citizen Participation Plan for this project is attached in **Appendix K**.

Document repositories have been established at the following locations and contain all applicable project documents:

Phillis Wheatley Community Library
33 Dr. Samuel McCree Way
Rochester, NY 14608
(585) 428-8213
Branch Site Manager: Lori Frankunas
E-Mail: Lori.Frankunas@Libraryweb.org
Hours:

| | |
|---|---|
| Wednesday | 11 AM–7 PM |
| Thursday | 11 AM–6 PM |
| Friday | 11 AM–5 PM |
| Saturday | 10 AM–2 PM |

[11] In accordance with item 4 of the *Frequently Asked Questions About Permit Requirements of the SPDES General Permit (GP-02-01) for Stormwater Discharges from Construction Activities Version 3.0 - September 12, 2006. https://extapps.dec.ny.gov/docs/water_pdf/constrfaq.pdf*, a State Pollutant Discharge Elimination System (SPDES) permit is not required for the Site since it is solely serviced by combined sewers, as a result, a Stormwater Pollution Prevention Plan (SWPPP) is not required.

| | |
|---|---|
| Sunday | Closed |
| Monday | 11 AM–7 PM |
| Tuesday | 11 AM–6 PM |

In addition, an electronic repository can be accessed via DECInfo Locator at the following link: https://extapps.dec.ny.gov/data/DecDocs/C828190.

## 5.2 General Remedial Construction Information

### 5.2.1 Project Organization

A copy of professional profiles for the Remedial Engineer, Qualified Person, Quality Assurance Officer, Project Manager, and Field Manager for Roux DPC and the Project Principal, Project Manager Data Validator for Roux MA are presented in **Appendix J**.

### 5.2.2 Remedial Engineer

The Remedial Engineer (i.e., PE of Record) for this project/Site will be Noelle M. Clarke, P. E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the project (NYSDEC BCP Site No. C828190). The Remedial Engineer will certify in the FER that the remedial activities were observed by Qualified Environmental Professional under the direct supervision of the Remedial Engineer and that the remediation requirements set forth in the RAWP, Decision Document and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Work Plan. The certification language in the current FER template will be used verbatim with no modifications.

The Remedial Engineer will coordinate the work of contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal off-site at permitted facilities. The Remedial Engineer will be responsible to ensure that communication with NYSDEC and NYSDOH project managers is conducted by the assigned Roux MA personnel.

The Remedial Engineer will review all remedial plans submitted by contractors for compliance with this RAWP and will certify compliance in the FER.

### 5.2.3 Remedial Action Construction Schedule

A schedule for the major elements of the Remedial Action construction is presented in **Section 11**.

### 5.2.4 Work Hours

The hours for operation of remedial construction will conform to the Local, State, and Federal code requirements or according to specific variances issued by the appropriate agency. NYSDEC project manager will be notified by the Remedial Party of any variances issued. NYSDEC project manager reserves the right to deny alternate remedial construction hours.

### 5.2.5 Site Security

Security for the work, equipment, materials, supplies, facilities, personnel, and incidentals will be provided throughout the performance of the work at the Site. A perimeter chain-link fence is partially in place and will be expanded to encompass the work area and maintained by the Remedial Party and/or its contractors during

implementation of the remedial action. Appropriate signage (e.g. authorized personnel only, no trespassing, etc.) will be posted on Site fencing or other perimeter locations. The qualified person/SSO will maintain a sign in/sign out sheet for all visitors to the Site. Perimeter fencing will be installed (where not currently in place) to encompass the work area and maintained by Roux and its contractors during implementation of the remedial action to control site access. The fences and gates will be closed and locked whenever there is no activity on the Site, and any breaks or gaps will be repaired immediately. Temporary fencing (e.g., cones, caution tape, etc.) will supplement the perimeter fencing to delineate and secure the area of on-going remediation activities within the Site, such as soil stockpiles and health and safety exclusion zones.

### 5.2.6 Traffic Control

For any trucking required, the proposed truck routes for ingress and egress to the Site are shown in **Figure 9**. All trucks loaded with Site-derived materials will exit the vicinity of the Site using only these approved truck routes. These are the most appropriate routes and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of City-mapped truck routes; (c) prohibiting off-Site queuing of trucks entering the facility, (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the Site will be kept clean of Site related material (e.g. soil) during Site remediation.

The contractors operating on the Site will be responsible for providing all necessary personnel and materials (e.g., traffic lanes, safety cones) to control traffic entering and exiting the Site and for coordinating traffic control measures with the local Police Department, as necessary. Contractors operating on roadways shall be responsible for all applicable New York Department of Transportation (NYDOT) traffic control and notification requirements and incorporating those elements into this Traffic Control Plan.

### 5.2.7 Contingency Plan

The Contingency Plan for USTs and previously unidentified contaminant areas is described in **Section 4.4.11.**

### 5.2.8 Worker Training and Monitoring

All general Site workers such as, but not limited to, equipment operators, general laborers, supervisory personnel (defined in OSHA 1910.120 (e)(3)(i)) that will be involved with remedy implementation activities will have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations (40 Hour HAZWOPER training), will have current 8 hour HAZWOPER refresher certification, and will meet the medical surveillance requirements included in the HASP. Certifications will be made available upon request from NYSDEC and NYSDOH.

### 5.2.9 Required Permits/Authorizations

All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of any fieldwork associated with the remedial construction. Copies of all permits and government approvals will be provided to the NYSDEC project manager prior to the start of any fieldwork activities.

The Remedial Party has addressed all State Environmental Quality Review Act (SEQRA) requirements for this Site.

As discussed in **Section 1.1**, the planned end use for the Site is in conformance with the planned rezoning of the property to multi-family restricted residential mixed use as determined by the City ZAP and the master development plan for the BOA. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all federal, state and local governmental permits, certificates or other approvals or authorizations required to perform the remedial work is attached in **Table 1**. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Engineering Report. Copies of all permits associated with the remedy implementation are included in **Appendix L** of the RAWP.

Any planned remedial or construction work in regulated wetlands and adjacent areas will be specifically approved by the NYSDEC Division of Fish and Wildlife, Bureau of Ecosystem Health to ensure that it meets the requirements for compliance with those regulations and guidance documents prior to the start of construction. Nothing in the approved RAWP or its approval by NYSDEC should be construed as an approval for this purpose.

### 5.2.10 NYSDEC BCP Signage

A BCP project sign is no longer required.

### 5.2.11 Pre-Construction Meeting with NYSDEC

A project kick-off meeting will be conducted with the Remedial Party, Roux DPC, Roux MA, NYSDEC project manager, and the selected remedial Contractor prior to the commencement of any remedial activities in this RAWP.

### 5.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in **Table 2.** That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency. As the contractors have not yet been selected, the emergency contact list will be updated prior to the start of work.

### 5.2.13 Remedial Action Costs

The total estimated cost of the Remedial Action is $16,424,383 with total estimated capital costs of $16,065,583 to complete the remedial action pursuant to a Certificate of Completion. Annualized post Certificate of Completion operation, maintenance, monitoring and reporting costs have been estimated with and without a groundwater monitoring component. Estimated annualized costs with groundwater monitoring are estimated at $33,000, and annualized costs without groundwater monitoring are estimated at $11,000.. It is understood that elements of the remedy will be inspected (annually) and maintained in perpetuity. An itemized and detailed summary of estimated costs for all remedial activity is attached on **Table 3**. This will be revised based on actual costs and submitted as an Appendix to the Final Engineering Report.

## 5.3 Site Preparation

### 5.3.1 Mobilization

The selected contractors shall supply any labor and materials required for the removal, mitigation and disposal of contaminated media. In addition, all necessary insurance certificates, disposal facility permits, imported fill documentation (to assist with Department PM approval of fill materials), and any other required documents shall be obtained prior to mobilization.

Mobilization and Site preparation activities include:

1. Mobilization of equipment to the work area.
2. Installation of the Site perimeter construction fencing, plus temporary fencing, signage, and traffic barricades to delineate the work zone and serve as worksite security measures.
3. Implementation of erosion and sediment control measures in accordance with the New York Guidelines for Urban Erosion and Sediment Control and the ESCP located in **Appendix F** of the RAWP.
4. Set-up of temporary facilities (e.g., construction field trailer and portable toilets) and decontamination facilities, including decontamination pad for decontamination of trucks and excavation equipment and other vehicles/equipment.

### 5.3.2 Monitoring Well Decommissioning

Existing groundwater monitoring wells will either be protected during remediation for use in post-remedial monitoring or will be properly decommissioned in accordance with NYSDEC Commissioners Policy CP-43. Groundwater monitoring well decommissioning will require prior approval from the NYSDEC project manager. The only exception to this is if the full length of the well is to be excavated during remediation and the NYSDEC project manager must be notified which groundwater monitoring wells meet this criteria.

Based on the current excavation areas and depths approved in the Site's Decision Document the following monitoring wells will be fully excavated during remediation:

- Excavation Area 1 (10 Flint Street parcel): OVR-100, OVR-101, OVR-107, OVR-130, OVR-131, OVR-132.
- Excavation Area 2 (Northern excavation on 102 Violetta Street parcel): no wells.
- Excavation Area 3 (Southern excavation on 102 Violetta Street parcel): no wells.
- Excavation Area 4 (13 Cottage Street parcel): OVR-117.

### 5.3.3 Erosion and Sedimentation Controls

Implementation of erosion and sediment controls will be in conformance with the Erosion and Sediment Control Plan and the requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control and the ESCP (**Appendix F**. As necessary and as detailed in **Appendix F**, straw bales/silt socks/silt fencing will be placed at locations upgradient of excavation areas to control stormwater runoff and surface water from entering or exiting the excavation. Catch basin inlets immediately adjacent to the work area or on the Site will be protected to prevent disturbed soil from entering them. All erosion and sedimentation controls will be installed as per manufacturer's instructions. All construction/remedy implementation water/liquids generated during the implementation of the remedy will be collected, containerized, and characterized for off-site disposal at a permitted facility (or discharged to the sewer of

Monroe County Department Environmental Services [DES] discharge permit). Construction water will also be managed in accordance with the SoMP described in **Section 4.4**.

### 5.3.4 Stabilized Construction Entrance(s)

Stabilized construction entrances will be installed at all points of vehicle ingress and egress to the Site or, with DEC approval, abutting sites which provide Site access to roadways. The truck wash/decontamination pad (see **Section 5.3.8**) and the stone-based egress path will be continuous so that trucks do not get re-contaminated following decontamination and prior to departure from the Site. Due to limitations to direct Site access to roadways, the currently planned locations of the stabilized construction entrance and truck wash/decontamination pad are on abutting BCP Site No. C828162C located at 15 Flint Street, as shown on **Figure 7.** Construction details are shown on **Figure 10**. Additional details on the stabilized construction entrance are included in Section 3.1.1 of Appendix F - Erosion and Sediment Control Plan.

Any Site-derived material on sidewalks or streets will be promptly removed, and the street will be cleaned. The material collected will be containerized, characterized, and disposed off-site at a permitted landfill facility. Site entrances and exits will be inspected at the beginning and end of the day as well as during the day to ensure that Site material is not being tracked off-site.

### 5.3.5 Utility Marker and Easements Layout

Prior to conducting any ground intrusive activities, excavation or other subsurface site work, the required notification will be provided UDIG NY.

The Remedial Party and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Remedial Party and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Remedial Party and its contractors must obtain any local, State or Federal permits or approvals required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of the permit or approval requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. Planned work under this RAWP include excavation activities in the vicinity of a sewer line located within the 10 Flint Street parcel, and a water and a potential gas line located in the vicinity of excavation activities on the northeastern end of the 102 Violetta Street parcel. The approximate locations of these known and suspected utilities are shown on **Figure 11**. While utilities have been identified based on available maps and locations of some portions of utilities have been confirmed in the field by a private utility survey (as shown on **Figure 11**), additional verification of the locations and depths of utilities is required. A site wide utility stakeout, based on available utility maps, information provided by utility companies (including UDig NY mark outs) and private utility surveys, will be completed for all utilities prior to any ground intrusive activities at the Site. Based on discussions with utility owners, the known utilities cannot be decommissioned and must remain in-place with the potential exception of mapped water service lines which appear to have been used to supply water to decommissioned fire hydrants associated with the former Vacuum Oil Refinery.

Consideration for known and suspected subsurface utilities will be made during advancement of excavation area soil borings as part of PDI activities. Specifically, PDI soil borings will be located at least 5-feet away

from utilities as identified in the Site wide utility stakeout, and “soft digging” techniques (e.g., soil vac, air knife, hand tools, etc.) will be used to the extent feasible in the vicinity of utilities.

Excavation areas will be adjusted as needed based on the final confirmed depths and locations of utilities. The limits of excavations in the vicinity of these utility lines will be advanced to a feasible safe distance from the utility to prevent potential disturbance to the existing utility lines. Prior to conducting any excavation or other subsurface site work, required notification will be provided UDIG NY. Utility owners will also be contacted to assist in determining means and methods of excavation (e.g. soft digging) which maximize the removal of contaminated soils; however, it is assumed that some soils in proximity to the utility lines will be left in place and the remaining contaminated soils will be documented in detail in the Site’s FER and SMP as well as managed under the Site’s SMP. Documentation samples will be collected in areas where utilities limit the removal actions.

### 5.3.6 Support of Excavation

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities including the excavation is the sole responsibility of the Remedial Party and its contractors. The Remedial Party and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Remedial Party and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this RAWP. Further, the Remedial Party and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved RAWP.

In areas where physical limitations or Site restrictions limit the safe depth that may be achieved by sloping excavations, shoring or other means of support of excavation systems will be employed to provide safe access to soils required to be removed to meet the excavation goals outlined in the Decision Document for the Site. Two of the four excavation areas identified in the Decision Document may require sidewall support due to adjacent to property boundaries or other limitations and are discussed below.

*10 Flint Street Parcel Excavation*

It is estimated that the excavation located on the 10 Flint Street parcel has approximately 700 linear feet of excavation sidewall situated adjacent to property boundaries which may require sidewall support. In addition, approximately 100 linear feet of excavation sidewall is located near the end of Flint Street and may require sidewall support to allow for Site access at this location.

*102 Violetta Street Parcel, Northeast Excavation*

It is estimated that the excavation located on the 102 Violetta Street parcel has approximately 70 linear feet of excavation sidewall is located near the end of Flint Street and may require sidewall support to allow for Site access at this location.

Information on soil types, groundwater depth, etc., collected during PDI soil boring advancement will be used to assist with support of excavation planning. Support of excavation (e.g., trench box, slide rail system, sheeting, shoring, bracing, and/or gravity walls etc.) will be designed, as required by federal, state, and local law, by a licensed professional engineer in the State of New York and reviewed by the Remedial Engineer before being installed by the Remedial Contractor.

### 5.3.7 Equipment and Material Staging

An equipment and materials staging area will be established in a designated area on-Site. In addition, an off-Site area located on the City owned 10 Flint Street parcel, to the northeast of the Site (across Flint Street), will be utilized for job site trailer placement, vehicle parking and off-Site equipment and materials staging (prior to mobilization on-Site for Site related activities). This off-Site area will be enclosed with perimeter fencing to prevent unauthorized access. Both on-Site and off-Site equipment and materials staging areas are shown on **Figure 7**.

As shown on **Figure 7**, on-Site staging areas include an equipment staging area, an imported soil and materials staging area, a soil and material staging area for potential on-Site reuse, and a staging area for off-Site disposal. These areas will be constructed with stone underlain by geotextile fabric.

### 5.3.8 Decontamination Area

A temporary decontamination pad/truck wash will be constructed to decontaminate trucks and other vehicles/equipment which made contact with contaminated Site soil prior to leaving the Site or, with DEC approval, abutting sites which provide Site access to roadways. The decontamination pad will be sized to accommodate the largest construction vehicle used and located prior to the stabilized construction egress. The decontamination pad will be integrated with the stabilized construction entrance. Dry decontamination will be employed to the extent practical, within a designated area of the Site. All liquid decontamination material will be collected and properly disposed of off-Site or treated using an on-Site treatment system prior to discharge to the municipal sewer system under an approved Monroe County DES discharge permit. The truck decontamination area/construction entrance will be adequately sloped toward the interior of the Site to prevent off-Site tracking of soils. As discussed, due to limitations to direct Site access to roadways, the currently planned locations of the stabilized construction entrance and truck wash/decontamination pad are on the abutting BCP Site No. C828162C located at 15 Flint Street, as shown on **Figure 7. C**onstruction details are shown on **Figure 10.** Additional details on the stabilized construction entrance are included in Section 3.1.1 of Appendix F - Erosion and Sediment Control Plan.

### 5.3.9 Demobilization

Demobilization from the Site will include:

- Removal and restoration of remediation-related equipment and materials storage areas including:
    - stabilized construction entrances;
    - decontamination pad/truck wash;
    - material staging areas; and
    - job site trailer and porta potties.
- Equipment decontamination; and
- General refuse disposal.

Erosion and sediment controls and work area perimeter fencing will remain in place until remedial activities (e.g. excavation, Site-wide cover system) have been completed, and vegetative cover established (or other Department approved cover materials have been installed) in the work area.

### 5.3.10 Groundwater Performance Monitoring

If there is a delay between completion of the remedy and issuance of the COC, quarterly groundwater performance monitoring will be conducted for the first year after the remedy has been completed then semi-annually until the Certificate of Completion is issued or at a frequency as determined by the NYSDEC and NYSDOH project managers. Quarterly groundwater monitoring results will be provided in the subsequent monthly progress reports and in the Site's FER.

The following ten existing Site monitoring wells are anticipated to be sampled as part of groundwater performance monitoring: OVR-102, OVR-104, OVR-105, OVR-106, OVR-108, OVR-109, OVR-110, OVR-112, OVR-113, OVR-119. This list of wells is subject to change depending on site conditions following the execution of remedial actions (i.e. final excavation extents, etc.) and the need for additional wells will be evaluated at this time.

Prior to sampling, monitoring wells will be gauged with an electronic oil/water interface probe (IP) to measure the depth to water and thickness of separate phase hydrocarbons (SPH), if present. Following well gauging activities, ground water samples will be collected from the monitoring wells which do not contain SPH. Each well will be sampled in general accordance with EPA low-flow sampling methodology, which includes extracting ground water from the monitoring wells using a peristaltic pump during which measurements of water quality field parameters will be obtained including:

- Specific Conductance;
- pH;
- Oxidation Reduction Potential; and
- Dissolved Oxygen.

Groundwater samples will be submitted for laboratory analysis of:

- Target Compound List (TCL) VOC's by EPA Method 8260D including tentatively identified compounds (TICs);
- TCL SVOCs by EPA Method 8270E including TICs; and
- Target Analyte List (TAL) metals by USEPA Methods 6010D/7470A.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). A Data Usability Summary Report (DUSR) will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for the remedial action. Additionally, electronic data deliverables of all validated laboratory data will be electronically submitted to the NYSDEC maintained state database.

## 5.4 Reporting

All daily and monthly reports will be included in the FER laboratory.

### 5.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by noon the following day and will include at a minimum:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site, number of trucks;
- References to alpha-numeric map for Site activities;
- A summary of any and all complaints with relevant details (names, phone numbers), response provided, who provided the response;
- A summary of CAMP finding, including excursions and corrective actions undertaken to mitigate exceedances as well as a map presenting the locations of the monitoring stations;
- Photographs of site activities;
- Issues encountered during the work day and resolution;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (e.g., accident, spill), requests for changes to the RAWP, or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication – email, telephone call.

The NYSDEC assigned project number will appear on all reports.

### 5.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the 10$^{th}$ of the month following the end of the month of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (e.g., tons/cubic yards of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.
- Tracking of GSR metrics determined during the design process should be included in monthly reports.

### 5.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the FER.

Progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the FER, including a comparison to the goals established during the remedial program. Update to the SiteWise™ model will be included in the FER, SMP and Periodic Review reports.

The Climate Screening process and results will be documented in the form of a completed checklist and brief letter report. If the Climate Screening results indicate that a CVA is necessary, a complete CVA Report will be developed. The CVA Report will be included as an Appendix or Attachment in relevant documents (i.e. SMP, FER and Periodic Review reports) and/or submitted as a standalone report.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff and included in the FER.

### 5.4.4 Complaint Management Plan

If an odor or dust complaint is received, the following procedure will be implemented:

1. Work in the affected area will be halted, and the source of odors/dust will be identified.
2. NYSDEC, NYSDOH, and the Remedial Party will be notified immediately of the complaint.
3. Nuisance odors, if any, will be abated through covering/containerizing excavated materials, backfilling open excavations in a timely manner, using a foam unit, and/or other appropriate odor suppression measures. These odor suppression materials and measures will be kept on-Site and readily available for use, as needed.
4. As described in NYSDEC DER-10, Appendix 1B – Fugitive Dust Control, nuisance dust, if any, will be abated by applying water on haul roads; wetting equipment and excavation faces; spraying water on buckets during excavation and dumping; hauling materials in properly tarped or watertight containers; restricting on-Site vehicle speeds to 10 mph; covering excavated areas and material after excavation activity ceases; and reducing the open excavation size and/or number of open excavations.
5. Work will resume in the affected area when the nuisance odors/dust have been abated, as determined by the Roux on-Site Qualified Person.

If any other complaints or concerns regarding the work is raised by the adjacent property owners and or the general public, NYSDEC, NYSDOH, and the Remedial Party will be notified immediately of the complaint or concern.

### 5.4.5 Deviations from the Remedial Action Work Plan

All deviations from the RAWP will be reported to NYSDEC for approval and fully explained in the FER.

# 6.0 RESIDUAL CONTAMINATION TO REMAIN ON SITE

Since the remedial cleanup track for the Site is a Track 4 cleanup there will be residual contaminated soil (soil containing concentrations exceeding the Site's SCOs) at the Site after the remedy is completed. Engineering and Institutional Controls (ECs and ICs) are required to be protective of human health and the environment. These ECs and ICs will be described in the Site's FER and SMP. Long- term management of EC/ICs and of residual contamination will be under a Site-specific SMP and will be included in the FER.

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances of both Track 1 and Track 4 SCOs.

# 7.0 ENGINEERING CONTROLS

The following sections provide the engineering controls to be implemented at the Site that will be protective of public health and the environment.

## 7.1 Site Cover System

Exposure to residual contaminated soils will be prevented by a Site-wide cover system that will be installed at the Site. The Site-wide cover system will be protective of human health and the environment.

A Site-wide cover system allows for restricted residential use of the Site. As discussed, in Site areas where existing soil in the top two feet meet Restricted-Residential SCOs (not requiring the installation of a cover system), the existing 2 feet of material would be considered the cover system. A cover system will be required to be installed in areas where the upper two feet of exposed surface soil exceeds the Site's SCOs. Where the Site-wide cover system is installed the soil cover will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Other components of the Site-wide cover system may include clean stone in areas of the Site with steep grades to assist with stabilization. A map with potential locations where stone cover may be used and a diagram showing the proposed design details for the Site-wide cover system (engineered soil cover) is shown in **Figure 12.** Soil cover material, including any soil or stone fill material brought to the Site, will meet the SCOs for all constituents for the restricted residential use of the Site as set forth in 6 NYCRR Part 375-6.7(d).

As discussed, a PDI will be performed to further define the extent of the Site-wide cover system (see **Section 4.2.2** for details). A demarcation layer will be installed below the Site-wide Cover system to serve as a visual boundary between the cover system and the Site's remaining contamination.

Stone material or soil imported to the Site for the construction of the Site-wide cover system will be in compliance with procedures defined for material import in the SoMP (see **Section 4.4.9**) and will be approved by the NYSDEC project manager prior to import to the Site. The material to be imported will meet soil quality objectives for this Site and/or will meet the sieve analysis requirements. The NYSDEC approved cover soil quality objectives are the lower of the PGSCOs or the RRSCOs for all constituents listed in Table 375-6.8(b) of 6 NYCRR Part 375 as well as PFAS and are presented on **Table 4** of this RAWP. The Site-wide cover system is an element of the selected remedy for the Site as detailed in the Site's Decision Document.

When redevelopment occurs at the Site, in locations where pavement, concrete, paved surface parking areas, sidewalks, building foundations, and building slabs are proposed those areas will be detailed in the 60 day change of use notification. Qualifying features of the development will constitute the site cover system component. Areas which are not components of the development will have 2 feet of soil cover that meets the Site's SCOs for all constituents listed in Part 375-6.8(b) including PFAS and are presented in Table 4 of this RAWP and/or stone cover that meets the sieve analysis requirements.

An Excavation Work Plan will be included in the SMP and will outline the procedures to be followed if the site cover system is breached or altered and the underlying residual contamination are disturbed after the Remedial Action is complete.

The final configuration of the Site-wide Cover System components will be documented in the FER. The FER will include as-built drawings presenting the details of the installed site-wide cover system with NYS PE stamp and signature. Maintenance and inspection of this site-wide cover system will be described in the Site's SMP.

# 8.0 CRITERIA FOR COMPLETION OF REMEDIATION/ TERMINATION OF REMEDIAL SYSTEMS

## 8.1 Site Wide Cover Systems

The Site-wide cover system is an engineering control, and the quality and integrity of this engineering control will be inspected at defined, regular intervals in perpetuity, and will be maintained as described in the SMP.

## 8.2 Post Certificate of Completion Groundwater Monitoring

As discussed in Section 5.3.10, groundwater performance monitoring will continue until the Certificate of Completion has been issued. The performance monitoring will assess the performance of the implemented remedy.

Long term post Certificate of Completion groundwater monitoring activities to assess the performance of the remedy, or natural attenuation following the removal of contaminant sources, will continue after issuance of the Certificate of Completion, as determined by NYSDOH and NYSDEC project managers, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. The long-term groundwater monitoring will continue at the Site until permission to discontinue is granted in writing by NYSDEC and NYSDOH project managers. All monitoring activities including the frequency, analytical parameters, and the number of groundwater monitoring wells will be outlined in the Monitoring Plan of the Site's SMP. No modifications and changes to groundwater sampling and analytical parameters will occur without prior written NYSDEC project manager approval. Select groundwater monitoring wells removed or decommissioned (with NYSDEC project manager approval) as part of excavation activities would be reinstalled to conduct groundwater monitoring. The decision on which monitoring wells will be reinstalled will be made, in consultation with NYSDEC, at the time of the SMP.

# 9.0 INSTITUTIONAL CONTROLS

The Site is achieving a Track 4 restricted residential remedy. As such the Site will have residual contamination remaining in place at the Site; therefore, institutional and engineering controls (ICs/ECs) for the residual contamination have been incorporated into the remedy to be protective of public health and the environment. All Site ICs/ECs will ensure continual and proper management of residual contamination in perpetuity. As a Track 4 restricted residential remedy, the Site will require an IC in form of an Environmental Easement (EE) and a SMP. As noted on **Figure 2 – Site Plan**, all areas of the Site are subject to the EE and SMP discussed below.

## 9.1 Environmental Easement

An Environmental Easement (EE), as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. As part of this remedy, an Environmental Easement executed by NYSDEC and the Remedial Party/property owner will be filed and recorded with the Monroe County Clerk. The EE will run in perpetuity with the controlled property. The Environmental Easement will be included as an appendix in the Site's SMP and Final Engineering Report.

The EE is the legal instrument that sets forth the use restriction(s) and/or prohibition(s) on the future use of the Site in a manner inconsistent with ECs. An Environmental Easement will be recorded with Monroe County Clerk. The EE will run with the properties of the Site in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage, restrictions on the use of groundwater at the Site, and compliance with the Site's SMP. The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement and the SMP. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with Monroe County before the SMP and FER can be approved, and the Certificate of Completion can be issued by NYSDEC. A series of ICs are required under this remedy to implement, maintain and monitor these EC systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to restricted residential, commercial or industrial use(s) only, although land use is subject to local zoning laws. These Institutional Controls are requirements or restrictions placed on the Site that are listed in the Environmental Easement. The Institutional and Engineering Control Plan in the Site's SMP provides all of the methods and procedures to be followed to comply with this Track 4 restricted residential remedy.

## 9.2 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the FER and issuance of the Certificate of Completion for the Site. The SMP is a complete and independent living document for the Site. Site Management continues in perpetuity or until released in writing by NYSDEC or until the Site is remediated to meet Unrestricted use. The property owner is responsible to ensure that all Site Management responsibilities defined in the SMP are performed.

The SMP will also include methods to incorporate and track GSR. Measures will be taken to maintain a cost-effective, protective remedy that remains conscientious of the Site's environmental footprint. At a minimum, the following should be assessed: waste generation, energy usage, emissions, and water usage.

The SMP is intended to be a living document that provides a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, site inspections, remedy performance monitoring and certification of results, (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include the following:

1. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

    a. Institutional Controls: The Environmental Easement discussed in Section 9.1 above and remedial element 5 of the DD.

    b. Engineering Controls: The Site cover system discussed in Section 7.0 and remedial element 4 of the DD.

    This plan includes, but may not be limited to:

    - an Excavation Work Plan which details the provisions for management of future excavations in areas of remaining contamination;
    - a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the NYSDEC. Based on the investigation results and the Department determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any sources areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to or in associate with redevelopment;
    - a provision should redevelopment occur to ensure no soil exceeding protection of groundwater concentrations will remain below storm water retention basin or infiltration structures;
    - descriptions of the provisions of the environmental easement including any land use, and groundwater or surface water use restrictions;
    - a provision for the evaluation of the potential for soil vapor intrusion for any occupied buildings on the Site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
    - a provision that should a building foundation or building be removed in the future, a cover system consistent with that described in Section 7.0 and remedy element 4 of the DD will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives;
    - provisions for the management and inspection of the identified engineering controls;

- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

2. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
   a. monitoring of groundwater to assess the performance and effectiveness of the remedy;
   b. monitoring for vapor intrusion for any proposed buildings on the Site, as may be required by the Institutional and Engineering Control Plan discussed above; and
   c. a schedule of monitoring and frequency of submittals to the NYSDEC.

The SMP will be prepared in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation and the NYSDEC's current template.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually, and the first submission will be due 16 months after the issuance of the Certificate of Completion, or at another frequency as approved by NYSDEC project manager thereafter.

The SMP will include a long-term groundwater monitoring plan to evaluate the Site-wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed if removed during the remedial action.

All handling of residual contaminated soil/fill material will be subject to provisions contained in the SMP and the EWP.

# 10.0 FINAL ENGINEERING REPORT

A FER will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides documentation that the remedial work approved under this RAWP has been completed and has been performed in compliance with the approved RAWP. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all excavation areas. The FER will include PE stamped and signed as-built drawings for all excavation areas, constructed elements including but limited to the site-wide cover system, calculation and manufacturer documentation for treatment systems, certifications, documentation for imported material to the Site, manifests and bills of lading. The FER will provide a description of the deviations from the approved RAWP. The FER will provide a tabular summary of all analytical sampling and associated SGCs, performance evaluation sampling results and all material characterization results and other sampling, and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10 Section 5.8 and the current NYSDEC FER template.

The FER will include written (e.g., daily reports, field log books) and photographic documentation of all remedial work performed under this RAWP.

The FER will provide a thorough summary of all soil, and a table and figure that presents exceedances from Track 4 RRSCOs for all soil remaining within the top two feet at the Site after the Remedial Action.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The FER will include an accounting of all material removed from the Site and disposed off-site at a permitted facility. This will include but not limited to excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records (e.g., manifests, bills of lading, weigh tickets) and approvals for receipt of the material (approval letters from disposal facility). The FER will document all material imported to the Site accounting of the origin and chemical quality of all material imported onto the Site as well as where the material was placed at the Site.

The FER must include a discussion of the green remediation practices/technologies employed throughout the remedial program. A final footprint analysis using a DER accepted model, and any tracking methods used through the construction including restoration activities. Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

## 10.1 Certifications

The certification of the Final Engineering Report will be as presented in the FER template with no changes or modifications. The FER will be prepared, stamped and signed by a NYS licensed and registered P.E. authorized in accordance with article 145 of the education law to practice the profession of engineering.

# 11.0 SCHEDULE

The proposed remedial activities at the Site described in this RAWP will be initiated upon approval of RAWP. Remedial Activities are tentatively scheduled to begin in January 2026. The NYSDEC Project Manager will be notified at least seven days in advance of all field activities. A FER and SMP will be prepared in accordance with NYSDEC DER-10 Section 5.8 and Section 6.0, respectively, and will also be developed using NYSDEC's current templates. The FER and SMP will be submitted to NYSDEC and NYSDOH project managers. An Environmental Easement will be placed on the Site prior the approval of the FER and issuance of the Certificate of Completion.

A schedule for the proposed Remedial Action for the Site is presented below.

| | |
|---|---|
| April 2025 | Submit RAWP |
| November 2025 | Submit Revised RAWP |
| January 2026 | Initiate implementation of RAWP |
| June 2026 | Submit Draft Environmental Easement (EE) Package |
| August 2026 | SMP |
| October 2026 | Complete remediation and submit Draft Final Engineering Report |
| On, or before, December 31, 2026 | Anticipated issuance of Certificate of Completion |

Respectfully submitted,

**ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY, D.P.C.**

Noelle M. Clarke, PE
Principal Engineer

# TABLES

1. Required Permits, Certificates or Other Approvals or Authorizations
2. Emergency Contact List
3. Remedial Cost Estimate
4. Soil Cleanup Objectives
5. Field and Laboratory QC Summary
6. Interim Remedial Measure Sampling Summary
7. Preservation, Holding Times, and Sample Containers

**Table 1 - Required Permits, Certificates or Other Approvals or Authorizations**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| Permit | Citation | Regulatory Agency | Regulatory Contact |
|---|---|---|---|
| 401 - Clean Water Act Permit (ID 8-2614-00969/00001) | Clean Water Act Section 401 | NYSDEC | Robert B. Call, robert.call@dec.ny.gov, (585) 226-5396 |
| Nationwide Permit (File # LRB-2010-01497) | Clean Water Act Section 401 | USACE | Joseph Rowley, joseph.m.rowley@usace.army.mil, (716) 879-4279 |
| Wetland Mitigation Credits | Clean Water Act Section 401 | NYSDEC / USACE | Joseph Rowley, joseph.m.rowley@usace.army.mil, (716) 879-4279 |
| Site Preparation Permits | City of Rochester Article IV, § 39-400 | City of Rochester Department of Neighborhood and Business Development | Crystal Gizzi, (585) 428-6520 |
| Short Term Discharge Permit (ST-Permit No: ST-474) | Sewer Use Law of Monroe County (Section 1 – Local Law No. 3 of 1988) | Monroe County Department of Environmental Services | Michael J. Garland, P.E., (585) 753-7600 |
| Hydrant Use Permit | City of Rochester Chapter 32 Waterworks § 23-29 Fire Hydrants | City of Rochester, Water Engineering Office | 585-428-7562 |

Notes:
USACE - United States Army Corps of Engineers

**Table 2 - Emergency Contact List**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| 10 Flint Street, LLC (Volunteer) | Contact | Telephone |
|---|---|---|
| Managing Member | Michael Roux | (631) 630-2425 |
| **City of Rochester (Volunteer)** | **Contact** | **Telephone** |
| Associate Environmental Specialist | Jane MH Forbes | (585) 428-7892 |
| **Roux DPC (Environmental Consultant)** | | |
| Project Engineer / Remedial Engineer | Noelle Clarke | (631) 232-2600 |
| Qualified Person / Site Saftey Officer | Nicholas Suraci | (716) 725-6969 |
| Quality Assurance Officer | Alex Wirth | (585) 895-4957 |
| Corporate Health and Safety Manager | Brian Hobbs | (631) 232-2600 |
| **Roux MA (Environmental Consultant)** | | |
| Project Principal | Ian Reed | (781) 569-4000 |
| Project Manager | Eric Runstrom | (781) 569-4000 |
| **Roux DPC (Remedial Contractor)** | | |
| Remedial Contractor Manager | Michael Lesakowski | (716) 725-6946 |
| Field Manager | John Deth | (716) 725-6952 |
| **NYS Project Managers** | | |
| NYSDEC Project Manager | Charlotte Theobald | (585) 226-5354 |
| NYSDOH Project Manager | Christopher Budd | (518) 402-1769 |
| **Emergency Phone Numbers** | | |
| Emergency Medical Service | -- | 911 |
| Rochester Police Department | -- | 911 |
| Rochester Fire Department | -- | 911 |
| Urgent Care | -- | (585) 426-4990 |
| National Response Center | -- | (800) 424-8802 |
| Poison Control Center | -- | (800) 222-1222 |
| Centers for Disease Control | -- | (800) 232-4636 |
| USEPA (Region II) | -- | (212) 637-3000 |
| NYSDEC Emergency Spill Response | -- | (800) 457-7362 |

**Table 3 - Remedial Alternative Cost Estimates**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| Remedial Costs | Track 4 (Excavation) | | | |
|---|---|---|---|---|
| | Est. Units | Unit | Unit Rate | Total |
| **Task 1 - Pre-Transaction Work** | Est. Units | Unit | Unit Rate | Total |
| BCP Applications and Amendments | 1 | Lump Sum | | $ 20,000 |
| **Task 1 Sub Total** | | | | **$ 20,000** |
| **Task 2 - Pre-Remediation Work, Engineering and Consulting** | Est. Units | Unit | Unit Rate | Total |
| AAR/Remedial Action/Remedial Design Work Plan, Final Engineering Report | 1 | Lump Sum | $ 40,000 | $ 40,000 |
| Pre-Design Investigation | 0 | Lump Sum | $ 145,000 | $ 145,000 |
| Mobilization and Site Preparation | 1 | Lump Sum | $ 1,496,600 | $ 1,496,600 |
| Water Management- mobilization, Permitting, Set-up, Operation, Testing, Cleaning, Demobilization | 1 | Lump Sum | $ 500,000 | $ 500,000 |
| Support of Excavation | 1.0 | Lump Sum | $ 695,000 | $ 695,000 |
| Building/Structure/Foundations/Concrete Walls Demo, Debris Removal | 1 | Lump Sum | $ 128,000 | $ 128,000 |
| Well Decommissioning | 10 | Each | $ 3,000 | $ 30,000 |
| Wetland Compensation | 1 | EST | $ 375,000 | $ 375,000 |
| Utility Support- protection and demo | 1 | LS | $ 55,000 | $ 55,000 |
| **Task 2 Sub Total** | | | | **$ 3,464,600** |
| **Task 3 - Program and Remedial Work Management and Administration** | Est. Units | Unit | Unit Rate | Total |
| BCP Project Management and Administration, Contracting, Contract Management, Scheduling, Laboratory Coordination, Personnel, Waste Profile Applications/Profiles Transportation/Disposal Coordination, Publicly Owned Treatment Works planning and permitting, Client/Attorney/NYSDEC Correspondence | 1 | Estimated | $ 150,000 | $ 150,000 |
| **Task 3 Sub Total** | | | | **$ 150,000** |
| **Task 4 - Remedial Excavation Work** | Est. Units | Unit | Unit Rate | Total |
| **Remediation Fieldwork Professional Services** | | | | |
| Remedial Excavation, ISS and Backfill Management, Oversight, Sampling, SWPPP monitoring (includes Field Equipment, PPE, Sampling Supplies, Expenses) | 180 | DY | $ 3,000 | $ 540,000 |
| Community Air monitoring (Data Ram, PIDs) | 180 | DY | $ 1,500 | $ 270,000 |
| **Earthwork Services-Impacted (Treatment, Excavation, Handling)** | | | | |
| Track 4 areas - Excavation and loading | 37,000 | Tons | $ 6 | $ 231,250 |
| **Transportation and Disposal Services** | | | | |
| GCM Non-Haz Transportation and Disposal | 37,000 | Tons | $ 81 | $ 2,978,500 |
| Organic Debris- Transportation and Disposal | 1,030 | Tons | $ 45 | $ 46,350 |
| C&D- Transportation and Disposal | 1,100 | Tons | $ 72 | $ 79,200 |
| **Earthwork Services- Backfill and Compaction** | | | | |
| CITY PARCELS: Track 4 (excavation) - Import, place, compact gravel | 65,900 | Tons | $ 30 | $ 1,977,000 |
| **Analytical/Physical Testing** | | | | |
| Imported Soil Characterization (gravel) | 1 | EST | $ 30,018 | $ 30,018 |
| Post-Excavation Soil Samples | 102 | EA | $ 400 | $ 40,801 |
| Waste Characterization Samples | 74 | EA | $ 1,000 | $ 74,000 |
| Compaction Testing | 8 | weeks | $ 1,400 | $ 11,200 |
| **Task 4 Sub Total** | | | | **$ 6,278,319** |
| **Task 5 - Site Grading, Cover Placement, Drainage and Restoration** | Est. Units | Unit | Unit Rate | Total |
| **Cover Placement and Restoration Fieldwork** | | | | |
| Cover Placement Management, Oversight, Sampling, SWPPP monitoring | 90 | Days | $ 3,000 | $ 270,000 |
| Community Air monitoring (Data Ram, PIDs) | 90 | Days | $ 1,500 | $ 135,000 |
| **Analytical Testing** | | | | |
| Imported Soil Characterization - Cover Material (gravel) | 1 | EST | $ 41,803 | $ 41,803 |
| Imported Soil Characterization - Cover Material (top soil) | 1 | EST | $ 15,405 | $ 15,405 |
| **Earthwork Services (Cover System)** | | | | |
| Import, Place Gravel | 70,900 | T | $ 30 | $ 2,127,000 |
| Import, Place Top Soil | 16,200 | T | $ 40 | $ 648,000 |
| Demarcation Material and Shipping | 15 | Rolls | $ 3,000 | $ 45,000 |
| Hydroseed/Fertilize/Watering | 15.40 | AC | $ 4,900 | $ 75,460 |
| **Utility Corridor** | | | | |
| Install Clean Utility Corridor | 800 | CY | $ 13 | $ 10,400 |
| **New monitoring Wells** | | | | |
| Install, Develop, Sample New Wells | 8 | Each | $ 4,000 | $ 32,000 |
| **Task 5 Sub Total** | | | | **$ 3,400,068** |
| **Task 6 - Final Engineering Report (FER) and Site Management Plan (SMP)** | Est. Units | Unit | Unit Rate | Total |
| Final Engineering Reports | 1 | Each | $ 25,000 | $ 25,000 |
| Site Management Plan and Environmental Easement Support | 1 | Each | $ 15,000 | $ 15,000 |
| Post-Remediation Survey, BCP Easement Surveys | 1 | Estimated | $ 15,000 | $ 15,000 |
| Third Party Data Validation (Post-Excavation and Imported Materials Samples) | 1 | Estimated | $ 20,000 | $ 20,000 |
| **Task 6 Sub Total** | | | | **$ 75,000** |
| **Estimated Remediation Cost** | | | | **$ 13,387,986** |
| | | | **With 20% Contingency** | **$ 16,065,583** |
| **Post-COC Operation, Maintenance and Monitoring Costs** | Est. Units | Unit | Unit Rate | Total |
| **Monitoring Well Replacement/Decommissioning** | | | | |
| Decommission monitoring Wells | 15 | Each | $ 3,000 | $ 45,000 |
| **Annual Post-COC Operation, Maintenance and Monitoring Costs** | Est. Units | Unit | Unit Rate | Total |
| **Groundwater monitoring, Cover System Maintenance and Monitoring** | | | | |
| Professional Services- Groundwater monitoring, GW Sampling, Sampling Equipment, Personal Protective Equipment, Analytical Samples (VOCs/SVOCs/Metals), Reports, Drum Disposal. | 1 | Year | $ 28,800 | $ 28,800 |
| **Cover System Maintenance and Monitoring (Without Groundwater Monitoring)** | | | | |
| Professional Services- Cover System Monitoring, Personal Protective Equipment, Reports | 1 | Year | $ 6,000 | $ 6,000 |
| **Annual Periodic Review Reports** | | | | |
| Professional Services- Annual Periodic Review Reports | 1 | Year | $ 5,000 | $ 5,000 |
| **Total Annual Costs With Groundwater Monitoring** | | | | **$ 33,800** |
| **Total Annual Costs Without Groundwater Monitoring** | | | | **$ 11,000** |

**Table 4 - Soil Cleanup Objectives**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| Contaminant | CAS Number | Track 4 Soil Cleanup Objectives [a] |
|---|---|---|
| **Metals (mg/kg)** | | |
| Arsenic | 7440-38-2 | 16 |
| Barium | 7440-39-3 | 400 |
| Beryllium | 7440-41-7 | 47 |
| Cadmium | 7440-43-9 | 4.3 |
| Chromium, hexavalent | 18540-29-9 | 19 |
| Chromium, trivalent | 16065-83-1 | 180 |
| Copper | 7440-50-8 | 270 |
| Total Cyanide | | 27 |
| Lead | 7439-92-1 | 400 |
| Manganese | 7439-96-5 | 2000 |
| Total Mercury | | 0.73 |
| Nickel | 7440-02-0 | 130 |
| Selenium | 7782-49-2 | 4 |
| Silver | 7440-22-4 | 8.3 |
| Zinc | 7440-66-6 | 2480 |
| **PCBs/Pesticides (mg/kg)** | | |
| 2,4,5-TP Acid (Silvex) | 93-72-1 | 3.8 |
| 4,4'-DDE | 72-55-9 | 8.9 |
| 4,4'-DDT | 50-29-3 | 7.9 |
| 4,4'-DDD | 72-54-8 | 13 |
| Aldrin | 309-00-2 | 0.097 |
| alpha-BHC | 319-84-6 | 0.02 |
| beta-BHC | 319-85-7 | 0.09 |
| Chlordane (alpha) | 5103-71-9 | 2.9 |
| delta-BHC | 319-86-8 | 0.25 |
| Dibenzofuran | 132-64-9 | 59 |
| Dieldrin | 60-57-1 | 0.1 |
| Endosulfan I | 959-98-8 | 24 |
| Endosulfan II | 33213-65-9 | 24 |
| Endosulfan sulfate | 1031-07-8 | 24 |
| Endrin | 72-20-8 | 0.06 |
| Heptachlor | 76-44-8 | 0.38 |
| Lindane | 58-89-9 | 0.1 |
| Polychlorinated biphenyls | 1336-36-3 | 1 |
| **Semivolatiles (mg/kg)** | | |
| Acenaphthene | 83-32-9 | 98 |
| Acenapthylene | 208-96-8 | 100 |
| Anthracene | 120-12-7 | 100 |
| Benz(a)anthracene | 56-55-3 | 1 |
| Benzo(a)pyrene | 50-32-8 | 1 |
| Benzo(b)fluoranthene | 205-99-2 | 1 |
| Benzo(g,h,i)perylene | 191-24-2 | 100 |
| Benzo(k)fluoranthene | 207-08-9 | 1.7 |
| Chrysene | 218-01-9 | 1 |

**Table 4 - Soil Cleanup Objectives**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| Contaminant | CAS Number | Track 4 Soil Cleanup Objectives [a] |
|---|---|---|
| Dibenz(a,h)anthracene | 53-70-3 | 0.33 |
| Fluoranthene | 206-44-0 | 100 |
| Fluorene | 86-73-7 | 100 |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.5 |
| m-Cresol | 108-39-4 | 0.33 |
| Naphthalene | 91-20-3 | 12 |
| o-Cresol | 95-48-7 | 0.33 |
| p-Cresol | 106-44-5 | 0.33 |
| Pentachlorophenol | 87-86-5 | 0.8 |
| Phenanthrene | 85-01-8 | 100 |
| Phenol | 108-95-2 | 0.33 |
| Pyrene | 129-00-0 | 100 |
| **Volatiles (mg/kg)** | | |
| 1,1,1-Trichloroethane | 71-55-6 | 0.68 |
| 1,1-Dichloroethane | 75-34-3 | 0.27 |
| 1,1-Dichloroethene | 75-35-4 | 0.33 |
| 1,2-Dichlorobenzene | 95-50-1 | 1.1 |
| 1,2-Dichloroethane | 107-06-2 | 0.02 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.25 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.19 |
| 1,3-Dichlorobenzene | 541-73-1 | 2.4 |
| 1,4-Dichlorobenzene | 106-46-7 | 1.8 |
| 1,4-Dioxane | 123-91-1 | 0.1 |
| Acetone | 67-64-1 | 0.05 |
| Benzene | 71-43-2 | 0.06 |
| Butylbenzene | 104-51-8 | 12 |
| Carbon tetrachloride | 56-23-5 | 0.76 |
| Chlorobenzene | 108-90-7 | 1.1 |
| Chloroform | 67-66-3 | 0.37 |
| Ethylbenzene | 100-41-4 | 1 |
| Hexachlorobenzene | 118-74-1 | 1.2 |
| Methyl ethyl ketone | 78-93-3 | 0.12 |
| Methyl tert-butyl ether | 1634-04-4 | 0.93 |
| Methylene chloride | 75-09-2 | 0.05 |
| n-Propylbenzene | 103-65-1 | 3.9 |
| sec-Butylbenzene | 135-98-8 | 11 |
| tert-Butylbenzene | 98-06-6 | 5.9 |
| Tetrachloroethene | 127-18-4 | 1.3 |
| Toluene | 108-88-3 | 0.7 |
| Trichloroethene | 79-01-6 | 0.47 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 3.6 |
| 1,3,5- Trimethylbenzene | 108-67-8 | 8.4 |
| Vinyl chloride | 75-01-4 | 0.02 |
| Xylene (mixed) | 1330-20-7 | 1.6 |

**Table 4 - Soil Cleanup Objectives**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| Contaminant | CAS Number | Track 4 Soil Cleanup Objectives [a] |
|---|---|---|
| **Perfluorinated Alkyl Acids (Concentrations in ng/g)** [b] | | |
| Perfluorooctanesulfonic acid (PFOS) | | 1 |
| Perfluorooctanoic acid (PFOA) | | 0.8 |

**Notes:**

µg/kg - Micrograms per kilogram

mg/kg - Milligrams per kilogram

ng/g - nanogram per gram

NYSDEC - New York State Department of Environmental Conservation

SCOs - Soil Cleanup Objectives

[a] Backfill, soil cover and reuse cleanup objectives for the Track 4 remedy are the lower of the NYSDEC Part 375 Restricted Residential or Protection of Groundwater from Table 375-6.8(b): Restricted Use Soil Cleanup Objectives.

[b] Backfill, soil cover and reuse cleanup objectives for the track 4 remedy are lower of the NYSDEC's part 375 Remedial Programs Restricted Residential or Protection of Groundwater guidance values listed in Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), dated April 2023.

**Table 5. Field and Laboratory QC Summary**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| QC Check Type | Minimum Frequency | Use |
|---|---|---|
| Field QC | | |
| Duplicate | 1 per matrix per 20 samples or SDG* | Precision |
| Trip Blank | 1 per VOC cooler | Sensitivity |
| Field Blank (non-PFAS) | 1 per matrix per 20 samples | Sensitivity |
| Field Blank (PFAS) | 1 per day when sampling for PFAS | Sensitivity |
| Laboratory QC | | |
| Laboratory Control Sample | 1 per matrix per SDG | Accuracy |
| Matrix Spike/Matrix Spike Duplicate/Matrix Duplica | 1 per matrix per SDG | Accuracy/Precision |
| Surrogate Spike | All organics samples | Accuracy |
| Laboratory Duplicate | 1 per matrix per SDG | Precision |
| Method Blank | 1 per matrix per SDG | Sensitivity |

**Notes:**
* SDG - Sample Delivery Group - Assumes a single extraction or preparation
** Provided to lab by field sampling personnel
PFAS - Per- and Polyfluoroalkyl Substances

**Table 6. Pre-Design Investigation Soil Sampling Plan**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| Sample Type | Sample Medium | Target Analytes | Field Samples | Sample Intervals | Duplicate[1] | Trip Blanks[2] | Field Blank[1] | Matrix Spike[1] | Spike Duplicate[1] | Total No. of Samples |
|---|---|---|---|---|---|---|---|---|---|---|
| PDI Excavation Bottom and Sidewall Samples | Area 1 (area surrounding OVR-117) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 11 | Highest PID response, or other visual indications of impacts | 1 | 2 | 1 | 1 | 1 | 17 |
| | Area 1 (area surrounding OVR-117) Potential Step Out Soil Sampling | | 8 | | - | 1 | 1 | - | - | 10 |
| | Area 2 (area surrounding SB-169) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 12 | Highest PID response, or other visual indications of impacts | 1 | 2 | 1 | 1 | 1 | 18 |
| | Area 2 (area surrounding SB-169) Potential Step Out Soil Sampling | | 8 | | - | 1 | 1 | - | - | 10 |
| | Area 3 (area surrounding SB-138) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 11 | Highest PID response, or other visual indications of impacts | 1 | 2 | 1 | 1 | 1 | 17 |
| | Area 3 (area surrounding SB-138) Potential Step Out Soil Sampling | | 5 | | - | 1 | 1 | - | - | 7 |
| | Area 4 (northern end of 10 Flint Street) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 41 | Highest PID response, or other visual indications of impacts | 3 | 5 | 3 | 3 | 3 | 58 |
| | Area 4 (northern end of 10 Flint Street) Potential Step Out Soil Sampling | | 2 | | - | 1 | 1 | - | - | 4 |
| PDI Site Cover System | Potential Site Cover Areas Soil Sampling | TCL VOCs +TICs | 40 | 2"-6", 12"-24" | 2 | 2 | 2 | 2 | 2 | 50 |
| | | TCL SVOCs +TICs | 60 | 0"-2", 2"-12", 12"-24" | 3 | 0 | 3 | 3 | 3 | 72 |
| | | TCL Pesticides | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | TCL PCBs | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | TAL Metals | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | PFAS | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | 1,4-Dioxane | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | Total Cyanide | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | Hexavalent Chromium | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| Offsite Backfill and On-Site Reuse Soil | Soil Sampling | TCL VOCs +TICs | 133 | See Table 5.4(e)10 in QAPP | 7 | 7 | 7 | 7 | 7 | 168 |
| | | TCL SVOCs +TICs | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TCL Pesticides | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TCL Herbicides | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TCL PCBs | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TAL Metals | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | PFAS | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | 1,4-Dioxane | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | Total Cyanide | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | Hexavalent Chromium | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| Groundwater Performance Monitoring Sampling | Groundwater Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 10 | Each Well | 1 | 2 | 1 | 1 | 1 | 16 |

**Notes:**
Totals are estimated based on scope of work as written, actual sample quantities may vary based on field conditions. QA/QC sample quantities will be adjusted accordingly.
[1] Based on 1 per 20 samples or 1 per Sample Delivery Group (3 days max)
[2] Based on 1 cooler per day
TCL - USEPA Contract Laboratory Program Target Compound List
USEPA - United States Environmental Protection Agency
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
TAL - Target Analyte List
TICs - Tentatively Identified Compounds

**Table 6. Pre-Design Investigation Soil Sampling Plan**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

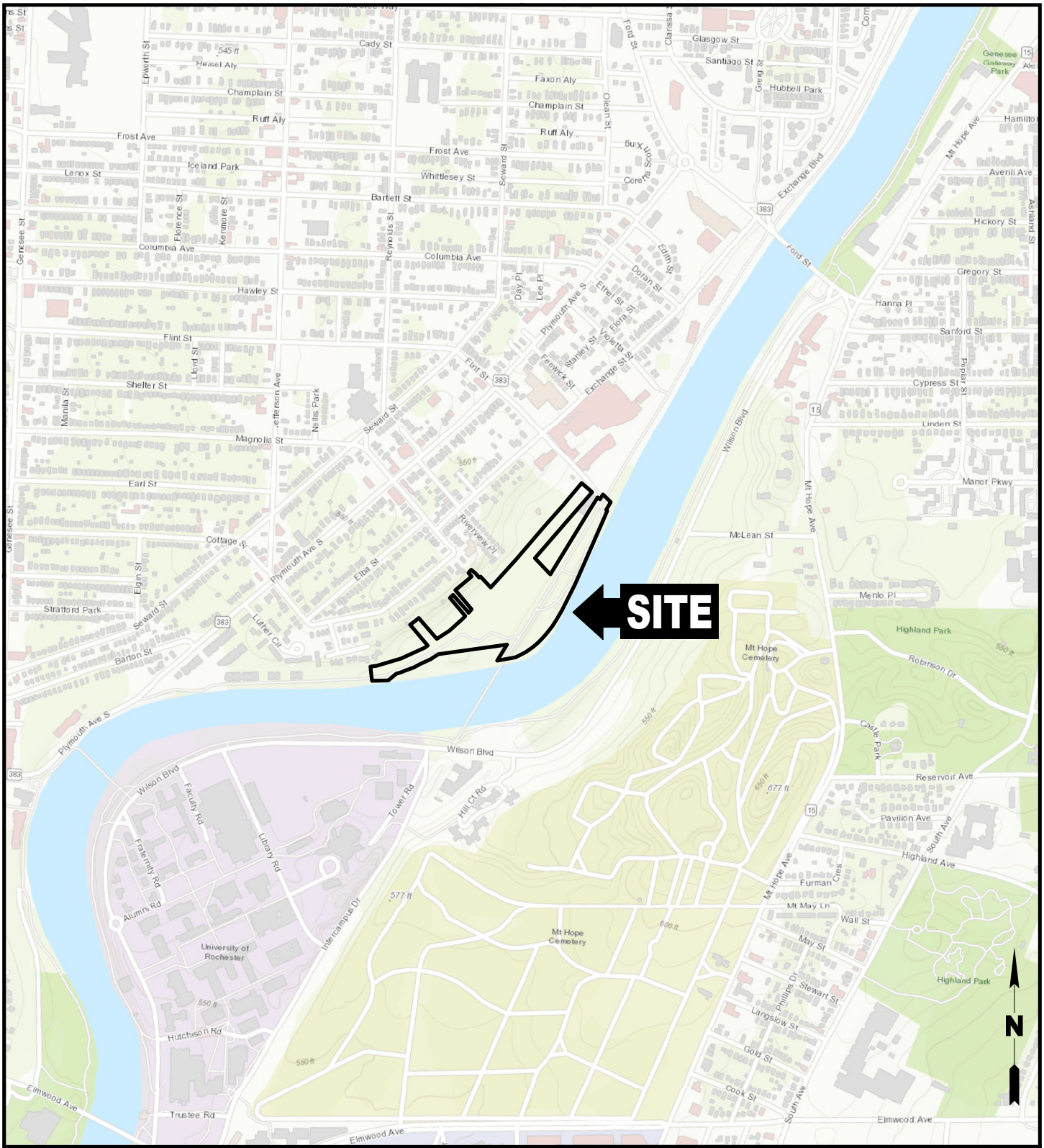
**Table 7. Preservation, Holding Times and Sample Containers**
**BCP Site No. C828190**
**Portion of the Former Vacuum Oil Refinery Site, Rochester, New York**

| Analysis | Matrix | Bottle Type | Preservation(a) | Holding Time(b) |
|---|---|---|---|---|
| Part 375 TAL Metals via EPA 6010D / 7471B<br>SW-846 6020B/7471B | Soil<br>Water | 4 oz amber glass, teflon lined cap<br>250 mL plastic, teflon lined cap | Cool to 4°C<br>Nitric acid | 180 days, Hg 28 days |
| Hexavalent Chromium | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 30 days from sample collection |
| 1,4-Dioxane via EPA 8270E | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 14 days from sample collection |
| Per- and Polyfluoroalkyl Substances (PFAS) via EPA 1633/537 | Soil | 8 oz plastic container (non teflon lined) | Cool to 4°C | 28 days from sample collection |
| **Target Compound List (TCL)** | | | | |
| Part 375 TCL Volatile Organic Compounds (VOCs) via EPA 8260D, including TICs | Soil | Encore Samplers | Cool to 4°C | 48 hours from sample collection to extract, 14 days for analysis after extraction |
| | Water | 40mL voa vial, teflon lined cap | Hydrochloric Acid | 14 days from sample collection |
| Part 375 TCL Semivolatile Organic Compounds (SVOCs) SW-846 8270E, including TICs | Soil | 4 oz amber glass, teflon lined cap | Cool to 4°C | 14 days from sample collection to extract, 40 days to analysis after extraction |
| | Water | 1 liter amber glass, teflon lined cap | | 7 days to extract, 40 days to analysis |
| Part 375 TCL Pesticides via EPA 8081B | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 14 days to extract, 40 days to analysis |
| Part 375 TCL Herbicides via EPA 8051B | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 14 days to extract, 40 days to analysis |
| Part 375 TCL Polychlorinated biphenyls (PCBs) via EPA 8082A | Soil | 4 oz amber glass, teflon lined cap | Cool to 4°C | 14 days to extract, 40 days to analysis |

(a) All soil and groundwater samples to be preserved in ice during collection and transport
(b) Days from date of sample collection.
TAL - Target Analyte List
TCL - USEPA Contract Laboratory Program Target Compound List
TICs - Tentatively Identified Compounds
Gas chromatography-mass spectrometry (GC/MS) in selected ion monitoring (SIM) mode

# FIGURES

1. Site Location Map
2. Site Plan
3. Tax and Surrounding Properties Map
4. Former Vacuum Oil Company Refinery Area
5. Remedial Investigation Summary
6. Proposed PDI Sampling Areas - Excavation Areas
7. Site Layout Plan
8. Proposed PDI Sampling Areas - Site Cover System – Sampling Locations
9. Truck Routes
10. Construction Details
11. Known and Suspected Utilities
12. Site Cover System – Cover Type Details and Locations




QUADRANGLE LOCATION

SOURCES

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE

1,000 0 1,000 FEET

TITLE:

# SITE LOCATION MAP
# BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: SB | DATE: 11/08/25 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 1 |
| PROJECT MGR: ER | PROJECT:4880.0001P000 | |
| FILE: 4880.0001P000.102.01 - LOCUS.MXD | | |

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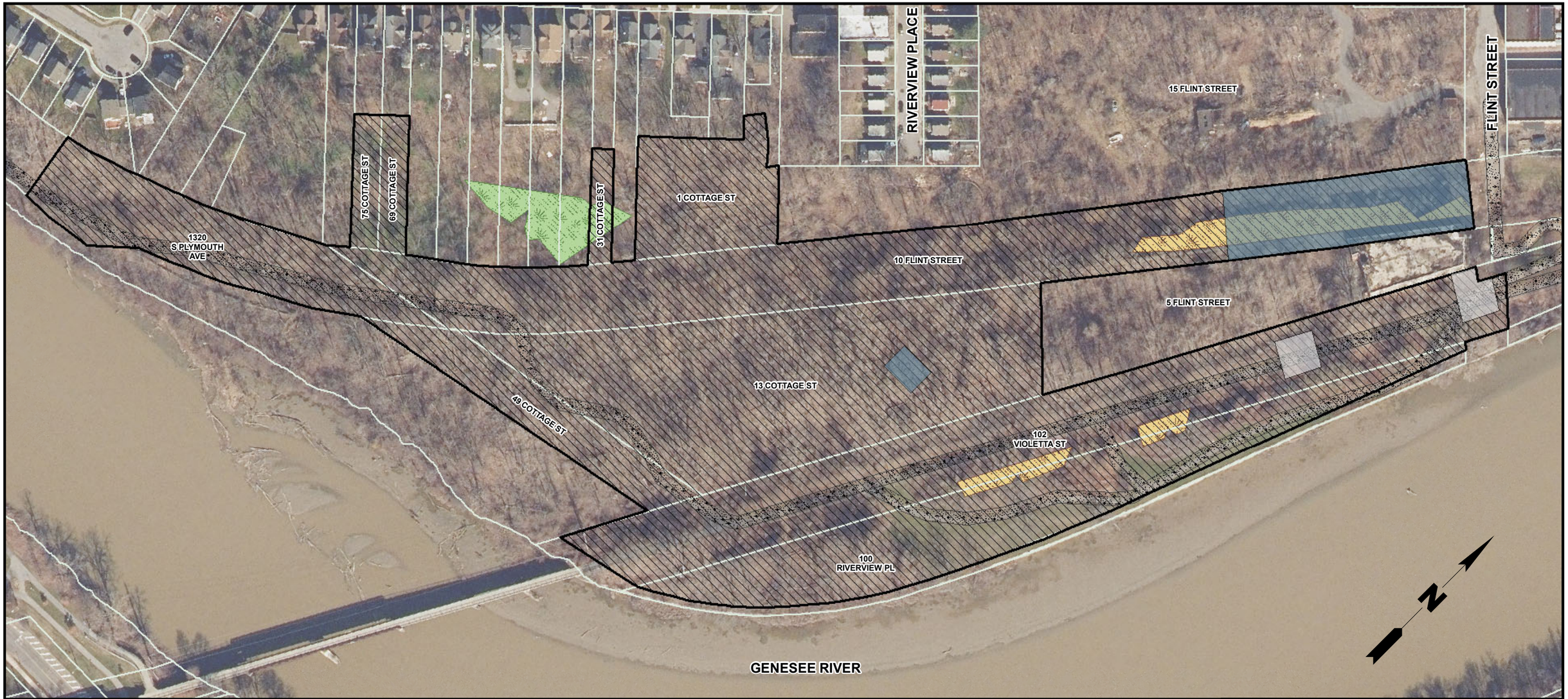



## LEGEND

- BCP SITE #C828190 LIMITS (APPROXIMATELY 15.4 ACRES)
- APPROXIMATE PROPERTY BOUNDARIES
- CITY TARGETED EXCAVATION, 11 TO 20 FEET IN DEPTH
- CITY TARGETED EXCAVATION, UP TO 21 FEET IN DEPTH
- BIKE PATH
- WETLAND
- FORMER WETLAND (INCLUDED AS PART OF APPROVED WETLANDS TAKING)

SOURCES

- AERIAL IMAGERY FROM THE CITY OF ROCHESTER'S OPEN DATA PORTAL.

- PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024) WITH THE EXECPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET.

- PROPERTY BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET TAKEN FROM DEED INSTRUMENT # 200307290847 FOR PROPERTY ADDRESS 5 FLINT STREET, ROCHESTER, NY, RECORDED ON JULY 29, 2003, RECORDED IN THE MONROE COUNTY REGISTRY OF DEEDS, BOOK 09821, PAGE 0657.

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

- TARGETED EXCAVATION AREAS AS SHOWN IN RAMBOLL'S APPROVED REMEDIAL ALTERNATIVES ANALYSIS REPORT DATED JUNE 14, 2023
.
- WETLANDS AS SHOWN IN O'BRIEN & GERE ENGINEERS, INC. (OBG) REMEDIAL INVESTIGATION REPORT DATED OCTOBER 2019.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE.

200 0 200 FEET

TITLE:

# SITE PLAN
# BCP SITE # C828190

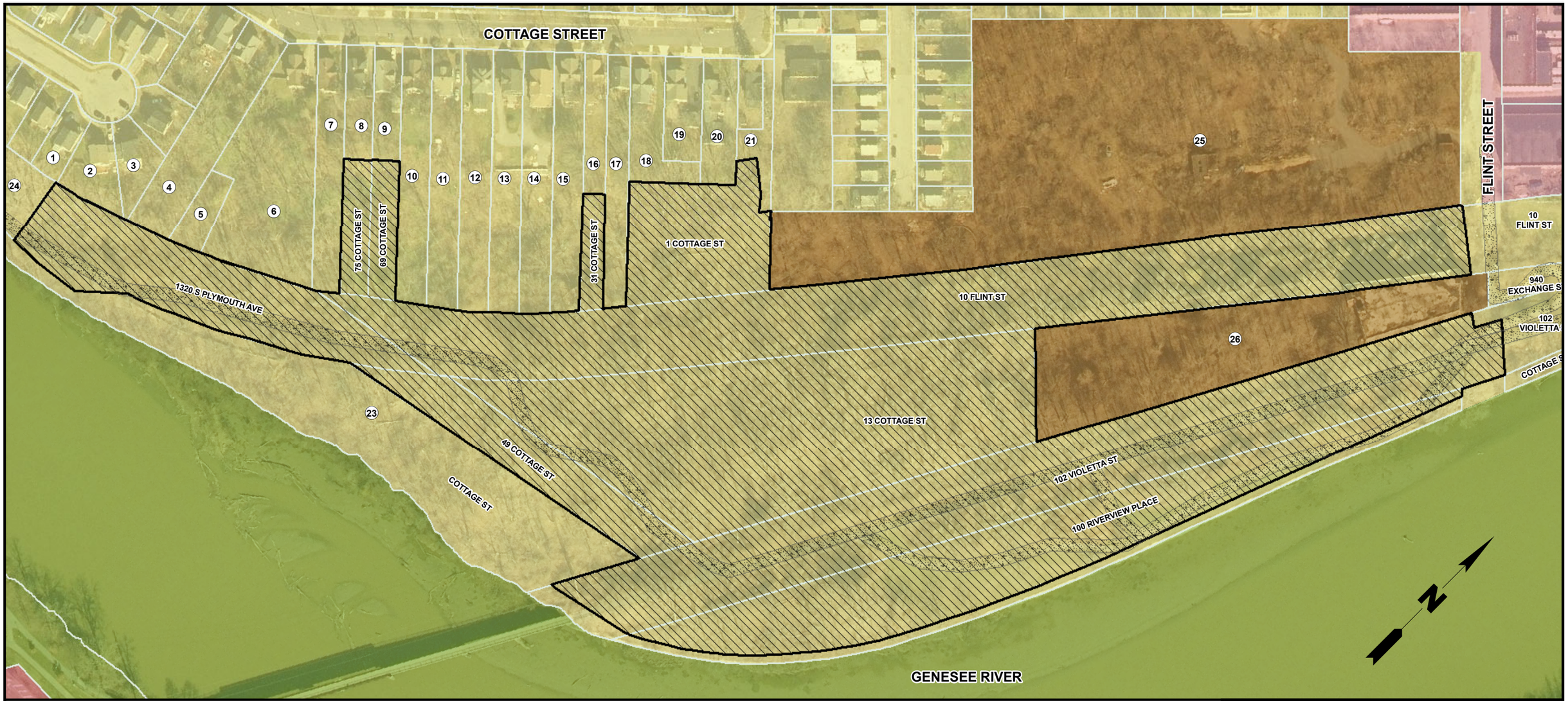
PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: SB | DATE: 13JAN26 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 2 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
| FILE: 4880.0001P000.102.02 - SITE PLAN_B.MXD | | |




## LEGEND

- PROPOSED BCP SITE #C828190 (APPROXIMATELY 15.4 ACRES)
- APPROXIMATE PROPERTY BOUNDARIES
- BIKE PATH

**CITY OF ROCHESTER ZONING DISTRICTS**

- R-3 HIGH-DENSITY RESIDENTIAL
- R-1 LOW DENSITY RESIDENTIAL
- PLANNED DEVELOPMENT DISTRICT
- OPEN SPACE
- INDUSTRIAL
- C-1 NEIGHBORHOOD CENTER

**PROPERTIES SOURRUNDING BCP SITE BCP SITE # C828190**

| MAP KEY | SBL | ADDRESS |
|---|---|---|
| 1 | 135.28-2-31.011 | 25 SERENITY CIR |
| 2 | 135.28-2-31.01 | 33 SERENITY CIR |
| 3 | 135.28-2-31.009 | 41 SERENITY CIR |
| 4 | 135.28-2-40 | 97 COTTAGE ST |
| 5 | 135.28-2-41 | 93 COTTAGE ST |
| 6 | 135.28-2-42 | 89 COTTAGE ST |
| 7 | 135.28-2-43 | 85 COTTAGE ST |
| 8 | 135.28-2-46 | 79 COTTAGE ST |
| 9 | 135.28-2-47 | 73 COTTAGE ST |
| 10 | 135.28-2-48 | 67 COTTAGE ST |
| 11 | 135.28-2-49 | 63 COTTAGE ST |
| 12 | 135.28-2-50 | 59 COTTAGE ST |
| 13 | 135.28-2-51 | 55 COTTAGE ST |
| 14 | 135.28-2-52 | 45 COTTAGE ST |
| 15 | 135.28-2-53 | 37-39 COTTAGE ST |
| 16 | 135.28-2-54 | 33 COTTAGE ST |
| 17 | 136.21-1-5 | 29 COTTAGE ST |
| 18 | 136.21-1-6 | 23 COTTAGE ST |
| 19 | 136.21-1-7 | 17 COTTAGE ST |
| 20 | 136.21-1-8 | 9 COTTAGE ST |
| 21 | 136.21-1-9 | 3 COTTAGE ST |
| 22 | 121.77-1-31 | 20 MAGNOLIA ST |
| 23 | 135.28-2-55 | COTTAGE ST |
| 24 | 135.28-2-63 | 1320 S PLYMOUTH AVE |
| 25 | 121.77-1-11 | 15 FLINT ST |
| 26 | 121.77-1-10.001 | 5 FLINT ST |

SOURCES

- AERIAL IMAGERY FROM THE CITY OF ROCHESTER'S OPEN DATA PORTAL.

- PROPERTY BOUNDARIES AND ZONING DISTRICTS OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024) WITH THE EXECPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREET
AND 5 FLINT STREET.

- PROPERTY BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET TAKEN FROM DEED INSTRUMENT # 200307290847 FOR PROPERTY ADDRESS 5 FLINT STREET, ROCHESTER, NY, RECORDED ON JULY 29, 2003, RECORDED IN THE MONROE COUNTY REGISTRY OF DEEDS, BOOK 09821, PAGE 0657.

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE.

- ALL SITE PARCELS ARE ZONED R-1 LOW DENSITY RESIDENTIAL

200 0 200 FEET

TITLE:

# TAX MAP AND SURROUNDING PROPERTIES BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: SB | DATE: 13JAN26 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 3 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
| FILE: 4880.0001P000.102.03 - TAX MAP_B.MXD | | |

## LEGEND

- BCP SITE #C828190 LIMITS (APPROXIMATELYL 15.4 ACRES)
- APPROXIMATE PROPERTY BOUNDARIES
- PORTION OF FORMER VACUUM OIL REFINERY FOOTPRINT
- EXISTING BUILDING

**FEATURES IDENTIFIED AND DESCRIBED (NAMED) BY AMEC 2004**

- RETAINING WALL
- CULVERT
- DRAINAGE SWALE
- WALL FOUNDATION/CONCRETE PILLARS / FOOTERS
- SLAG MOUNDS/REEL-O-MATIC
- SHALLOW FLOOR PITS
- RUBBLE AND/OR TIRE
- PIPES
- SEWAGE PIPES
- MOLTEN PLASTIC
- MANHOLE
- MACHINERY
- FIRE HYDRANTS
- DRUMS (55) GALLON
- REMNANT OF CIRCULAR FOOTING
- APPROXIMATE SLUDGE PITS AREA

**HISTORIC FEATURES GEOREFERENCED FROM 1926 SANBORN**

- FORMER STRUCTURE (BUILDING, TANK, ETC)
- FORMER BARREL CONVEYOR
- PROPERTY PROPERTY BOUNDARIES
- PIPES
- FORMER RAILROAD

SOURCES

- AERIAL IMAGERY FROM THE CITY OF ROCHESTER'S OPEN DATA PORTAL.

- THE PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL ( SEPTEMBER 2024) WITH THE EXECPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET.

- THE PROPERTY BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET TAKEN FROM DEED INSTRUMENT # 200307290847 FOR PROPERTY ADDRESS 5 FLINT STREET, ROCHESTER, NY, RECORDED ON JULY 29, 2003, RECORDED IN THE MONROE COUNTY REGISTRY OF DEEDS, BOOK 09821, PAGE 0657.

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NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE.

N

200 0 FEET

# FORMER VACUUM OIL COMPANY REFINERY AREA
# BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:
10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

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|---|---|---|
| COMPILED BY: SB | DATE: 11/08/25 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 4 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
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## LEGEND

- BCP SITE #C828190 LIMITS (APPROXIMATELYL 15.4 ACRES)
- APPROXIMATE PROPERTY BOUNDARIES
- BIKE PATH

**CITY PROPOSED EXCAVATIONS**

- TARGETED EXCAVATION (11 TO 20 FEET IN DEPTH)
- TARGETED EXCAVATION (UP TO 21 FEET IN DEPTH)

**OBG REMEDIAL INVESTIGATION SAMPLE LOCATIONS - 2019**

- BEDROCK WELL
- OVERBURDEN MONITORING WELL
- TEST PITS
- SOIL BORING
- SURFACE SOIL
- SOIL VAPOR

SOURCES

- AERIAL IMAGERY FROM THE CITY OF ROCHESTER'S OPEN DATA PORTAL.

- PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024) WITH THE EXECPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET.

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- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

- TARGETED EXCAVATION AREAS AS SHOWN ON FIGURE 5 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE.

200 0 200 FEET

TITLE: **REMEDIAL INVESTIGATION SUMMARY**
**BCP SITE # C828190**

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:
10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

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|---|---|---|
| COMPILED BY: SB | DATE: 11NOV25 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 5 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
| FILE: 48880.0001P000.102.05 - REMEDIAL | | |

**LEGEND**

- BCP SITE #C828190 LIMITS (APPROXIMATELY 15.4 ACRES)
- APPROXIMATE PROPERTY BOUNDARIES
- BIKE PATH
- TARGETED EXCAVATION (11 TO 20 FEET IN DEPTH)
- TARGETED EXCAVATION (UP TO 21 FEET IN DEPTH)

**PRE-DESIGN INVESTIGATION (PDI) PROPOSED SAMPLE LOCATIONS**

- BOTTOM SAMPLE
- SIDEWALL SAMPLE
- POTENTIAL SIDEWALL SAMPLE

SOURCES

- AERIAL IMAGERY FROM THE CITY OF ROCHESTER'S OPEN DATA PORTAL.

- PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024) WITH THE EXECPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET.

- PROPERTY BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET TAKEN FROM DEED INSTRUMENT # 200307290847 FOR PROPERTY ADDRESS 5 FLINT STREET, ROCHESTER, NY, RECORDED ON JULY 29, 2003, RECORDED IN THE MONROE COUNTY REGISTRY OF DEEDS, BOOK 09821, PAGE 0657.

- TARGETED EXCAVATION AREAS AS SHOWN ON FIGURE 5 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON O'BRIEN & GERE ENGINEERS, INC. (OBG) REMEDIAL INVESTIGATION REPORT DATED OCTOBER 2019.

NOTES

- POTENTIAL SIDEWALL SAMPLE TO BE COLLECTED ONLY IF UTILITIES OR OTHER OBSTRUCTIONS PREVENT EXCAVATION TO THE SITE BOUNDARY AND ON-SITE SOIL WILL REMAIN.

- ALL FEATURES SHOWN ARE APPROXIMATE.

100 0 100 FEET

TITLE:

# PROPOSED PDI SAMPLING AREAS AND EXCAVATION AREAS BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: SB | DATE: 11NOV25 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 6 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
| FILE: 4880.0001P000.102.06 - PDI | | |

RIVERVIEW PLACE

**BCP SITE NO. C828162C**

**15 FLINT STREET PARCEL**

IMPORT SOIL AND MATERIAL STOCKPILE AREA

EQUIPMENT STAGING AREA

METAL STORAGE BUILDING

BUILDING MATERIAL STOCKPILE AREA

ENTRANCE GATE

CONCRETE BLOCK BUILDING

SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE

DECONTAMINATION PAD

WASTE STORAGE AREA

FRAC TANK

STABILIZED CONSTRUCTION ENTRANCE

FLINT STREET (60' WIDE)

ENTRANCE GATE

TRAILER AND FACILITIES STAGING AREA

IMPORT SOIL AND MATERIAL STOCKPILE AREA

ENTRANCE GATE

EQUIPMENT STAGING AREA

BUILDING MATERIAL STOCKPILE AREA

BUILDING MATERIAL STOCKPILE AREA

BRICK BUILDING

**10 FLINT STREET PARCEL**

WASTE STORAGE AREA

SOIL AND MATERIAL STAGING AREA FOR OFF-SITE DISPOSAL

SOIL AND MATERIAL STAGING AREA FOR OFF-SITE DISPOSAL

ENTRANCE GATE

**BCP SITE NO. C828162B**

**5 FLINT STREET PARCEL**

IMPORT SOIL AND MATERIAL STOCKPILE AREA

EQUIPMENT STAGING AREA

FOUNDATION OF DEMOLISHED 3-STORY BLOCK BUILDING

**BCP SITE NO. C828190**

**13 COTTAGE STREET PARCEL**

WASTE STORAGE AREA

SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE

**102 VIOLETTA STREET PARCEL**

ASPHALT-PAVED BIKE/PEDESTRIAN PATH

**100 RIVERVIEW PLACE PARCEL**

40' 0 40'

NOTES

1. PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024).
2. ALL FEATURES DEPICTED ARE APPROXIMATE.
3. LOCATIONS OF FENCING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACTIVE WORK AREAS.
4. BUILDING DEMOLITION EXCLUSION ZONES FENCING WILL BE INSTALLED DURING BUILDING DEMOLITION ACTIVITIES AT A MINIMUM SET BACK OF 1.5 TIMES THE HEIGHT OF EACH RESPECTIVE BUILDING.

LEGEND

- SANITARY MANHOLE
- HYDRANT
- SECURITY GATE ENTRANCE
- BCP BOUNDARY
- APPROXIMATE LOCATION OF PARAMETER FENCING
- PROPERTY BOUNDARIES FROM OPEN DATA PORTAL
- SITE ACCESS ROAD
- DECONTAMINATION PAD
- FRAC TANK
- CURRENT ISS AND/OR EXCAVATION AREAS
- ASPHALT-PAVED BIKE/PEDESTRIAN PATH
- BUILDING DEMOLITION EXCLUSION ZONES FENCING

LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS:

- SOIL AND MATERIAL STAGING AREA FOR OFF-SITE DISPOSAL
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- IMPORT SOIL AND MATERIAL STOCKPILE AREA
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- EQUIPMENT STAGING AREA

TITLE:

# SITE LAYOUT MAP BCP SITE #C828190, #C828162B, AND #C828162C

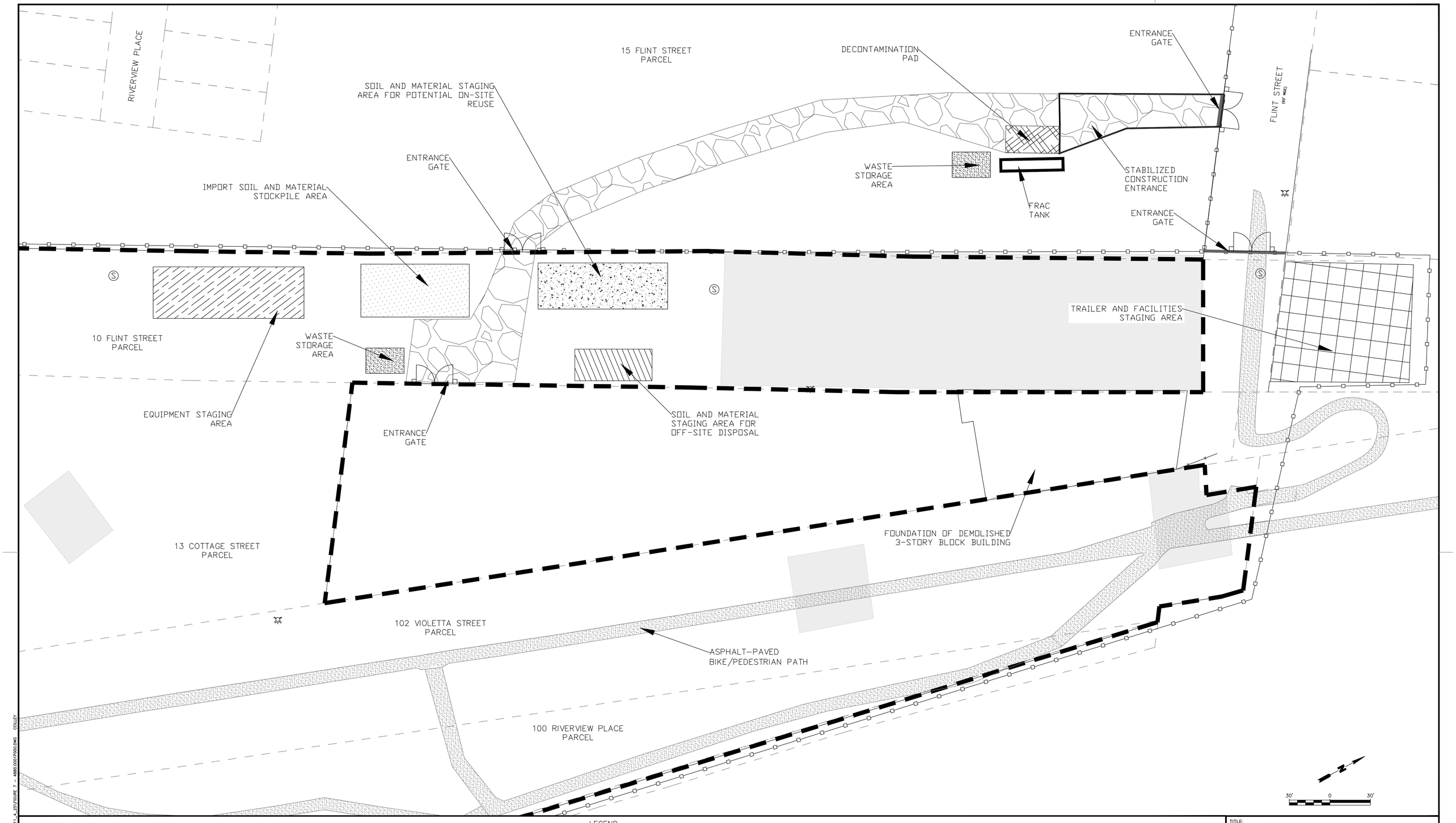
5, 10, & 15 FLINT STREET SITE
ROCHESTER, NEW YORK

5, 10 & 15 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: CC | DATE: 12/22/25 | FIGURE |
| PREPARED BY: CC | SCALE: AS SHOWN | 7 |
| PROJECT MGR: SB | PROJECT: 4880.0001P00 | |
| FILE: FIGURE XX - 4880.0001P000_DEC COMBINED PARCELS.DWG | | |

S:\CLIENTS\10 FLINT STREET LLC\DATA\REPORT FIGURES 11 x 17\FIGURE XX - 4880.0001P000_DEC COMBINED PARCELS.DWG COLLEY




NOTES

1. LOCATIONS OF FENCING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACTIVE WORK AREAS.
2. PROPOSED EXCAVATION AREAS AS SHOWN ON FIGURE 5 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.
3. BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.
4. BASEMAP FEATURES OBTAINED FROM NUSSBAUMER & CLARKE, INC., OCTOBER 2025.
5. PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER, SEPTEMBER 2024.

LEGEND

- SANITARY MANHOLE
- HYDRANT
- SECURITY GATE ENTRANCE
- BCP BOUNDARY
- APPROXIMATE LOCATION OF PARAMETER FENCING
- PROPERTY BOUNDARIES FROM OPEN DATA PORTAL
- EXCAVATION AREAS
- SITE ACCESS ROAD
- DECONTAMINATION PAD
- FRAC TANK
- ASPHALT-PAVED BIKE/PEDESTRIAN PATH

LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS:

- SOIL AND MATERIAL STAGING AREA FOR OFF-SITE DISPOSAL
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- IMPORT SOIL AND MATERIAL STOCKPILE AREA
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- EQUIPMENT STAGING AREA

TITLE:

# SITE LAYOUT MAP
# BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

5, 10 & 15 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: CC | DATE: 11/3/25 | FIGURE |
| PREPARED BY: CC | SCALE: AS SHOWN | 7A |
| PROJECT MGR: SB | PROJECT: 4880.0001P00 | |
| FILE: FIGURE 7 - 4880.0001P000.DWG | | |

S:\CLIENTS\15 FLINT STREET LLC\CAD\REPORT FIGURES 11_25\FIGURE 7 - 4880.0001P000.DWG COLLEY

RIVERVIEW PLACE

15 FLINT STREET PARCEL

DECONTAMINATION PAD

ENTRANCE GATE

FLINT STREET (60' ROW)

ENTRANCE GATE

WASTE STORAGE AREA

FRAC TANK

STABILIZED CONSTRUCTION ENTRANCE

ENTRANCE GATE

10 FLINT STREET PARCEL

TRAILER AND FACILITIES STAGING AREA

ENTRANCE GATE

SOIL AND MATERIAL STAGING AREA FOR OFF-SITE DISPOSAL

5 FLINT STREET PARCEL

13 COTTAGE STREET PARCEL

IMPORT SOIL AND MATERIAL STOCKPILE AREA

EQUIPMENT STAGING AREA

WASTE STORAGE AREA

FOUNDATION OF DEMOLISHED 3-STORY BLOCK BUILDING

SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE

102 VIOLETTA STREET PARCEL

100 RIVERVIEW PLACE PARCEL

30' 0 30'

S:\CLIENTS\10 FLINT STREET LLC\CAD\REPORT FIGURES 11_4_25\FIGURE XX - 4880.0001P000 - 5 FLINT STREET.DWG COLLEY

NOTES

1. LOCATIONS OF FENCING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACTIVE WORK AREAS.
2. PROPOSED EXCAVATION AND ISS AREAS AS SHOWN ON FIGURE 6 OF THE REVISED REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JULY 2024, AND PRESENTED IN THE NOVEMBER 2025 DECISION DOCUMENT FOR THE SITE.
3. PROPOSED EXCAVATION AND ISS AREAS AS SHOWN ON FIGURE 1A IN THE NOVEMBER 2025 DECISION DOCUMENT FOR THE SITE.
4. BASEMAP FEATURES OBTAINED FROM NUSSBAUMER & CLARKE, INC., OCTOBER 2025.
5. PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024) WITH THE EXCEPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREETAND 5 FLINT STREET.
6. PROPERTY BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET TAKEN FROM DEED INSTRUMENT #200307290847 FOR PROPERTY ADDRESS 5 FLINT STREET, ROCHESTER, NY, RECORDED ON JULY 29, 2003, RECORDED IN THE MONROE COUNTY REGISTRY OF DEEDS, BOOK 09821, PAGE 0657.

LEGEND

- SANITARY MANHOLE
- HYDRANT
- SECURITY GATE ENTRANCE
- SITE BOUNDARY
- APPROXIMATE LOCATION OF PARAMETER FENCING
- PROPERTY BOUNDARIES FROM OPEN DATA PORTAL
- EXCAVATION AND/OR ISS AREAS
- SITE ACCESS ROAD
- DECONTAMINATION PAD
- FRAC TANK

7. LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS:

- SOIL AND MATERIAL STAGING AREA FOR OFF-SITE DISPOSAL
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- IMPORT SOIL AND MATERIAL STOCKPILE AREA
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- EQUIPMENT STAGING AREA

TITLE:

# SITE LAYOUT PLAN
# BCP SITE # C828162B

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

5, 10 & 15 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: CC | DATE: 11/3/25 | FIGURE |
| PREPARED BY: CC | SCALE: AS SHOWN | 7B |
| PROJECT MGR: SB | PROJECT: 4880.0001P00 | |
| FILE: FIGURE XX - 4880.0001P000 - 5 FLINT STREET.DWG | | |

RIVERVIEW PLACE

15 FLINT STREET
PARCEL

IMPORT SOIL AND MATERIAL
STOCKPILE AREA

EQUIPMENT STAGING
AREA

METAL STORAGE
BUILDING

BUILDING MATERIAL
STOCKPILE AREA

ENTRANCE
GATE

CONCRETE BLOCK
BUILDING

DECONTAMINATION
PAD

WASTE
STORAGE
AREA

FRAC
TANK

STABILIZED
CONSTRUCTION
ENTRANCE

ENTRANCE
GATE

BUILDING MATERIAL
STOCKPILE AREA

BUILDING MATERIAL
STOCKPILE AREA

BRICK
BUILDING

ENTRANCE
GATE

10 FLINT STREET
PARCEL

N

30' 0 30'

NOTES

1. PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER, SEPTEMBER 2024.
2. ALL FEATURES DEPICTED ARE APPROXIMATE.
3. LOCATIONS OF FENCING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACTIVE WORK AREAS.
4. BUILDING DEMOLITION EXCLUSION ZONES FENCING WILL BE INSTALLED DURING BUILDING DEMOLITION ACTIVITIES AT A MINIMUM SET BACK OF 1.5 TIMES THE HEIGHT OF EACH RESPECTIVE BUILDING.
5. BUILDING MATERIALS WILL BE SEGREGATED BY TYPE AND STOCKPILED IN AN AREA CLOSE TO THE SOURCE BUILDING.
6. BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN IN EXHIBIT A 2 OF THE BROWNFIELD CLEANUP AGREEMENT DATED OCTOBER 10, 2025.
7. PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024).

LEGEND

- SANITARY MANHOLE
- HYDRANT
- SECURITY GATE ENTRANCE
- BCP BOUNDARY
- APPROXIMATE LOCATION OF PARAMETER FENCING
- PROPERTY BOUNDARIES FROM OPEN DATA PORTAL
- SITE ACCESS ROAD
- DECONTAMINATION PAD
- FRAC TANK
- ASPHALT-PAVED BIKE/PEDESTRIAN PATH

LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS:

- BUILDING MATERIAL STOCKPILE AREA
- EQUIPMENT STAGING AREA
- BUILDING DEMOLITION EXCLUSION ZONES FENCING

TITLE:

# SITE SECURITY AND LAYOUT PLAN
# BCP SITE #C828162C

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

5, 10 & 15 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

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| COMPILED BY: CC | DATE: 11/3/25 | FIGURE |
| PREPARED BY: CC | SCALE: AS SHOWN | 7C |
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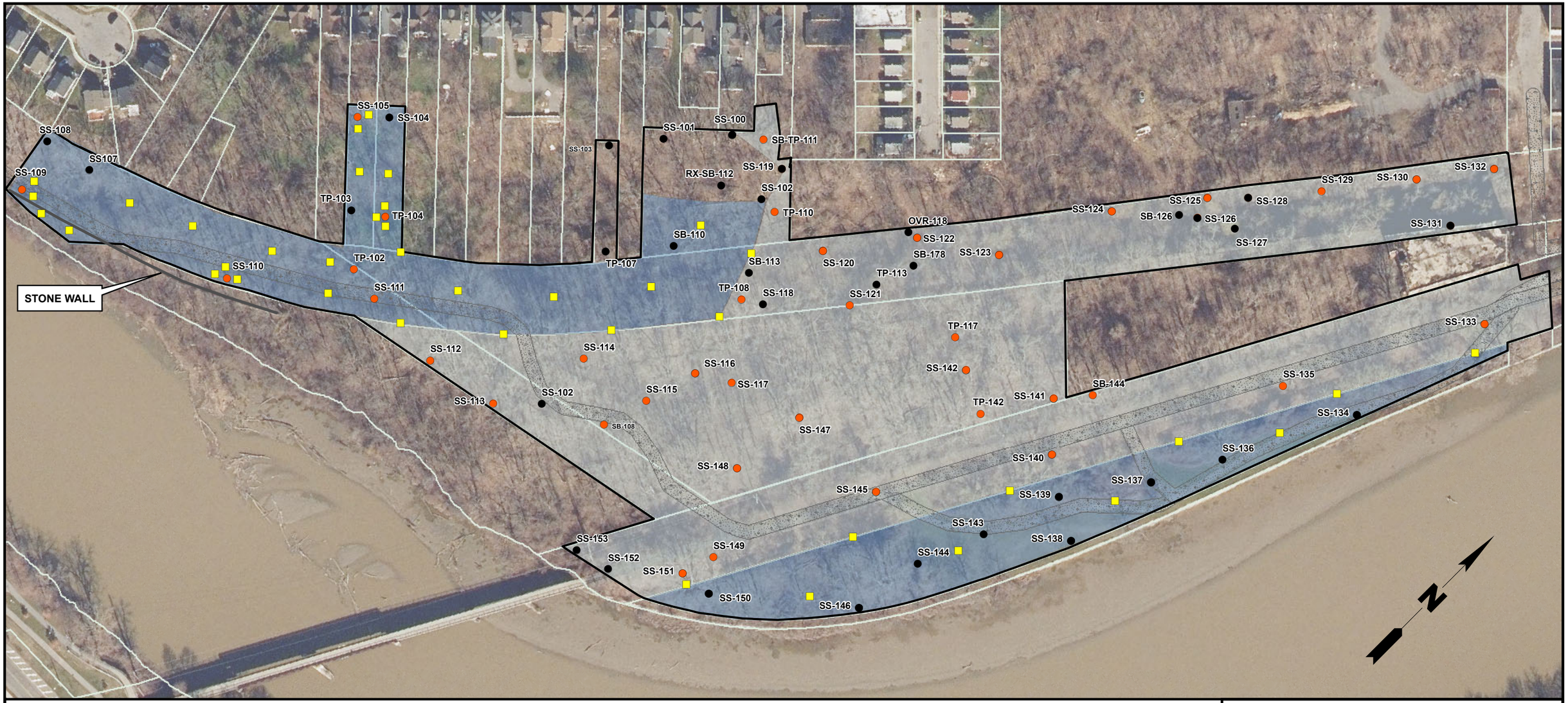
N:\PROJECTS\ROCHESTER 4825.0001P000\104\4825.0001P000.104.03.DWG COLLEY




**LEGEND**

- BCP SITE #C828190 LIMITS (APPROXIMATELY 15.4 ACRES)
- APPROXIMATE PROPERTY BOUNDARIES
- BIKE PATH

**PROPOSED SITE COVER AREAS**

- POTENTIAL SITE COVER AREA
- PROPOSED SITE COVER AREA

**OBG REMEDIAL INVESTIGATION SURFACE COVER RESULTS (0-2 FT BELOW GROUND SURFACE) - 2019**

- EXCEEDS RESTRICTED RESIDENTIAL SCOS
- DOES NOT EXCEED RESTRICTED RESIDENTIAL SCOS

**PRE-DESIGN INVESTIGATION (PDI) PROPOSED SAMPLE LOCATIONS**

- PDI COVER SYSTEM SAMPLE LOCATION

SOURCES

- AERIAL IMAGERY FROM THE CITY OF ROCHESTER'S OPEN DATA PORTAL.

- PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024) WITH THE EXECPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET.

- PROPERTY BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET TAKEN FROM DEED INSTRUMENT # 200307290847 FOR PROPERTY ADDRESS 5 FLINT STREET, ROCHESTER, NY, RECORDED ON JULY 29, 2003, RECORDED IN THE MONROE COUNTY REGISTRY OF DEEDS, BOOK 09821, PAGE 0657.

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE.

- COVER SYSTEM WILL CONSIST OF SOIL COVER EXCEPT WHERE STONE HAS OTHERWISE BEEN IDENTIFIED.

200 0 200 FEET

TITLE:

# PROPOSED PDI COVER SYSTEM SAMPLES AND SITE COVER SYSTEM AREAS BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

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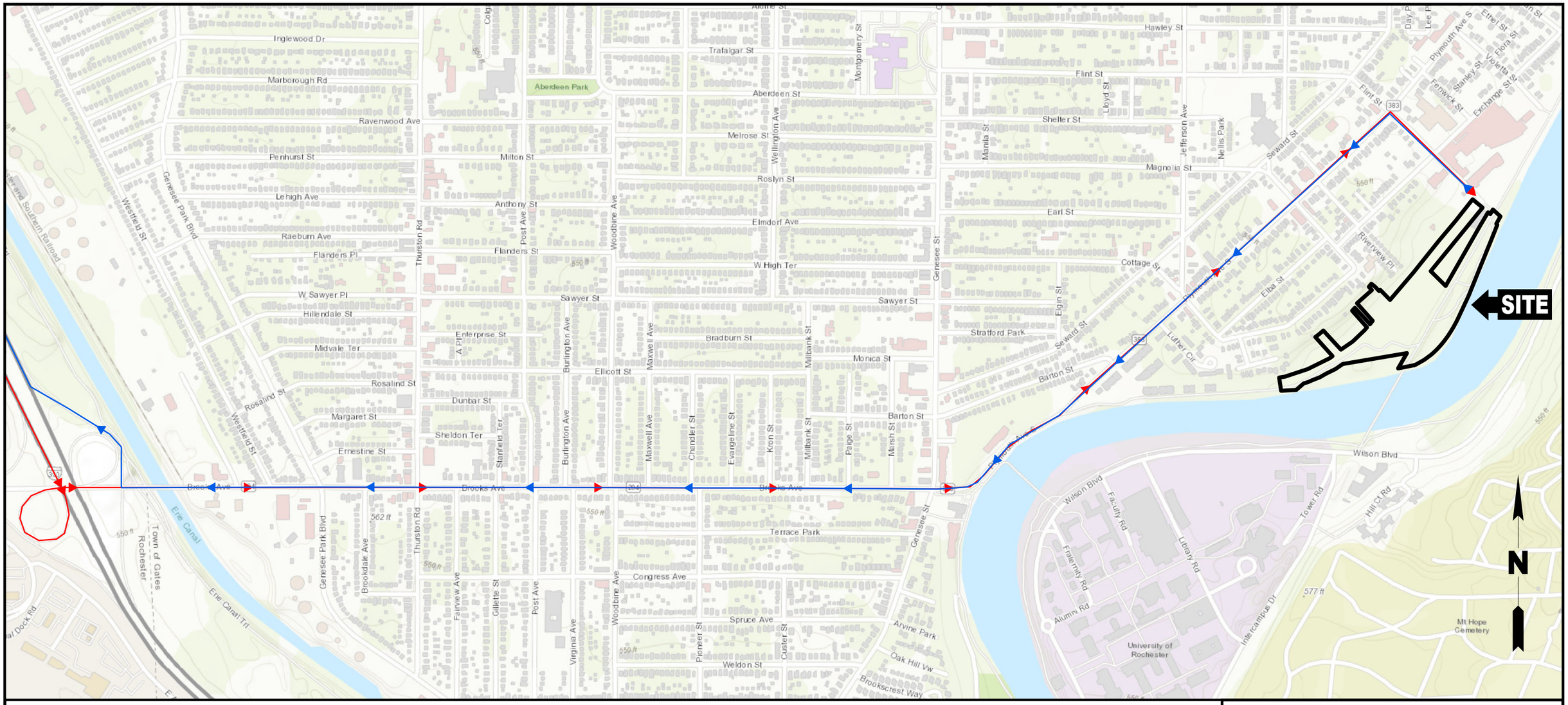
|---|---|---|
| COMPILED BY: SB | DATE: 15JAN26 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 8 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
| FILE: 4880.0001P000.102.08 - PDI Cover | | |




DIRECTIONS INBOUND

1. DRIVE EAST.
2. TURN LEFT ONTO BREW ROAD/CR 196.
3. TURN LEFT ONTO CHILI-RIGA CENTER ROAD/NY 33A.
4. TAKE THE I 490 EAST RAMP TOWARD ROCHESTER.
5. TAKE EXIT 6 ONTO NY 204 EAST TOWARD AIRPORT.
6. TURN LEFT ONTO CHILI AVENUE/NY 33A/NY 204.
7. TURN RIGHT TOWARD NY 204 EAST/BROOKS AVENUE.
8. TAKE THE I 390 SOUTH RAMP TOWARD I 90/CORNING.
9. TAKE EXIT 17 ONTO NY 383 TOWARD ROCHESTER/SCOTTSVILLE ROAD/ROCHESTER INSTITUTE OF TECHNOLOGY.
10. TURN LEFT ONTO SCOTTSVILLE ROAD/NY 383. CONTINUE ON NY 383.
11. TURN RIGHT ONTO SOUTH PLYMOUTH AVENUE/NY 383.
12. TURN RIGHT ONTO FLINT STREET.

DIRECTIONS OUTBOUND

1. DRIVE NORTHWEST ON FLINT STREET.
2. TURN LEFT ONTO SOUTH PLYMOUTH AVENUE/NY 383.
3. TURN LEFT ONTO CHILI AVENUE/NY 33A/NY 204.
4. TURN RIGHT ONTO NY 204/AIRPORT EXPRESSWAY.
5. KEEP LEFT TO TAKE I 490 WEST TOWARD BUFFALO.
6. TAKE EXIT 2 ONTO NY 33A TOWARD BERGEN/BATAVIA.
7. TURN LEFT ONTO CHILI-RIGA CENTER ROAD/NY 33A.
8. TURN RIGHT ONTO BREW ROAD/CR 196.
9. TURN RIGHT.

SOURCES

- TRUCK ROUTES FROM TRACKROAD.COM (OCTOBER 2025).

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE.

1,000 0 1,000
FEET

TITLE:

# TRUCK ROUTES
# BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

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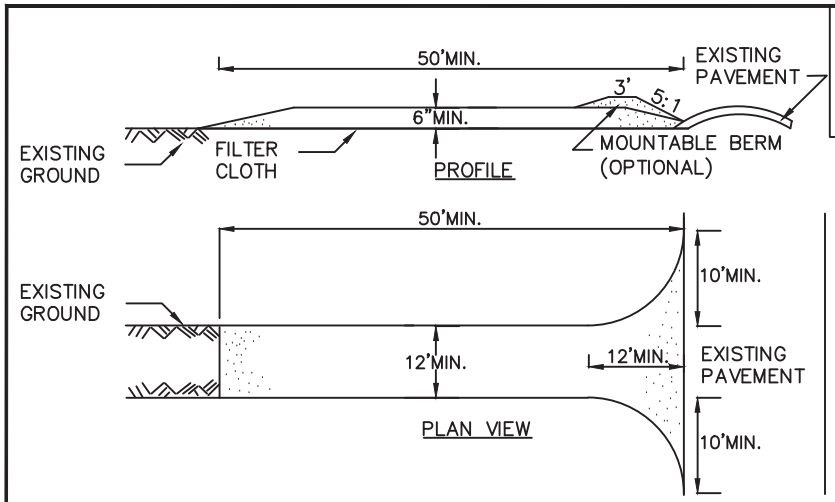
| COMPILED BY: SB | DATE: 08NOV25 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 9 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
| FILE: 4880.0001P000.102.09 - TRUCK ROUTES | | |



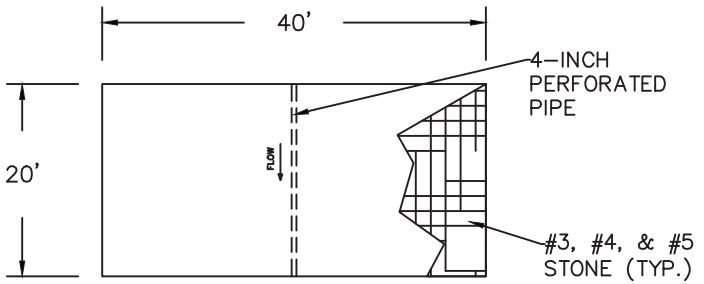

## CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 1–4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ACCESS SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

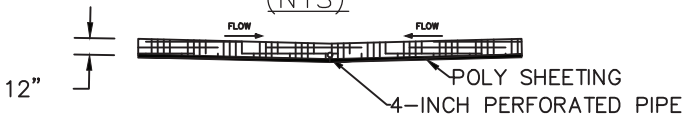
ADAPTED FROM DETAILS PROVIDED BY: USDA – NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STABILIZED CONSTRUCTION ACCESS

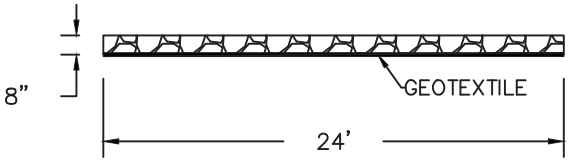
## DECONTAMINATION PAD PLAN VIEW DETAIL (NTS)




## DECONTAMINATION PAD PROFILE DETAIL (NTS)




## ACCESS ROAD PROFILE DETAIL (NTS)




Title:

# CONSTRUCTION DETAILS
# BCP SITE # C828190

1PORTION OF FORMER VACUUM OIL
REFINERY SITE ROCHESTER, NEW YORK

Prepared for:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: CMC | DATE: OCTOBER 2025 | FIGURE |
| PREPARED BY:CMC | SCALE: AS SHOWN | |
| PROJECT MGR:ER | PROJECT: 4880.0001P000 | 10 |
| FILE: FIGURE 1; SITE ACCESS & DECON PAD.DWG | | |

15 FLINT STREET
PARCEL

10 FLINT STREET
PARCEL

13 COTTAGE STREET
PARCEL

102 VIOLETTA STREET
PARCEL

100 RIVERVIEW PLACE
PARCEL

RIVERVIEW PLACE

FLINT STREET
(60' WIDE)

3 STORY
BLOCK
BUILDING

ASPHALT DRIVEWAY

VAULT

GENESEE RIVER

NOTES

1. SUBSURFACE UTILITIES AND FEATURES IDENTIFIED IN ROCHESTER PURE WATERS DISTRICT, COMBINED WASTEWATER OVERFLOW ABATEMENT PROGRAM, PHASE I, ENGINEERING DRAWING DS-3 GENESEE RIVER INTERCEPTOR SOUTHWEST, MONROE COUNTY, NEW YORK, MARCH 28, 1974.
2. SUBSURFACE UTILITIES CONFIRMED IN THE FIELD BY GROUND PENETRATING RADAR SYSTEMS, LLC (GPRS), OCTOBER 28, 2025.
3. LOCATIONS OF FENCING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACTIVE WORK AREAS.
4. PROPOSED EXCAVATION AREAS AS SHOWN ON FIGURE 5 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.
5. BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.
6. BASEMAP FEATURES OBTAINED FROM NUSSBAUMER & CLARKE, INC., OCTOBER 2025.
7. PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL, SEPTEMBER 2024.
8. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

- HYDRANT
- SANITARY MANHOLE
- WATERLINE MANHOLE
- UTILITY POLE
- BCP BOUNDARY
- OVERHEAD ELECTRICAL/UTILITY LINE
- INFERRED LOCATION OF SUSPECTED WATER UTILITY LINE
- INFERRED LOCATION OF SUSPECTED GAS UTILITY LINE
- PROPERTY BOUNDARIES FROM OPEN DATA PORTAL – NOT SURVEYED
- EXCAVATION AREAS

SUSPECTED POTENTIAL SUBSURFACE UTILITIES AS MAPPED IN ROCHESTER PURE WATERS DISTRICT MAP, 1974:

- G — APPROXIMATE LOCATION OF UNCONFIRMED GAS UTILITY
- SA — APPROXIMATE LOCATION OF UNCONFIRMED SANITARY SEWER LINE
- W — APPROXIMATE LOCATION OF UNCONFIRMED WATER UTILITY LINE

SUBSURFACE UTILITIES CONFIRMED IN THE FIELD BY GPRS, OCTOBER 2025:

- CONFIRMED LOCATION OF GAS UTILITY LINE
- CONFIRMED LOCATION OF WATER UTILITY LINE
- CONFIRMED LOCATION OF UNKNOWN LINEAR ANOMALY
- CONFIRMED LOCATION OF SANITARY SEWER LINE
- END OF CONFIRMED EXTENT OF SUBSURFACE WATER LINE
- END OF CONFIRMED EXTENT OF SUBSURFACE GAS LINE
- END OF CONFIRMED EXTENT OF SUBSURFACE SANITARY SEWER LINE

30' 0 30'

TITLE:

# KNOWN AND SUSPECTED UTILITIES
# BCP SITE # C828190

PORTION OF THE FORMER VACUUM OIL REFINERY
ROCHESTER, NEW YORK

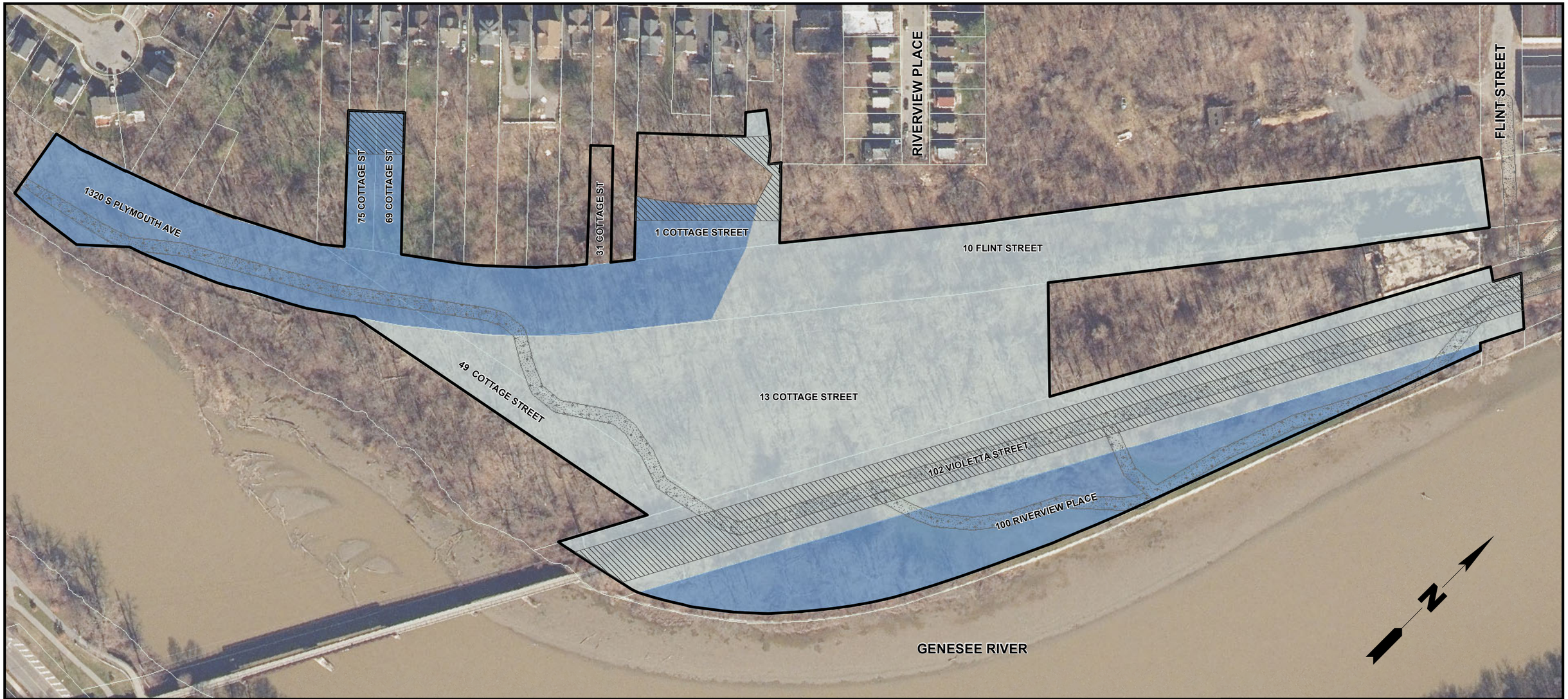
PREPARED FOR:
10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | |
|---|---|
| COMPILED BY: SK | DATE: 11/12/25 |
| PREPARED BY: SK | SCALE:AS SHOWN |
| PROJECT MGR: SB | PROJECT: 4880.0001P00 |
| FILE: FIGURE 11 - 4880.0001P000 11.7.2025.DWG | |

FIGURE 11

S:\CLIENTS\10 FLINT STREET LLC\CAD\REPORT FIGURES 11_4_25\FIGURE 11 - 4880.0001P000 11.7.2025.DWG COLLEY

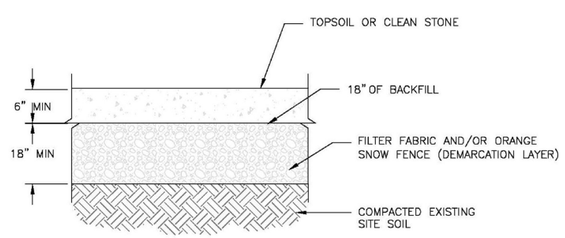



## LEGEND

- APPROXIMATE PROPERTY BOUNDARIES
- BCP SITE #C828190 LIMITS (APPROXIMATELY 15.4 ACRES)
- BIKE PATH

**PROPOSED SITE COVER AREAS**

- POTENTIAL SITE COVER AREA
- PROPOSED SITE COVER AREA
- APPROXIMATE AREAS WHERE STONE COVER MAY BE PLACED, AS NEEDED, TO ASSIST WITH SLOPE STABILIZATION




1 PROPOSED SITE COVER SYSTEM: LANDSCAPED AREAS

SCALE: NOT TO SCALE

SOURCES

- AERIAL IMAGERY FROM THE CITY OF ROCHESTER'S OPEN DATA PORTAL.

- PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL (SEPTEMBER 2024) WITH THE EXECPTION OF THE BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET.

- PROPERTY BOUNDARY BETWEEN 940 EXCHANGE STREET AND 5 FLINT STREET TAKEN FROM DEED INSTRUMENT # 200307290847 FOR PROPERTY ADDRESS 5 FLINT STREET, ROCHESTER, NY, RECORDED ON JULY 29, 2003, RECORDED IN THE MONROE COUNTY REGISTRY OF DEEDS, BOOK 09821, PAGE 0657.

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE.

- COVER SYSTEM WILL CONSIST OF SOIL COVER EXCEPT WHERE STONE HAS OTHERWISE BEEN IDENTIFIED.

200 0 200 FEET

TITLE: **SITE COVER SYSTEM – COVER TYPE DETAILS AND LOCATIONS BCP SITE # C828190**

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: SB | DATE: 15JAN26 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 12 |
| PROJECT MGR: ER | PROJECT: 4880.0001P000 | |
| FILE: 4880.0001P000.102.12 - COVER | | |

# APPENDICES

A. 2024 City of Rochester Wetland Mitigation Credit Sale Letter
B. NYDEC BCP Public Notice Fact Sheet – Site No. C828190
C. Groundwater Contour Maps
D. Quality Assurance Project Plan (QAPP) / Field Sampling Plan (FSP)
E. Request to Import/Reuse Fill Material Form
F. Erosion and Sediment Control Plan (ESCP)
G. Community Air Monitoring Plan (CAMP)
H. SiteWise™ Model
I. Site Health and Safety Plan (HASP)
J. Professional Profiles
K. Citizen Participation Plan
L. Required Permits

# APPENDIX A

2024 City of Rochester Wetland Mitigation Credit Sale Letter

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April 16, 2024

Mr. Harold Keppner
Chief, Monitoring & Enforcement Section
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199

RE: Wetland Mitigation Credits Reserved in the Lower Genessee Service Area
Ducks Unlimited New York In-Lieu Fee Program

Ducks Unlimited, Inc. (DU) is the authorized sponsor of the Ducks Unlimited – New York In-lieu Fee program (DU-NY-ILF). DU signed an In-Lieu Fee agreement, effective September 28, 2012, with the US Army Corps of Engineers, Buffalo & New York District, to operate the program.

PERMITTEE: City of Rochester
PERMIT NUMBER(S):
DA permit number: LRB-2010-01497
Date Issued: November 2, 2023
NYS Department of Environmental Conservation: 8-2614-00969/00001 Date Issued: 08/2/2023
PROJECT LOCATION (town): Rochester
AUTHORIZED IMPACT ACREAGE: .44 AC
AUTHORIZED IMPACT RESOURCE TYPE(S): PFO
Number of Credits Purchased: 0.44
Service Area of Purchased Credits: Lower Genesee Service Area

The credits purchased through this sale are ADVANCED CREDITS.

This letter confirms receipt of $49,287.92 for the above authorized project.

By making this payment, City of Rochester permanently transfers responsibility for the mitigation liability to Ducks Unlimited, Inc., the ILF sponsor. By accepting the ILF payment, DU is responsible for use of these funds to provide compensatory mitigation for the above-described impacts.

DU signature: DocuSigned by: Karen Waldrop D86079ACEB7A4CB... EH

Permittee signature: Patrick Beath Corporation Counsel City of Rochester

CC: Jane Forbes, Permittee
Patrick Beath, Esq., Corporation Counsel, Permittee
Joseph M. Rowley, USACE
Peter Krakowiak, USACE
Amy L. Gitchell, USACE

NYDEC BCP Public Notice Fact Sheet – Site No. C828190

NEW YORK STATE | Department of Environmental Conservation

# FACT SHEET

**Brownfield Cleanup Program**

**Portion of Former Vacuum Oil Refinery**
**City of Rochester, Monroe County**

**SITE No. C828190**
**NYSDEC REGION 8**

**July 2023**

## Remedy Proposed for Brownfield Site Contamination; Public Comment Period and Public Meeting Announced

**Public Meeting, Wednesday 08/16/2023 at 6:00 PM**
**Willie Walker Lightfoot Recreation Center Gymnasium**
**271 Flint Street, City of Rochester, 14608**

NYSDEC invites you to a public meeting to discuss the remedy proposed for the site. You are encouraged to provide comments at the meeting, and during the 45-day comment period described in this fact sheet.

DEC will provide interpreter services for hearing impaired persons and language interpreter services for individuals with difficulty understanding or reading English at no charge upon written request submitted no later than 2 weeks prior to meeting date.

The public is invited to comment on a proposed remedy being reviewed by the New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), to address contamination related to the Portion of Former Vacuum Oil Refinery site ("site") located south side of Flint Street and adjacent to the Genesee River, City of Rochester, Monroe County. Please see the map for the site location.

Based on the findings of the investigation, NYSDEC in consultation with the New York State Department of Health (NYSDOH) has determined that the site does not pose a significant threat to public health or the environment. This decision is based on the nature of the existing contaminants identified at the site.

**How to Comment:** NYSDEC is accepting written comments about the proposed plan, called a "Draft Remedial Alternatives Analysis Report (RAAR)" for 45 days, from **July 26 through September 8, 2023**.

- Access the RAAR and other project documents online through the DECinfo Locator: https://www.dec.ny.gov/data/DecDocs/C828190/
- Documents also are available at the location(s) identified at left under "Where to Find Information."
- Please submit comments to the NYSDEC project manager listed under Project-Related Questions in the "Who to Contact" area at left.

**Draft Remedial Alternatives Analysis Report:** The proposed Restricted Residential Use remedy consists of:

- Excavation and off-site disposal of contaminated soil from 11 feet to 21 feet below surface grade. Excavations will target soil/fill exhibiting sheens, staining, odors, elevated contaminants of concern.
- Long-term groundwater monitoring of the site's groundwater to monitor groundwater contaminants.

### Where to Find Information

Access project documents through the DECinfo Locator and at these location(s):
https://www.dec.ny.gov/data/DecDocs/C828190/

**Phillis Wheatley Community Library**
33 Dr. Samuel McCree Way
Rochester, New York 14608
585-428-8212

**Plymouth-Exchange (PLEX)**
Neighborhood Assoc.
Attn: Dorothy Hall
Carlson Commons
70 Coretta Scott Crossing
Rochester, New York 14608
585-328-6916
info@PL-EX.org

### Who to Contact

Comments and questions are welcome and should be directed as follows:

**Project-Related Questions**
Charlotte B. Theobald, Project Manager
NYSDEC
6274 East Avon-Lima Road
Avon, New York 14414
585-226-5354
charlotte.theobald@dec.ny.gov

**Project-Related Health Questions**
Christopher Budd
NYSDOH
Empire State Plaza
Corning Tower
Albany, New York 12237
518-402-7860
beei@health.ny.gov

**For more information about New York's Brownfield Cleanup Program, visit:**
www.dec.ny.gov/chemical/8450.html

# BROWNFIELD CLEANUP PROGRAM

- Placement of a site-wide soil cover system over areas without hardscape (buildings, asphalt, or concrete) to address contamination remaining above restricted residential use soil cleanup objectives.
- Importing clean material that meets the established Soil Cleanup Objectives for use as backfill.
- Implementing a Health and Safety Plan (HASP)and Community Air Monitoring Plan (CAMP) during all ground intrusive activities.
- Implementation of a Site Management Plan (SMP).
- Recording of an Environmental Easement to ensure proper use of the site.

The proposed remedy was developed by City of Rochester ("applicant") after performing a detailed investigation of the site under New York's Brownfield Cleanup Program (BCP). A "Remedial Investigation Report," which describes the results of the site investigation, was submitted concurrently with the Remedial Alternatives Analysis Report and is also available for review at the locations identified on Page 1.

**Next Steps:** NYSDEC will consider public comments, revise the cleanup plan as necessary, and issue a final Decision Document. NYSDOH must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The applicant may then design and perform the cleanup action to address the site contamination, with oversight by NYSDEC and NYSDOH.

NYSDEC will keep the public informed throughout the investigation and cleanup of the site.

**Site Description:** The Portion of Former Vacuum Oil Refinery site is a 15.4-acre site located in the southwestern quadrant of the City of Rochester in the Plymouth-Exchange (PLEX) neighborhood. The site is currently undeveloped except for an asphalt paved recreational trail that runs through the entire eastern side of the site from north to south. A grass covered area is located east of the trail. The rest of the site is wooded. Most of the site was part of the former Vacuum Oil refinery which operated from about 1866 to 1930. Other historical uses included a greenhouse, railroads, and canals.

Additional site details, including environmental and health assessment summaries, are available on NYSDEC's Environmental Site Remediation Database (by entering the site ID, C828190) at: https://www.dec.ny.gov/cfmx/extapps/derexternal/index.cfm?pageid=3

**Summary of the Investigation:** Semi-volatile organic compounds (SVOCs) and metals (primarily arsenic), are the primary compounds found in soils at concentrations above use-specific soil cleanup objectives. The SVOCs and metals are present from the surface to depths up to 12 feet below grade and are present throughout the site. Soils with nuisance odors, staining, and visible sheens associated with petroleum-related compounds are also present, especially in the northern part of the site. Volatile organic compounds (VOCs), SVOCs, and metals are found in groundwater at concentrations above groundwater standards. Groundwater impacts are generally limited to the northern part of the site.

**Brownfield Cleanup Program:** New York's Brownfield Cleanup Program (BCP) encourages the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and redeveloped. These uses may include recreation, housing, business, or other uses. A brownfield site is any real property where a contaminant is present at levels exceeding the soil cleanup objectives or other health-based or environmental standards, criteria or guidance adopted by DEC that are applicable based on the reasonably anticipated use of the property, in accordance with applicable regulations.

For more information about the BCP, visit: https://www.dec.ny.gov/chemical/8450.html

***We encourage you to share this fact sheet with neighbors and tenants, and/or post this fact sheet in a prominent area of your building for others to see.***

**Stay Informed With DEC Delivers**
Sign up to receive site updates by email: www.dec.ny.gov/chemical/61092.html

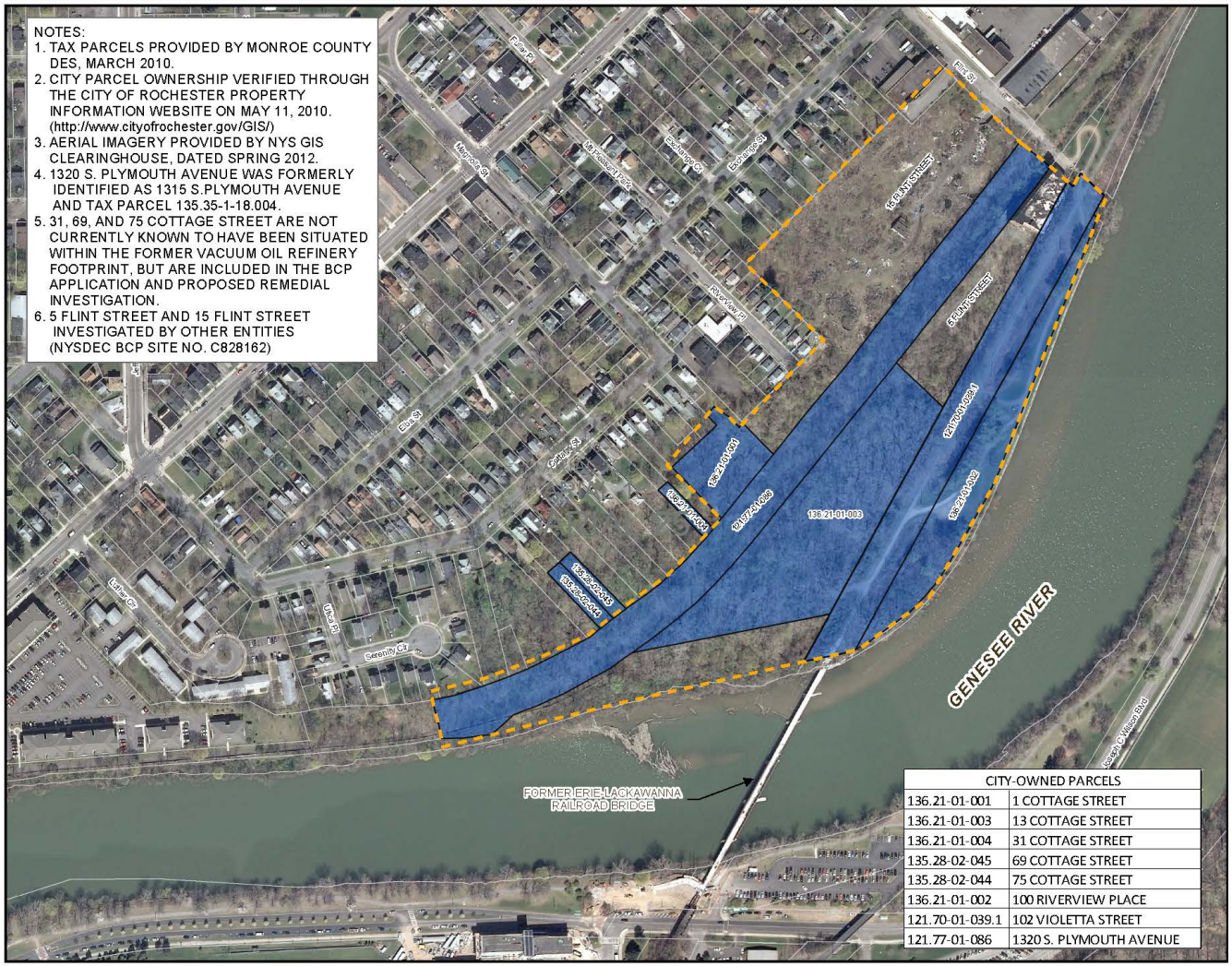
Note: Please disregard if you already have signed up and received this fact sheet electronically.

**DECinfo Locator**
Interactive map to access DEC documents and public data about the environmental quality of specific sites: https://www.dec.ny.gov/pubs/109457.html

# BROWNFIELD CLEANUP PROGRAM

## Site Location

FIGURE 2



NEW YORK STATE | Department of Environmental Conservation

**Kathy Hochul**, Governor | **Basil Seggos**, Commissioner www.dec.ny.gov

# Translation Available. Don't see your language? Ask!

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|---|---|
| **English** | To have this document translated into a language you can understand, contact the person below. There is no charge for the translation. |
| **Español**<br>**Spanish** | Si necesita la traducción de este documento a un idioma que pueda entender, comuníquese con la persona indicada abajo. La traducción es gratis. |
| **简体字**<br>**Simplified Chinese** | 如需將此文件翻譯成您能理解的語言版本，請聯絡下方人員。本次翻譯不收取費用。 |
| **Русский**<br>**Russian** | Чтобы получить перевод этого документа на понятный вам язык, свяжитесь с представителем, данные которого указаны ниже. Плата за эту услугу не взимается. |
| **אידיש**<br>**Yiddish** | צו האבן די דאקומענט איבערגעטייטשט אין א שפראך וואס איר קענט פארשטיין, פארבינדט זיך מיט די פערזאן אונטן. די איבערטייטשונג איז פריי פון אפצאל. |
| **বাঙালি**<br>**Bengali** | এই নথিটি আপনি বুঝতে পারেন এমন একটি ভাষায় অনুবাদ করতে, নিম্নলিখিত ব্যক্তির সাথে যোগাযোগ করুন। অনুবাদের জন্য কোন চার্জ দিতে হবে না। |
| **한국어**<br>**Korean** | 이 언어를 본인이 이해할 수 있는 언어로 받아보려면 아래 담당자에게 문의하십시오. 번역료는 없습니다. |
| **Kreyòl Ayisyen**<br>**Haitian Creole** | Pou yo ka tradwi dokiman sa nan yon lang ou ka konprann, kontakte moun ki anba a. Ou p'ap peye anyen pou tradiksyon an. |
| **Italiano**<br>**Italian** | Per ottenere la traduzione di questo documento in un'altra lingua, contatti la persona indicata qui di seguito. La traduzione è gratuita. |
| **العربية**<br>**Arabic** | لترجمة هذا المستند إلى لغة يمكنك فهمها، تواصل مع الشخص أدناه. لا يتم تطبيق رسوم مقابل الترجمة. |
| **Języky Polski**<br>**Polish** | Aby uzyskać tłumaczenie tego dokumentu na język, który jest dla Ciebie zrozumiały, skontaktuj się z poniższą osobą. Za tłumaczenie nie jest pobierana żadna opłata. |

**Contact: Charlotte B. Theobald, charlotte.theobald@dec.ny.gov, 585-226-5354**

# APPENDIX C

Groundwater Contour Maps

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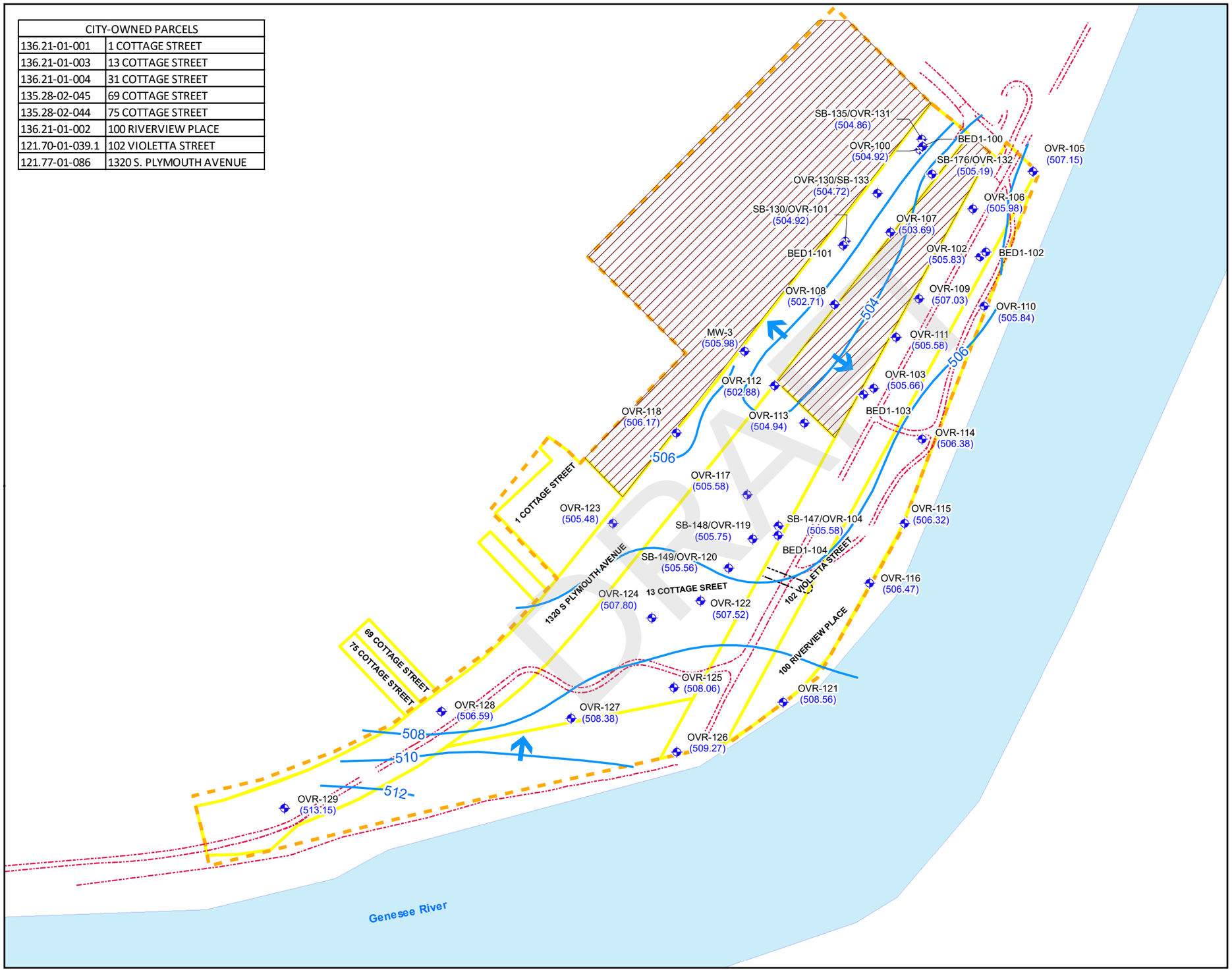
| CITY-OWNED PARCELS | |
|---|---|
| 136.21-01-001 | 1 COTTAGE STREET |
| 136.21-01-003 | 13 COTTAGE STREET |
| 136.21-01-004 | 31 COTTAGE STREET |
| 135.28-02-045 | 69 COTTAGE STREET |
| 135.28-02-044 | 75 COTTAGE STREET |
| 136.21-01-002 | 100 RIVERVIEW PLACE |
| 121.70-01-039.1 | 102 VIOLETTA STREET |
| 121.77-01-086 | 1320 S. PLYMOUTH AVENUE |




N

LEGEND

- MONITORING WELL
- GROUNDWATER CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- DRAINPIPE
- BIKE PATH
- NOT PART OF CITY OF ROCHESTER BROWNFIELD CLEANUP PROGRAM SITE; HOWEVER, THESE PARCELS ARE BEING INVESTIGATED BY OTHER ENTITIES
- FORMER VACUUM OIL REFINERY SITE (APPROXIMATE)
- BROWNFIELD CLEANUP PROGRAM SITE LIMITS (APPROXIMATELY 15.4 ACRES)

# CITY OF ROCHESTER BROWNFIELD CLEANUP PROGRAM REMEDIAL INVESTIGATION REPORT PORTION OF FORMER VACUUM OIL REFINERY

1, 13, 31, 69, AND 75 COTTAGE STREET; 100 RIVERVIEW PLACE; 102 VIOLETTA STREET; AND PORTION OF 1320 S. PLYMOUTH AVENUE ROCHESTER, NEW YORK

## OVERBURDEN GROUNDWATER ELEVATION CONTOURS - AUGUST 2016

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| CITY-OWNED PARCELS | |
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| 136.21-01-001 | 1 COTTAGE STREET |
| 136.21-01-003 | 13 COTTAGE STREET |
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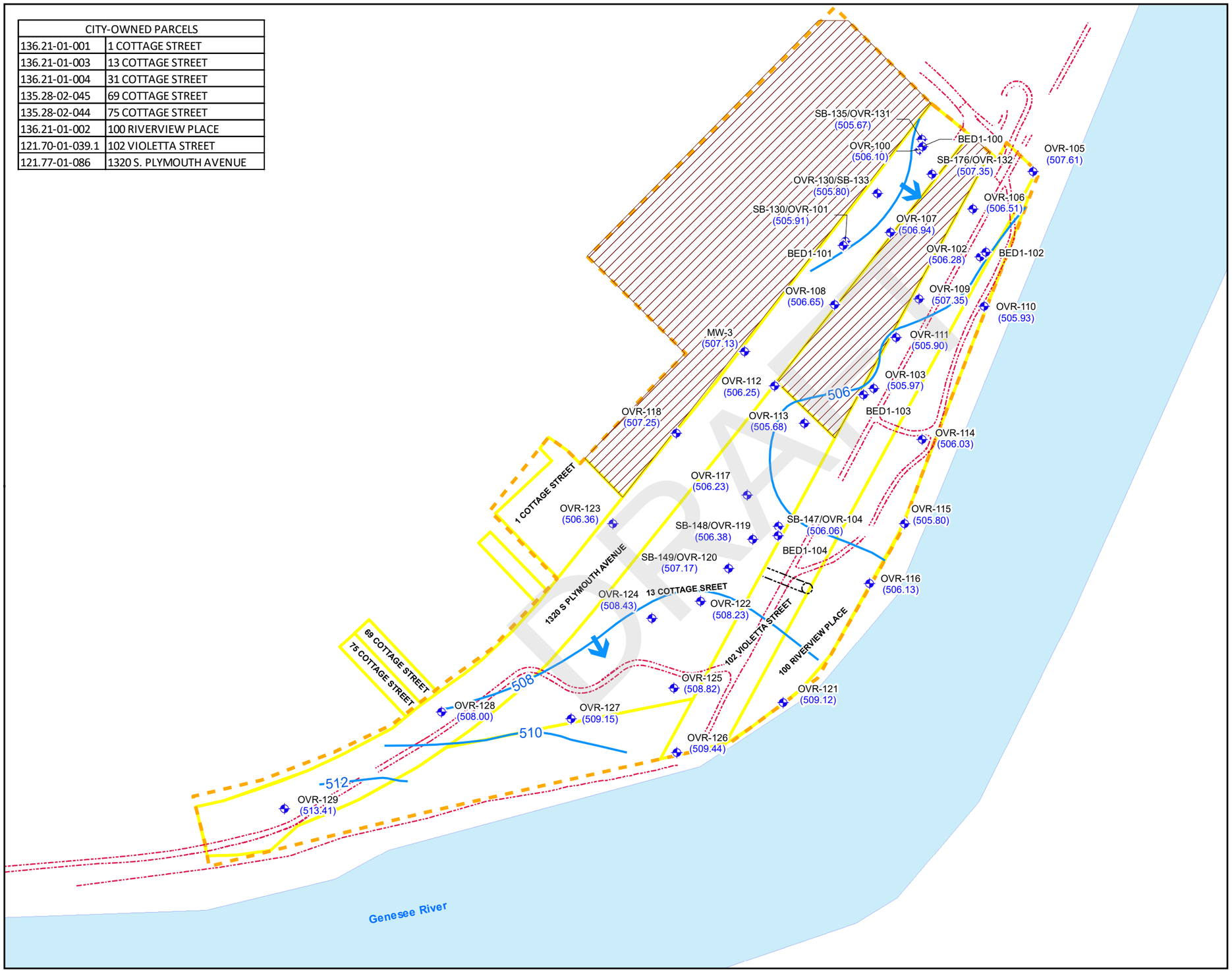


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1, 13, 31, 69, AND 75 COTTAGE STREET; 100 RIVERVIEW PLACE; 102 VIOLETTA STREET; AND PORTION OF 1320 S. PLYMOUTH AVENUE ROCHESTER, NEW YORK

## OVERBURDEN GROUNDWATER ELEVATION CONTOURS - DECEMBER 2016

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| 136.21-01-004 | 31 COTTAGE STREET |
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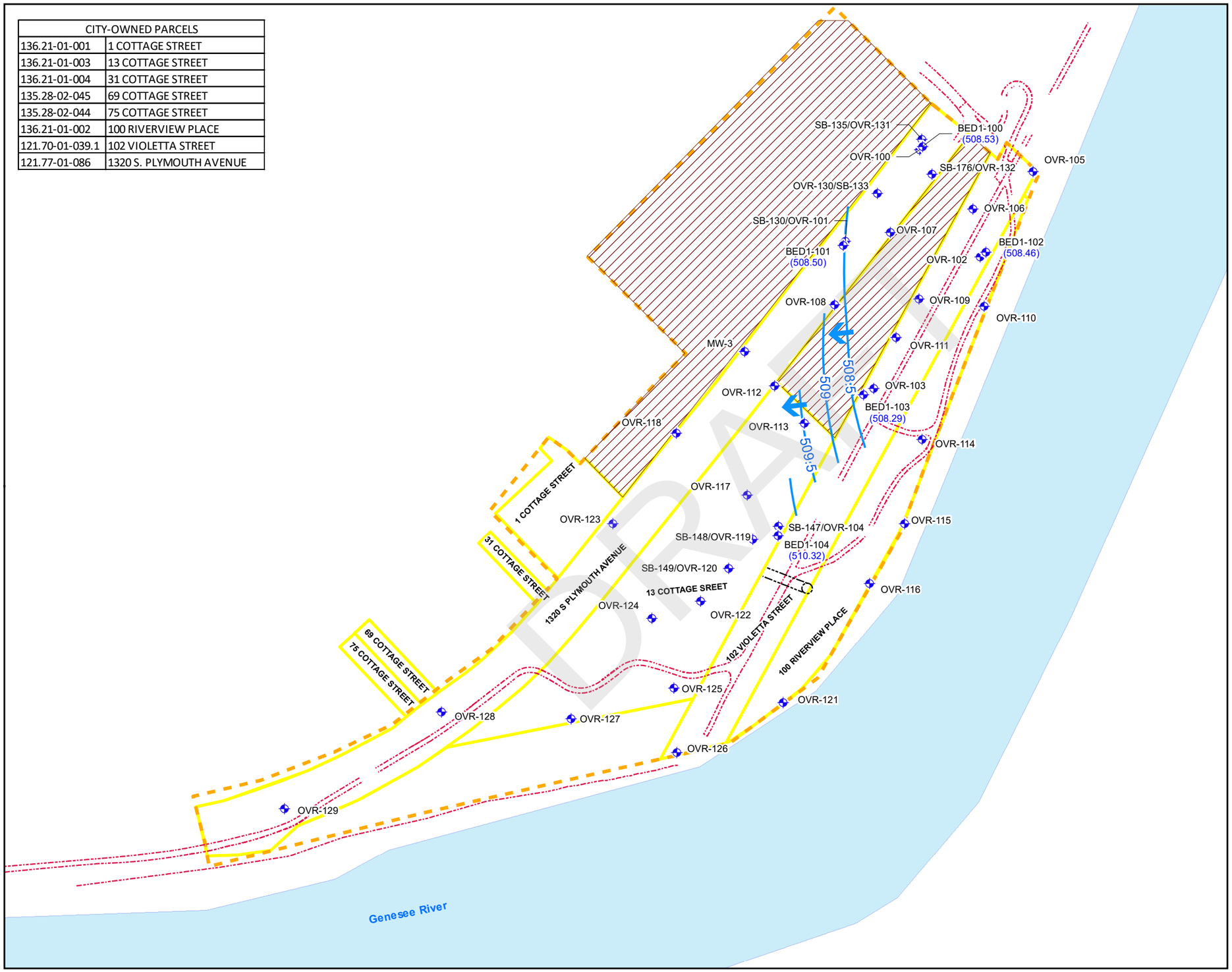


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# CITY OF ROCHESTER BROWNFIELD CLEANUP PROGRAM REMEDIAL INVESTIGATION REPORT PORTION OF FORMER VACUUM OIL REFINERY

1, 13, 31, 69, AND 75 COTTAGE STREET; 100 RIVERVIEW PLACE; 102 VIOLETTA STREET; AND PORTION OF 1320 S. PLYMOUTH AVENUE ROCHESTER, NEW YORK

## BEDROCK GROUNDWATER ELEVATION CONTOURS - AUGUST 2016

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APRIL 2018

O'BRIEN & GERE ENGINEERS, INC.

| CITY-OWNED PARCELS | |
|---|---|
| 136.21-01-001 | 1 COTTAGE STREET |
| 136.21-01-003 | 13 COTTAGE STREET |
| 136.21-01-004 | 31 COTTAGE STREET |
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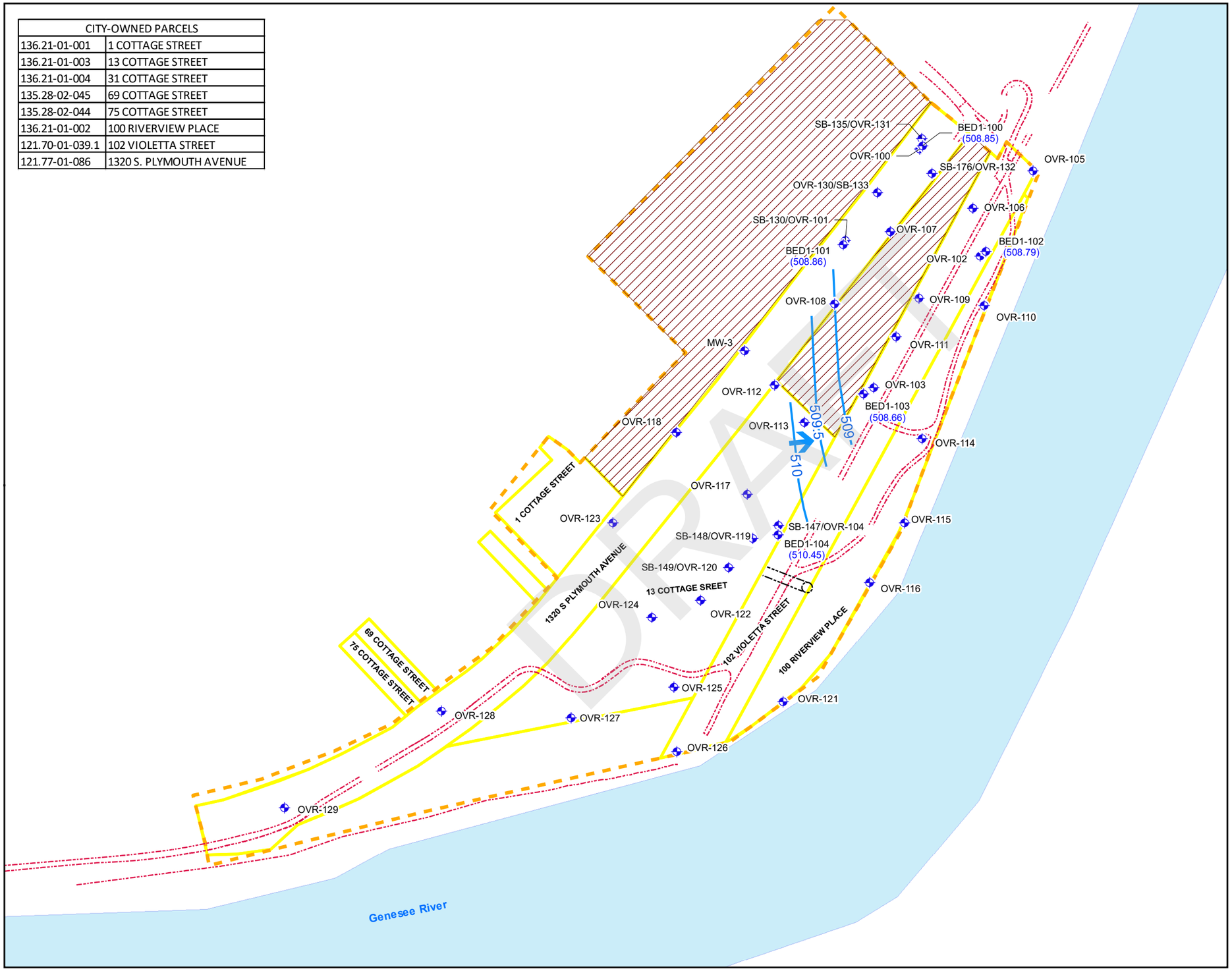
| 135.28-02-044 | 75 COTTAGE STREET |
| 136.21-01-002 | 100 RIVERVIEW PLACE |
| 121.70-01-039.1 | 102 VIOLETTA STREET |
| 121.77-01-086 | 1320 S. PLYMOUTH AVENUE |

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# APPENDIX D

Quality Assurance Project Plan (QAPP) / Field Sampling Plan (FSP)

# QUALITY ASSURANCE PROJECT PLAN / FIELD SAMPLING PLAN

Portion of the Former Vacuum Oil Refinery Site
Rochester, New York
BCP Site No. C828190

November 13, 2025

Prepared for:

**10 Flint Street LLC & City of Rochester**

Prepared by:

**Roux Environmental Engineering and Geology, D.P.C.**
209 Shafter Street
Islandia, New York 11749

**Roux Associates, Inc.**
200 Summit Drive, Suite 500
Burlington, Massachusetts 01803

4880.0001PM000.102.RCV

Environmental Consulting
& Management
+1.800.322.ROUX
rouxinc.com

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3. Project Organization ..... 3
4. Sampling Locations, Analytical Suites, and Frequency ..... 5
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   4.2 Site's Existing Cover System Delineation Sampling Areas ..... 6
   4.3 Offsite Backfill/On-Site Reuse Soil Sampling ..... 7
   4.4 Groundwater Performance Monitoring ..... 9
5. Field Sampling Procedures ..... 10
   5.1 Soil Sampling ..... 10
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   5.3 Offsite Backfill/On-Site Reuse Soil Sampling ..... 11
   5.4 Groundwater Performance Monitoring Sampling ..... 11
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2. Interim Remedial Measure Sampling Summary
3. Preservation, Holding Times, and Sample Containers


# Attachments


1. Professional Profiles
2. NYSDEC PFAS Sampling Guidance
3. Roux's Standard Operating Procedures
4. Laboratory's Standard Operating Procedures

# 1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), on behalf of 10 Flint Street LLC and the City of Rochester (referred to herein as the Remedial Party), has prepared this Quality Assurance Project Plan/Field Sampling Plan (QAPP/FSP) to describe the measures that will be taken to ensure that the data generated during performance of the Remedial Action Work Plan (RAWP) at the Portion of the Former Vacuum Oil Refinery Site, City of Rochester, New York Site (the "Site") are of quality sufficient to meet project-specific data quality objectives (DQOs). This QAPP/FSP also includes field sampling procedures.

The Site is in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), BCP Site # C828190. Although the redevelopment plan for the Site is not finalized, it is anticipated that when development is completed, the development plan will be consistent with the City master development plan for the Vacuum Oil Brownfield Opportunity Area (BOA) and the Site's use restrictions.[1]

This QAPP/FSP was prepared in accordance with the guidance provided in NYSDEC Technical Guidance DER-10 Technical Guidance for Site Investigation and Remediation (DER-10), the NYSDEC BCP Guide, and the United States Environmental Protection Agency's (USEPA's) Guidance for the Data Quality Objectives Process (EPA QA/G 4).

## 1.1 Purpose

The QAPP/FSP describes in detail the field sampling and quality assurance/quality control (QA/QC) methods to be used during soil and groundwater sampling tasks performed during the remedial action.

This QAPP/FSP provides guidelines and procedures to be followed by field personnel during performance of sampling during the RAWP. Information contained in this QAPP/FSP relates to:

- Sampling objectives (Section 2);
- Project organization (Section 3);
- Sampling locations, analytical suites, sampling frequencies and analytical laboratory (Section 4);
- Field sampling procedures (Section 5);
- Sample handling, sample analysis, and quality assurance/quality control (Section 6); and
- Site control procedures and decontamination (Section 7).

[1] City Vacuum Oil - South Genesee River Corridor Brownfield Opportunity Area (BOA). Additional information on this BOA can be found online: https://www.cityofrochester.gov/VacuumOilBOA/

# 2. Sampling Objectives

The sampling program is designed to meet the data quality objectives (DQOs) set forth in DER-10. Specifically, analytical parameters selected for each sample, as described in Section 4, are comprehensive, and are intended to meet the following objectives:

- collecting PDI soil samples to finalize vertical and lateral extents of targeted excavation areas;
- collecting PDI soil samples to finalize lateral extents of the Site cover system;
- collection of documentation and/or confirmation samples;
- analyze offsite backfill/on-Site reuse soil to evaluate its suitability for use as backfill that meets the lower of the NYSDEC Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs) for human health or the SCOs for protection of groundwater (PGWSCOs) presented in Table 6.8 (b) of the latest revision of Title 6 of New York Code of Rules and Regulations (NYCRR) Part 375 (Part 375);
- aid waste characterization for disposal; and
- Collect groundwater performance monitoring samples.

Sampling procedures are discussed in Section 5 of this QAPP/FSP. A discussion of the DQOs and quality assurance/quality control is provided in Section 6.

# 3. Project Organization

A general and generic summary of the overall management structure and responsibilities of project team members are presented below. Contact information for the Roux team and primary subcontractors is provided in the table below. Professional profiles for the team are provided in Attachment 1.

**Project Principal**

Ian Reed will serve as Project Principal. The Project Principal is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the RAWP.

**Remedial Engineer**

The Remedial Engineer for this project will be Noelle Clarke, P.E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the RAWP and future remedial program for the Site. The Remedial Engineer will certify in the Final Engineering Report (FER) that the RAWP activities were observed by qualified environmental professionals under her direct supervision as well as any other relevant provisions of ECL 27-1419 have been achieved in full conformance with the RAWP.

**Project Manager**

Eric Runstrom of Roux will serve as Project Manager. The Project Manager will provide overall management for the implementation of the scope of work and will coordinate all field activities. The Project Manager is also responsible for data review/interpretation and report preparation.

**On-Site Qualified Person**

Nicholas Suraci will act as a Qualified Person who is a direct report to the Remedial Engineer and will be on-Site at all times. The Qualified Person will provide project updates to the Remedial Engineer and Project Manager to coordinate all Site activities and bears the responsibility for the successful execution of the field program. The Qualified Person will direct the activities of the technical staff in the field, as well as all subcontractors. The Qualified Person will also assist in the interpretation of data and in report preparation.

**Laboratory Project Manager**

The Laboratory Project Manager will be Jennifer Byrnes of Alpha Analytical. The Laboratory Project Manager is responsible for sample container preparation, sample custody in the laboratory, and completion of the required analysis through oversight of the laboratory staff. The Laboratory Project Manager will ensure that quality assurance procedures are followed and that an acceptable laboratory report is prepared and submitted. The Laboratory Project Manager reports to the Project Principal and Project Manager.

**Quality Assurance Officer**

Alex Wirth of Roux will serve as the Quality Assurance Officer (QAO) for this project. The QAO is responsible for conducting reviews, inspections, and audits to ensure that the data collection is conducted in accordance with the FSP and QAPP. The QAO's responsibilities range from ensuring effective field equipment decontamination procedures and proper sample collection to the review of all laboratory analytical data for completeness and usefulness. The QAO reports to the Project Manager and makes independent recommendations to the Field Team Leader.

| Roux Personnel | Title | Contact Information |
|---|---|---|
| Ian Reed<br>Executive Vice President / Principal Hydrogeologist | Project Principal | (781) 569-4000<br>ireed@rouxinc.com |
| Noelle Clarke, P.E.<br>Principal Engineer | Project Principal/<br>Engineer of Record | (631) 232-2600<br>nclarke@rouxinc.com |
| Eric Runstrom<br>Senior Geologist | Project Manager | (781) 569-4000<br>erunstrom@rouxinc.com |
| Nicholas Suraci | On-Site Qualified Person | (716) 725-6969<br>nsuraci@rouxinc.com |
| Alex Wirth<br>Technical Director | Quality Assurance Officer | (585) 895-4957<br>awirth@rouxinc.com |
| James Hauri<br>Senior Scientist | Data Usability Summary Report Preparation | 781-569-4000<br>jhauri@rouxinc.com |

| Subcontractor | Company Name | Contact Information |
|---|---|---|
| Laboratory Analysis | Alpha Analytical, a Pace® Analytical Services Laboratory | (800) 624-9220<br>jbyrnes@alphalab.com |
| Drilling | To Be Determined | To Be Determined |
| Remedial Contractor | Roux DPC | (716) 856-0599<br>mlesakowski@rouxinc.com |
| Surveying | Nussaumer & Clarke, Inc. | (716) 688-0766<br>gkoester@nussclarke.com> |

# 4. Sampling Locations, Analytical Suites, and Frequency

The sampling to be completed during the RAWP includes PDI targeted excavation areas delineation and end point sampling, Site's existing cover system delineation sampling, and imported soil sampling. Sampling analytical suites and frequency vary by location. A utility callout will be completed prior to any ground intrusive activities at the Site.

A discussion of the sampling schedule for each sampling objective is provided below, while the assumed number of field samples to be collected for each location, including quality control (QC) samples, is shown in **Table 2**. Specifics regarding the collection of samples at each location and for each task are provided in **Section 5** of this QAPP/FSP.

## 4.1 PDI Targeted Excavation Area Sampling

PDI soil sampling is proposed to refine the extent of the four targeted soil excavation areas identified in the Site's selected remedy detailed in the Decision Document. Soil borings will be advanced at intervals of every 30-feet around the perimeter of each excavation area and at every 900-square feet of surface area within each area, as shown on Figure 6 of the RAWP**.** The proposed PDI samples will be considered the sidewall and bottom final delineation samples for the targeted excavation areas (as applicable).

As discussed in Section 4.2.1 of the RAWP, Soil samples will be collected continuously during boring advancement and field screened to assist in verifying that the excavation goals identified in the Decision Document (Excavation Goals) will be met. Field screening will include visually inspecting soil samples for the presence of petroleum impact, screened using a calibrated photoionization detector (PID), characterized for visual and odor impacts, and textural classifications based on the Unified Soil Classification System (USCS). In addition, any observations regarding staining, odor and/or sheen in/on the soil will be noted. A soil boring log will be generated for each boring.

If conditions not meeting the Excavation Goals are identified during field screening in soil samples collected from excavation perimeter soil borings, an additional soil boring will be advanced at a minimum distance of 10-feet from the perimeter soil boring until field screening results meet Excavation Goals or the excavation area is extended to the Site boundaries. Once field screening of soil samples collected from soil borings advanced around the perimeter of the excavation areas meet Excavation Goals, sidewall final delineation samples will be collected for laboratory analysis from soils exhibiting the highest PID response, or other field screening impacts, at each of the perimeter soil borings. If multiple layers of contamination are identified, sidewall samples will be collected from each layer of contamination identified.

Field screening results from soil samples collected from soil borings advanced within the interior of the excavation areas will be assessed to determine if there are intervals extending up from bedrock which meet Excavation Goals. If such intervals are identified, soil samples will be collected for laboratory analysis at the top of this interval.

All samples will be submitted for laboratory analysis of:

- Part 375 Target Compound List (TCL) VOC's by EPA Method 8260D including tentatively identified compounds (TICs);

- Part 375 TCL SVOCs by EPA Method 8270E including TICs; and
- Part 375 Target Analyte List (TAL) metals by USEPA Methods 6010D/7470A.

Samples may also be collected and analyzed for any parameters that may be required for off-Site disposal

Soil samples submitted for laboratory analysis from soil borings advanced at Site boundaries, or from soils samples located adjacent to subsurface utilities which will prevent further excavation, will be considered Confirmation samples if their results meet Excavation Goals; otherwise, these soil samples will be considered Documentation samples to document the level of contamination remaining.

Soil samples submitted for laboratory analysis will be used to assist in determining if Excavation Goals have been achieved, or if further delineation is required. Soil samples collected to assess vertical excavation extents will be considered Confirmation samples and will be used as final delineation samples if their analytical results meet Excavation Goals. Otherwise, either additional sampling will be completed at deeper depths, or the excavation will be advanced to bedrock.[2] Soil samples collected to assess horizontal excavation extents will be considered Confirmation samples and will be used as final delineation samples if their analytical results meet Excavation Goals. If soil sample results do not meet Excavation Goals, additional soil boring(s) will be advanced at a minimum distance of 10-feet from the corresponding soil boring until both field screening and laboratory results meet Excavation Goals in the additional soil boring, or the excavation area is extended to the Site boundaries.

## 4.2 Site's Existing Cover System Delineation Sampling Areas

In addition to the four targeted soil excavation areas discussed in **Section 4.1** above, additional PDI soil sampling is proposed to revise the extent of the Site-wide cover system by delineating/evaluating the Site areas where the existing 0-2 foot soil interval meets the Site's SCOs for all constituents including 1,4-dioxane and PFAS; therefore, will be considered the Site's cover system. Whereas the 0-2 foot interval of existing soil that exceeds the Site's SCOs require the installation of a cover system that meets the NYSDEC requirements.

As shown on Figure 8 of the RAWP, soil borings are proposed to determine the extent of the site cover system within two Potential Site Cover areas. The first area, consisting of approximately 2.0 acres, is the approximate area of the 100 Riverview Place Site parcel. The second area, consisting of approximately 1.3 acres, is located on or near portions of the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) parcel and various Cottage Street parcels. The quantity and distribution of the soil boring locations as shown on Figure 8 of the RAWP are based on the draft NYSDEC Soil Screening Guidance dated August 2017 (Soil Screening Guidance).

Soil borings will be advanced to two ft bgs at each location. Soil samples will be collected continuously from each boring and visually inspected for the presence of petroleum impact, field screened using a calibrated PID, characterized for visual and odor impacts as well as textural classifications based on the USCS. In addition, any observations regarding staining, odor and/or sheen in/on the soil will be noted. Soil samples will be submitted from each soil boring for laboratory analysis based on the Soil Screening Guidance for the following depth intervals and analyses:

[2] Please note that only soil will be collected for laboratory analysis, no rock/bedrock samples will be collected.

| Laboratory Analysis | Depth Intervals (bgs) |
|---|---|
| TCL VOC's by EPA Method 8260D including TICs | 2 to 6 inches & 12 to 24 inches |
| TCL SVOCs by EPA Method 8270E including TICs; | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| TAL metals (including hexavalent chromium) by USEPA Methods 6010D/7470A/7196A; | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| TCL Pesticides by USEPA Method 8081B | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| TCL PCBs by USEPA Method 8082A | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| Total Cyanide by USEPA 9010C/9012B, SM4500CN-CE | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |
| Emerging Contaminants[3], PFAS by USEPA Methods 1633/537 and 1,4 dioxane by USEPA Method 8270E | 0 to 2 inches, 2 to 12 inches & 12 to 24 inches |

Additional contingency samples will be collected 10 feet from the primary delineation samples and held at the laboratory within the appropriate holding times pending the results of the original samples. If the original samples exceed the Site's SCOs, the corresponding contingency sample will be analyzed for the parameters listed in the table. The need for any additional sampling in these areas will be evaluated based on the results of the delineation/evaluation samples.

## 4.3 Offsite Backfill/On-Site Reuse Soil Sampling

For offsite fill/on-Site reuse soil materials requiring chemical testing, the following samples shall be collected:

- One sample for pre-qualification chemical testing at the source location, including the following:
    1. Chemical testing shall be performed at a minimum for the full suite of analytical parameters listed in Table 375-6.8(a) of the latest revision of Part 375. Samples will be analyzed for the full suite of analytical parameters (TAL metals including hexavalent chromium; TCL VOCs + TICs and SVOCs + TICs, TCL pesticides/herbicides, and PCBs), total cyanide and Emerging Contaminants (1,4-dioxane and PFAS).
    2. Backfill/on-Site reuse soil materials excluding those materials that do not require sampling as described below, shall meet criteria presented in Section 2.0 of this QAPP.
    3. Backfill/on-Site reuse soil materials that exceed the criteria presented in Section 2.0 of this QAPP shall not be imported to the Site without prior approval of the NYSDEC.
    4. The backfill/on-Site reuse soil material will be free of extraneous debris or solid waste as well as staining/sheen and odors.
    5. If the NYSDEC project manager agrees in writing that the material originated from a virgin source, then a minimum of one sample (i.e., the pre-qualification sample) will be collected and analyzed per source.

[3] Emerging Contaminants (ECs) list includes 1,4-Dioxane and the 40 Per- and Polyfluoroalkyl Substances (PFAS) which include the 40 compounds listed in the most recent April 2023 (or current version) NYSDEC guidance Sampling, Analysis, and Assessment of Per-and Polufluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs (NYSDEC April 2023 Guidance) is included as an attachment to this QAPP/FSP.

- The sampling frequency will comply with DER-10 Table 5.4(e)10 shown below unless otherwise prior approval has been obtained from the NYSDEC project manager:

| Table 5.4(e)10<br>Recommended Number of Soil Samples for Soil Imported To or Exported From a Site | | | |
|---|---|---|---|
| **Contaminant** | **VOCs** | **SVOCs, Inorganics & PCBs/Pesticides** | |
| **Soil Quantity (cubic yards)** | **Discrete Samples** | **Composite** | **Discrete Samples/Composite** |
| 0-50 | 1 | 1 | 3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis |
| 50-100 | 2 | 1 | |
| 100-200 | 3 | 1 | |
| 200-300 | 4 | 1 | |
| 300-400 | 4 | 2 | |
| 400-500 | 5 | 2 | |
| 500-800 | 6 | 2 | |
| 800-1000 | 7 | 2 | |
| ➢ 1000 | Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER | | |

The source of the offsite fill/on-Site reuse soil must be documented by the supplier, including the location where the fill/on-Site reuse soil was obtained and a brief history of the site that is the source of the fill.

Samples of offsite backfill/on-Site reuse soil will be analyzed for the full suite of Part 375 parameters (TAL metals including hexavalent chromium; TCL VOCs + TICs and SVOCs + TICs, TCL pesticides/herbicides, and PCBs), total cyanide and Emerging Contaminants (1,4-dioxane and PFAS).

Reporting limits for PFAS and 1,4-dioxane will be in accordance with the NYSDEC's current guidance. All PFAS compounds in soil will be analyzed and reported to 0.5 ug/kg. 1,4-Dioxane will be analyzed and reported to 0.1 mg/kg.

The following materials may be imported, without chemical testing, to be used as backfill beneath pavement, buildings or as part of the site cover system, provided that it contains less than 10 percent by weight material that would pass through a size 100 sieve and consists of:

- gravel, rock or stone, consisting of virgin material from a permitted mine or quarry; or
- recycled concrete or brick from a NYSDEC registered construction and demolition debris processing facility if the material conforms to the requirements of Section 304 of the 2002 New York State Department of Transportation Standard Construction and Materials Volume 1.

Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All materials proposed for import onto the site will be approved by the Remedial Engineer and will be in compliance with provisions in this QAPP/FSP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

## 4.4 Groundwater Performance Monitoring

Quarterly groundwater performance monitoring will be conducted for the first year after the remedy has been completed then semi-annually until the Certificate of Completion is issued or at a frequency as determined by the NYSDEC and NYSDOH project managers. Quarterly groundwater monitoring results will be provided in the subsequent monthly progress reports and in the Site's FER.

The following existing Site monitoring wells are anticipated to be sampled as part of groundwater performance monitoring: OVR-102, OVR-104, OVR-105, OVR-106, OVR-108, OVR-109, OVR-110, OVR-112, OVR-113, OVR-119. This list of wells is subject to change depending on site conditions following the execution of remedial actions (i.e. final excavation extents, etc.) and the need for additional wells will be evaluated at this time.

Groundwater samples will be submitted for laboratory analysis of:

- Target Compound List (TCL) VOC's by EPA Method 8260D including tentatively identified compounds (TICs);
- TCL SVOCs by EPA Method 8270E including TICs; and
- Target Analyte List (TAL) metals by USEPA Methods 6010D/7470A.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). A Data Usability Summary Report (DUSR) will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for the remedial action. Additionally, electronic data deliverables of all validated laboratory data will be electronically submitted to the NYSDEC maintained state database.

# 5. Field Sampling Procedures

This section provides a detailed discussion of the field procedures to be used during sampling of the various locations being evaluated as part of the remedial action (i.e., PDI delineation sampling). Additional details regarding sampling procedures and protocols are described in Roux's relevant SOPs, which are provided in Attachment 3.

## 5.1 Soil Sampling

Details for the collection of soil samples are provided below. Additional necessary precautions will be taken when sampling for emerging contaminates in the field in accordance with the NYSDEC's current guidance, including but not limited to:

- Using the proper field clothing or personal protective equipment (i.e., no materials will contain Gore-Tex or Tyvek);
- Avoid sampling equipment components/containers making contact with aluminum foil, low density polyethylene (LDPE), glass, or polytetrafluoroethylene materials;
- Following PFAS field sampling guidelines (i.e., using sampling materials made from high density polyethylene [HDPE], silicon, or stainless steel and avoid using equipment containing Teflon and using sharpies, permanent markers, adhesives, and waterproof/plastic clipboards and notebooks); and
- Utilizing regular ice cubes for sample presevation and only Alconox for decontamination.

## 5.2 PDI Delineation Sampling

Details for the collection of PDI excavation area and Site cover system delineation samples are provided below. As discussed, a utility callout will be completed prior to any ground intrusive activities at the Site.

PDI Targeted Excavation Area Sampling

Soil borings will be advanced as part of excavation area delineation using a Geoprobe direct-push drill rig or an excavator to bedrock (refusal) to anticipated depths between 8 and 21 feet. At each borehole location utility clearances will be performed prior to advancement of soil borings using hand tools and/or vacuum excavation to a minimum of five ft bg to confirm that no subsurface utilities are present (the depth of utility clearance will be increased to eight ft bg in areas in close proximity to know utilities or other infrastructure. Soil borings will be advanced for Site cover system delineation using hand tools (e.g. hand auger, trowel, shovel). Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated with concurrence from the NYSDEC project manager.

Soil samples will be collected continuously during boring advancement and placed immediately thereafter into new Ziploc® bags for field screening (as outlined above) and recording headspace using a PID. After a minimum of 15 minutes for equilibration with the headspace in the Ziploc® bag, each sample will be screened for organic vapors using a PID equipped with a 10.6 eV lamp.

Select soil samples will be submitted for laboratory analysis as outlined in Section 4.2.1 of the RAWP. These samples will be placed in the laboratory-supplied containers, placed in an iced cooler (4°C), and shipped to the laboratory under chain of custody procedures in accordance with Roux's SOPs in Attachment 3.

## 5.3 Offsite Backfill/On-Site Reuse Soil Sampling

All imported fill/on-Site reuse soil material samples will be collected using pre-cleaned stainless steel sampling tools (e.g., trowels, spatulas) and placed immediately thereafter into new Ziploc® bags for field screening and recording headspace using a PID. After a minimum of 15 minutes for equilibration with the headspace in the Ziploc® bag, each sample will be screened for organic vapors using a PID equipped with a 10.6 eV lamp. In general, where composite samples are required for offsite fill/on-Site reuse soil material samples, composite samples will be collected from a minimum of three locations across the stockpiled materials. The exception is for VOC samples, which will be collected as grab samples (discrete). Samples will be placed in the laboratory-supplied containers, placed in an iced cooler (4°C), and shipped to the laboratory under chain of custody procedures in accordance with Roux's SOPs in Attachment 3.

## 5.4 Groundwater Performance Monitoring Sampling

As discussed, select Site monitoring wells are anticipated to be sampled as part of groundwater performance monitoring. Prior to sampling, monitoring wells gauged with an electronic oil/water interface probe (IP) to measure the depth to water and thickness of separate phase hydrocarbons (SPH), if present.

Following well gauging activities, ground water samples will be collected from the monitoring wells which do not contain SPH. Each well will be sampled in general accordance with EPA low-flow sampling methodology, which includes extracting ground water from the monitoring wells using a peristaltic pump during which measurements of water quality field parameters will be obtained including:

- Specific Conductance;
- pH;
- Oxidation Reduction Potential; and
- Dissolved Oxygen.

# 6. Sample Handling and Analysis

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples, as well as sample packaging, shipping procedures, and QA/QC.

## 6.1 Field Sample Handling

A discussion of the proposed number and types of samples to be collected during each task, as well as the analyses to be performed, can be found in Section 4 of this QAPP/FSP. The types of containers, volumes, and preservation techniques for the aforementioned testing parameters are presented in Table 3.

## 6.2 Sample Custody Documentation

The purpose of documenting sample custody is to ensure that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis (and return of unused sample portion, if applicable).

Each individual collecting samples is personally responsible for the care and custody of the samples. All sample labels should be pre printed or filled out using waterproof ink. The technical staff will review all field activities with the Field Team Leader to determine whether proper custody procedures were followed during the field work and to decide if additional samples are required.

All samples being shipped offsite for analysis must be accompanied by a properly completed chain of custody form. The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

Samples will be packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

## 6.3 Sample Shipment

If sample shipment is necessary, sample packaging and shipping procedures are based upon USEPA specifications, as well as DOT regulations. The procedures vary according to potential sample analytes, concentration, and matrix and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below.

All samples will be shipped within 24 hours of collection and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare cooler(s) for shipment:
    - tape drain(s) of cooler shut;
    - affix “This Side Up” arrow labels and “Fragile” labels on each cooler; and
    - place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number.

3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material approximately at the bottom of the cooler to act as a cushion for the sample containers.
6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed in packaging material.
9. If ice is required to preserve the samples, ice cubes should be repackaged in Ziploc® bags and placed on top of the packaging material. Cooler temperature needs to maintained at 4°C.
10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to courier as appropriate.
11. Separate chain of custody forms. Seal proper copies within a large Ziploc® bag and tape to inside cover of cooler. Retain copies of all forms.
12. Close lid and latch.
13. Secure each cooler using custody seals.
14. Tape cooler shut on both ends.
15. Relinquish to overnight delivery service as appropriate. Retain air bill receipt for project records. (Note: All samples will be shipped for "NEXT A.M." delivery).

## 6.4 Quality Assurance/Quality Control

The primary intended use for the remedial action data is to characterize Site conditions during and after the remedial action activities are undertaken at the Site. The primary DQO of the PDI endpoint sampling and imported fill/on-Site reuse soil sampling programs, therefore, is that data be accurate and precise, and hence representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value and is assessed through both field and laboratory duplicate samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples, and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called "field blanks"). Field blanks for PFAS will be collected at a minimum frequency of one per day. A laboratory SOP for analysis of PFAS is included in Attachment 4.

Table 1 lists the requirements for field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised. Table 2 lists the number/type of field and QA/QC samples that will be collected during the remedial action. Table 3 lists the preservation, holding times and sample container information.

All remedial action analyses will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW 846 methods. The laboratory will have a ELAP certification for the analytical method to be used.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). A Data Usability Summary Report (DUSR) will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for the remedial action. James Hauri of Roux will review the analytical data for quality assurance and quality control in accordance with NYSDEC standards. The professional profile for James Hauri is provided in Attachment 1.

# 7. Site Control Procedures

Site control procedures, including decontamination and waste handling and disposal, are discussed below. Site control procedures have been developed to minimize both the risk of exposure to contamination and the spread of contamination during field activities at the Site. All personnel who come into designated work areas, including contractors and observers, will be required to adhere strictly to the conditions imposed herein and to the provisions of a Site-Specific Health and Safety Plan (HASP). The HASP is included as Appendix I to the RAWP.

## 7.1 Decontamination

In an attempt to avoid the spread of contamination, all drilling and sampling equipment must be decontaminated after the completion of each boring in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in Roux's SOPs for the Decontamination of Field Equipment located in Attachment 3. The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal. Only "PFAS-free" water will be used for decontamination of sample equipment onsite. Only Alconox will be used as decontamination detergent (Liquinox shall not be used).

## 7.2 Management of Investigation Derived Waste

Management of investigation derived waste will be completed in accordance with NYSDEC DER-10, Section 3.3 (e).

Following sample collection, boreholes will be backfilled with soil cuttings in reverse order (last material out first material back in borehole) to within one foot of the ground surface with an upper bentonite plug and restored with like materials to surrounding grade. Soil cuttings with NAPL and/or grossly contaminated will be placed into Department of Transportation (DOT) approved 55-gallon drums, sealed and labeled, characterized, and disposed off-site at a permitted facility. All fluids generated including but limited to decon fluids, well development water and purge water generated during sampling will be placed into DOT approved 55-gallon drums, sealed and labeled, characterized, and disposed off-site at a permitted facility.

# TABLES

1. Field and Laboratory QC Summary
2. Interim Remedial Measure Sampling Summary
3. Preservation, Holding Times, and Sample Containers

## Table 1. Field and Laboratory QC Summary

| QC Check Type | Minimum Frequency | Use |
|---|---|---|
| Field QC | | |
| Duplicate | 1 per matrix per 20 samples or SDG* | Precision |
| Trip Blank | 1 per VOC cooler | Sensitivity |
| Field Blank (non-PFAS) | 1 per matrix per 20 samples | Sensitivity |
| Field Blank (PFAS) | 1 per day when sampling for PFAS | Sensitivity |
| Laboratory QC | | |
| Laboratory Control Sample | 1 per matrix per SDG | Accuracy |
| Matrix Spike/Matrix Spike Duplicate/Matrix Duplica | 1 per matrix per SDG | Accuracy/Precision |
| Surrogate Spike | All organics samples | Accuracy |
| Laboratory Duplicate | 1 per matrix per SDG | Precision |
| Method Blank | 1 per matrix per SDG | Sensitivity |

**Notes:**

* SDG - Sample Delivery Group - Assumes a single extraction or preparation

** Provided to lab by field sampling personnel

PFAS - Per- and Polyfluoroalkyl Substances

**Table 2. Pre-Design Investigation Soil Sampling Plan**

| Sample Type | Sample Medium | Target Analytes | Field Samples | Sample Intervals | Duplicate[1] | Trip Blanks[2] | Field Blank[1] | Matrix Spike[1] | Spike Duplicate[1] | Total No. of Samples |
|---|---|---|---|---|---|---|---|---|---|---|
| PDI Excavation Bottom and Sidewall Samples | Area 1 (area surrounding OVR-117) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 11 | Highest PID response, or other visual indications of impacts | 1 | 2 | 1 | 1 | 1 | 17 |
| | Area 1 (area surrounding OVR-117) Potential Step Out Soil Sampling | | 8 | | - | 1 | 1 | - | - | 10 |
| | Area 2 (area surrounding SB-169) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 12 | Highest PID response, or other visual indications of impacts | 1 | 2 | 1 | 1 | 1 | 18 |
| | Area 2 (area surrounding SB-169) Potential Step Out Soil Sampling | | 8 | | - | 1 | 1 | - | - | 10 |
| | Area 3 (area surrounding SB-138) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 11 | Highest PID response, or other visual indications of impacts | 1 | 2 | 1 | 1 | 1 | 17 |
| | Area 3 (area surrounding SB-138) Potential Step Out Soil Sampling | | 5 | | - | 1 | 1 | - | - | 7 |
| | Area 4 (northern end of 10 Flint Street) Delineation Soil Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 41 | Highest PID response, or other visual indications of impacts | 3 | 5 | 3 | 3 | 3 | 58 |
| | Area 4 (northern end of 10 Flint Street) Potential Step Out Soil Sampling | | 2 | | - | 1 | 1 | - | - | 4 |
| PDI Site Cover System | Potential Site Cover Areas Soil Sampling | TCL VOCs +TICs | 40 | 2"-6", 12"-24" | 2 | 2 | 2 | 2 | 2 | 50 |
| | | TCL SVOCs +TICs | 60 | 0"-2", 2"-12", 12"-24" | 3 | 0 | 3 | 3 | 3 | 72 |
| | | TCL Pesticides | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | TCL PCBs | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | TAL Metals | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | PFAS | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | 1,4-Dioxane | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | Total Cyanide | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| | | Hexavalent Chromium | 60 | | 3 | 0 | 3 | 3 | 3 | 72 |
| Offsite Backfill and On-Site Reuse Soil | Soil Sampling | TCL VOCs +TICs | 133 | See Table 5.4(e)10 in QAPP | 7 | 7 | 7 | 7 | 7 | 168 |
| | | TCL SVOCs +TICs | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TCL Pesticides | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TCL Herbicides | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TCL PCBs | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | TAL Metals | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | PFAS | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | 1,4-Dioxane | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | Total Cyanide | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| | | Hexavalent Chromium | 65 | | 4 | 0 | 4 | 4 | 4 | 81 |
| Groundwater Performance Monitoring Sampling | Groundwater Sampling | TCL VOCs + TICs, TCL SVOCs + TICs & TAL Metals | 10 | Each Well | 1 | 2 | 1 | 1 | 1 | 16 |

**Notes:**

Totals are estimated based on scope of work as written, actual sample quantities may vary based on field conditions. QA/QC sample quantities will be adjusted accordingly.

[1] Based on 1 per 20 samples or 1 per Sample Delivery Group (3 days max)

[2] Based on 1 cooler per day

TCL - USEPA Contract Laboratory Program Target Compound List

USEPA - United States Environmental Protection Agency

VOCs - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds

TAL - Target Analyte List

TICs - Tentatively Identified Compounds

## Table 3. Preservation, Holding Times and Sample Containers

| Analysis | Matrix | Bottle Type | Preservation(a) | Holding Time(b) |
|---|---|---|---|---|
| Part 375 TAL Metals via EPA 6010D / 7471B<br>SW-846 6020B/7471B | Soil<br>Water | 4 oz amber glass, teflon lined cap<br>250 mL plastic, teflon lined cap | Cool to 4°C<br>Nitric acid | 180 days, Hg 28 days |
| Hexavalent Chromium | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 30 days from sample collection |
| 1,4-Dioxane via EPA 8270E | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 14 days from sample collection |
| Per- and Polyfluoroalkyl Substances (PFAS) via EPA 1633/537 | Soil | 8 oz plastic container (non teflon lined) | Cool to 4°C | 28 days from sample collection |
| **Target Compound List (TCL)** | | | | |
| Part 375 TCL Volatile Organic Compounds (VOCs) via EPA 8260D, including TICs | Soil<br>Water | Encore Samplers<br>40mL voa vial, teflon lined cap | Cool to 4°C<br>Hydrochloric Acid | 48 hours from sample collection to extract, 14 days for analysis after extraction<br>14 days from sample collection |
| Part 375 TCL Semivolatile Organic Compounds (SVOCs) SW-846 8270E, including TICs | Soil<br>Water | 4 oz amber glass, teflon lined cap<br>1 liter amber glass, teflon lined cap | Cool to 4°C | 14 days from sample collection to extract, 40 days to analysis after extraction<br>7 days to extract, 40 days to analysis |
| Part 375 TCL Pesticides via EPA 8081B | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 14 days to extract, 40 days to analysis |
| Part 375 TCL Herbicides via EPA 8051B | Soil | 4 oz wide mouth glass, teflon lined cap | Cool to 4°C | 14 days to extract, 40 days to analysis |
| Part 375 TCL Polychlorinated biphenyls (PCBs) via EPA 8082A | Soil | 4 oz amber glass, teflon lined cap | Cool to 4°C | 14 days to extract, 40 days to analysis |

(a) All soil and groundwater samples to be preserved in ice during collection and transport

(b) Days from date of sample collection.

TAL - Target Analyte List

TCL - USEPA Contract Laboratory Program Target Compound List

TICs - Tentatively Identified Compounds

Gas chromatography-mass spectrometry (GC/MS) in selected ion monitoring (SIM) mode

# ATTACHMENTS

1. Professional Profiles
2. NYSDEC PFAS Sampling Guidance
3. Roux's Standard Operating Procedures
4. Laboratory's Standard Operating Procedures

# ATTACHMENT 1

Professional Profiles

# PROFESSIONAL PROFILE

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**EDUCATION**
BS, Environmental Science,
Springfield College, 1997

## Ian T. Reed

### Vice President | Principal Hydrogeologist

**EXPERIENCE SUMMARY**
Over 20 years of experience: Vice President – Roux, New England Office (current); Principal/Office Manager – Roux Associates, New England Office (2012-2017); Senior Hydrogeologist/Project Manager, Roux (2005-2012); Project Hydrogeologist, Roux (2001-2005); Associate Hydrogeologist, Aqua Science Engineer, Inc. – San Francisco, CA (1998-2001); Associate Geologist, Parsons ES – Boston, MA (1997-1998); Emerald Excavating – Plymouth, MA (1993-997).

**TECHNICAL SPECIALTIES**
Development, implementation, and management of comprehensive site investigations, implement remedial work plans, environmental investigations, and construction management.

Development and implementation of project/regulatory closure strategies for challenging sites in New England and New York.

Management and support for construction/redevelopment projects including Brownfields regulatory stewardship. Regulatory liaison and customer support with extensive experience in New England and New York.

Investigation and remedial implementations of impacted sediments including development and implementation of investigations in navigable waterways in New England. Scopes have included conventional sediment sample collections as well as innovative qualitative analysis (Sediment Profile Imagining). Sediment remediation scopes have included dredging, sheet pile installations, and engineered natural systems.

Management of environment and construction projects for oil and gas industry including pipeline maintenance and repairs, facility compliance, engineering support and construction management in MA, CT, RI, NY, and NJ.

Management and support of litigation projects for both petroleum and industrial clients. Currently technical expert for major oil company on challenging petroleum site investigation and remediation strategies.

Management and strategic support for challenging insurance claim cases in Massachusetts and New Hampshire. General duties performed have included both federal, state and local reporting, project and construction management, litigation support, soil/sediment excavation/dredge/removal management, emergency response management, soil and groundwater sampling, soil gas surveys, stream gauging, sediment investigations, soil immunoassay/XRF testing and hazardous materials surveys/ demo management, GIS data evaluations and mapping, UXO geophysical surveys, treatment system installations, Cone Penetration Testing, phytoremediation implementation, data tabulation and report preparation.

**REPRESENTATIVE PROJECTS**

- **Project Principal, Major Oil Company**. Manager of a complex dredging project on the Allegheny River to remove petroleum impacted sediments. Included the Site Investigation, Remedial Investigation, Alternative Feasibility Study, regulatory permitting and planning for upcoming dredge of 1,000 tons of sediment. Project requires the relocation of the largest documented population of a federally listed endangered mussel species.
- **Project Principal, Major Oil Company, Active Bulk Storage and Pipeline Facilities.** Manager of environment and construction projects at both active terminals and pipeline facilities on the east coast (Florida to Maine). Work scopes have included various types of

permitting, pipeline corrosion/dent inspections and repairs, OWS design and installation, Method 21/LDAR inspections, AST annual inspections, building upgrades including demo surveys and general construction management, containment dike surveys and secondary containment evaluations and designs. Safety awards received by Major Oil Company multiple times over the last several years.

- **Project Principal, Major Oil Company, Pipeline Facilities.** Provided engineering and technical support for securing > 100 wetland and various construction permits (state, local, federal). Developed risk reduction plans, engineering design for stream & RR crossings. Work scopes included assisting with foreign lines, dent anomalies (>1,000). Permits include CWA Order of Conditions, DOT access, road opening/construction, NHESP VMP & OMP, Water Quality Cert., and US Army Corp.
- **Project Principal, Major Petroleum Co., Former Petroleum Refinery, Upstate New York.** This Site is one of the 1st refineries in the US, at one time encompassing 700+ acres of land now in various stages of investigation, cleanup, and redevelopment. Roux currently has several roles and manages many aspects of the overall project. Serving as technical consultant for this client reviewing all regulatory submittals and overall strategy to achieve site closure through both the NY State Brownfields and Spills Programs. Serves as liaison to regulators, local stake holders and construction/redevelopment firms. Additional value added has included significant identified cost efficiencies during both remediation and redevelopment.
- **Expert/Technical Witness and Project Principal, Major Oil Company, Rochester, New York.** Oversaw large-sale investigation of several 100+ acre former refinery. Assisted with 3rd party negotiations and regulatory liaison.
- **Project Manager, Oil Company, Albany, New York**. Project Manager in-charge for large scale dredging project on the Hudson River to remove petroleum impacted sediments and soil. Included the removal of 3,000 tons of sediment, installation of sheet pile wall, carbon trench and phyto-remediation plot. Work performed in accordance with Stip. Agreement with NYSDEC. Included various stages of client advocacy. Project was completed on-time and under budget resulting in significant cost savings to the client.
- **Project Manager, Oil Company, Newington, New Hampshire.** Project Manager in-charge for large scale remediation and regulatory closure of former petroleum terminal on navigational waterway.
- **Project Principal, Multiple Spill Sites for Insurance Co., New Hampshire and Massachusetts.** Assist local insurance company with complex emergency response spills including development of closure strategy and oversight/management of response actions.
- **Project Manager, Demolition of Former Bulk Storage Facilities, New England, and New York.** Oversaw and managed team during the demolition of several facilities including completing the hazardous materials surveys, ACM removal, building demo and soil excavations.
- **Litigation Project Manager, Several Projects.** Managed litigation teams for several large-scale litigation, allocation, and facility assessment projects. Included the development and design of significant GIS and database systems to assist in the review of large quantities of both analytical and geographic information.
- **Project Manager for Several Secondary Containment System Evaluation Projects on Petroleum Bulk Storage Facilities in Several States.** Included both aerial and conventional surveys/mapping, use of 3D AutoCAD/GIS for evaluating secondary containment requirements in accordance with local, state, and federal programs. Project work also included the development of complex containment system designs and engineering oversight.
- **Project Manager, Major Oil Company, Everett, Massachusetts.** Project Manager-in-Charge for massive exploration, investigation, and rehabilitation of storm water collection system for former refinery and active petroleum bulk storage facility. Included the mapping of 5 miles of piping, extensive reconstruction, and abandonment of large-scale and deep structures in an active loading rack and terminal. Included the oversight of numerous subcontractors performing permit required CSEs with Marine Chemist certs.
- **Field Manager, USARMY, Seneca, New York and Falmouth, Massachusetts.** Oversaw numerous geophysical surveys, locating unexploded ordinance (UXO) and radioactive materials at a former US Army Depot (storing tactical nuclear weapons) and at on a former anti-tank weapons range. Responsible for performing extensive and thorough geophysical surveys using GPS and GIS mapping. Required compliance of strict UXO and radiation safety programs.
- **Project Manager, Oil Company, Upstate New York.** Project Manager in-charge and point of contact with NYSDEC project managers for emergency response following release of 30,000 gallons of Jet Fuel from a bulk storage facility in New York. Oversaw initial cleanup, following by rapid subsurface investigation to identify leak location and product plume.
- **Task/Field Manager, Major Oil Company, Several Locations.** Manager for multiple bulk petroleum storage and distribution facilities/terminals located in New England and New York.

Schedule, coordination, and oversight of all field operations including remediation system O&M, subsurface investigations, product recovery, surface water sampling, groundwater sampling events, waste management including soil excavation/removal.

- **Hydrogeologist/Field Manager, Stratford, Connecticut.** Site Assessments for Major Design Plant including Phase II Site Assessments of various industrial properties. Assessments included property inspection and review of state and federal documents, aerial photographs, and environmental databases. Historical land use research and interviews with property occupants and municipal personnel were conducted as part of these assessments.
- **Field Manager, Retail Service Station, Manteca, California.** Oversaw down-gradient groundwater investigation, domestic well sampling, cone penetration testing.

**PROFESSIONAL TRAININGS**

Operator Qualification (OQ) Training (several tasks)

OSHA 29 CFR 1910.120 40-Hour Safety Training

OSHA 29 CFR 1910.120 8-Hour Annual Refresher

Confined Space Safety Training

DOT HM-181/126F Certificate

Red Cross Certified, First Aid and CPR

ExxonMobil Loss Prevention System Training

Radiation Safety and Monitoring/Measurement

# PROFESSIONAL PROFILE

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## EDUCATION

BS, Civil Engineering,
Manhattan College, 1991
ME, Environmental Engineering,
Manhattan College, 1994

## PROFESSIONAL LICENSES

Professional Engineer in New York

# Noelle M. Clarke, PE

## Principal Engineer

### EXPERIENCE SUMMARY

Thirty-five years' experience: Principal Engineer/Senior Engineer at Remedial Engineering, P.C./Roux; Project Engineer at Camp Dresser & McKee.

### TECHNICAL SPECIALTIES

Extensive experience with feasibility studies/alternatives analyses, pilot testing, remedial design, implementation, construction management, and startup evaluations for remediation of soil, groundwater, soil vapor and sediment. Phase I/Phase II Environmental Site Assessments (ESA). Soil vapor intrusion sampling, evaluation and mitigation at numerous sites. Extensive experience at brownfields redevelopment sites, including dozens enrolled in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), former industrial facilities, and public works facilities. Evaluation and design of storm water drainage systems. Evaluation, design, and construction management for new and existing wastewater treatment processes.

### REPRESENTATIVE PROJECTS

- **Principal Engineer for a Brownfield Redevelopment of a Property Adjacent to a Dry Cleaning Solvent Distribution Facility Under the NYSDEC BCP in Brooklyn, New York.** The site was previously a warehouse built on a former freight railyard that serviced the dry cleaning solvent facility with significant soil, groundwater, and vapor contamination with chlorinated VOCs (CVOCs). The site was developed into multifamily housing with first floor retail use and a subgrade parking garage. Pre-remediation and post-remediation Phase I ESAs were prepared by Roux, as well as an extensive remedial investigation (RI). The remedy, as summarized in the RAWP, consisted of soil hot spot removal down to 35 feet below grade, a physical barrier to limit on site groundwater migration, a permeable reactive wall to treat groundwater and mitigate offsite migration, and a sub slab depressurization system (SSDS). Roux, under the direction of Ms. Clarke provided full-time oversight of the remediation and prepared the Final Engineering Report (FER) and Site management Plan (SMP). The Certificate of Completion for the Site was obtained in October 2015, and Roux is currently providing post-remediation O, M&M and reporting services under the SMP.
- **Principal Engineer for a Renovation Project at an Affordable Housing Complex in the East Village, New York, New York.** Roux's client is partnered with NYCHA to renovate the site under the PACT program. The renovations will include envelope repairs; interior renovations to residential units and common areas; and exterior renovations to the landscaped areas, walkways, and common areas. Roux prepared and implemented a New York City Department of Environmental Protection (NYCDEP)-approved Phase II ESA Work Plan. Since the Site is located within 200 feet of subway/rail lines, Roux prepared New York City Transit Authority/Metropolitan Transportation Authority-required drawings for the Site to achieve a determination of no impact for subsurface activity prior to implementation of the investigation. Based on the results of the investigation, a RAP and CHASP were submitted to NYCDEP to detail the environmental procedures to be followed during the planned exterior renovations.
- **Principal Engineer Providing Due Diligence Support for Real Estate Transactions on Multiple Projects in the New York Metropolitan Area.** Projects have included multi-family housing (both affordable and market rate), retail/ commercial, community services and industrial properties. Services have included Phase I and Phase II ESAs.

- **Principal Engineer for a NYSDEC BCP Remediation Project at a Mixed-use Multifamily Housing/Neighborhood Retail Complex with a former On-site Dry Cleaner in Brooklyn, New York.** Significant soil, groundwater, and vapor contamination from CVOCs was present from the former on-site dry cleaner, as well as groundwater contamination from offsite dry cleaners. The remedy, described in the Remedial Investigation Report (RIR)/RAWP prepared by Roux, consisted of hot spot soil removal, in situ groundwater chemical oxidation treatment and SSDS for vapor mitigation in the existing building. The NYSDEC accepted the FER and SMP prepared by Roux and the Site received a Certificate of Completion from NYSDEC in 2016. Roux is currently providing post-remediation operation, maintenance and monitoring (O, M&M) and reporting services under the SMP.
- **Principal Engineer for the Investigation and Remediation of a Former Petroleum Refinery Under the NYSDEC BCP Located in Olean, New York.** The work included site investigation and preparation of an Alternatives Analysis Report (to document analysis of engineering options and remedy recommendation), RAWP and remedial design documents to address the environmental impacts associated with the historical operations. The selected remedy included excavation and on-Site reuse of 13,000 cubic yards of soil, excavation and off-Site disposal of 17,000 tons of soil, in-situ stabilization of 58,000 cubic yards of deep petroleum impacted soil and capping. The remediation work was completed in phases between 2022 and 2024, with an anticipated Certificate of Completion date in 2025.
- **Principal Engineer Environmental Consulting Services at the Baychester Houses and Murphy Houses Affordable Housing Developments in the Bronx, New York.** Roux's client, in partnership with NYCHA, is renovating and operating the developments under NYCHA's PACT program. Roux's work has included preparation of a Phase I ESA for each site, and closure of two underground storage tanks at Baychester Houses and one underground storage tank at Murphy Houses, including reporting related to the Sites' NYSDEC PBS registrations.
- **Principal Engineer for a NYSDEC BCP Remediation and Redevelopment Project of a Former Retail Service Station and Former Auto Dealership Site in Long Island City, New York.** Soil, groundwater, and vapor contamination exists from petroleum-related constituents across the former service station property (the petroleum source area), as well as historic fill across the entire site. The remedy, described in the RAWP prepared by Roux, consists of delineation sampling to define potential hot spots for excavation, installation of support of excavation and excavation of up to 10 feet of soil in the petroleum source area and other hot spots on-site, in-situ soil solidification (i.e., soil mixing) to a maximum depth of 34 feet below land surface in the petroleum source area, a site cover system, a vapor barrier and an active sub-slab depressurization system.
- **Principal Engineer for a Complex Dredging Project for a Major Petroleum Company Under the NYSDEC Spills Program on the Allegheny River, New York.** The goal of the project was to remove 1,000 tons of petroleum impacted sediments from the river. Work included Site investigation, remedial investigation, alternatives evaluation, remedial design, planning and extensive regulatory permitting with multiple federal, state, and local agencies. It also included relocation and monitoring of endangered mussels from the work area. The remediation work was completed in 2021.
- **Principal Engineer for two Adjoining Multifamily NYSDEC BCP Redevelopment sites in Mott Haven, Bronx, New York Along the Harlem River.** Project includes characterization, excavation, and disposal of over 40,000 tons of soil, support for obtaining a SPDES discharge permit for construction water and a site-wide cover system. Project tasks include community air monitoring, shoreline permitting, and construction monitoring while minimizing cost impact by sharing resources between both projects. Certificates of completion were received in 2020 and 2020 and Roux is providing post-remediation monitoring and reporting services.
- **Principal Engineer at a Former Metals Manufacturing Site Under the NYSDEC Voluntary Cleanup Program (VCP) in Staten Island, New York.** Principal Engineer for the alternatives evaluation, remedy selection, regulatory negotiation, preparation of design documents (drawings, specifications, and permit applications) and permitting for all remedial components in support of redevelopment at a former metals manufacturing site. The remedy included dredging and on-site disposal of stream sediments; consolidation and capping of fill material across the site; in-place abandonment of the Site's former sewer system; installation of drainage swales for storm water management; and wetland bank stabilization and mitigation/restoration. Required permits and regulatory approvals for the project included a Joint Permit from the USACE and NYSDEC; a NYSDEC SPDES equivalency permit for discharge of treated water to the Arthur Kill, a New York State Department of State Coastal Management Program (CMP) Federal Consistency Assessment; a New York City Waterfront Revitalization Program Consistency Assessment, a modification of topography authorization from New York City Department of City Planning; and a New York City Department of Environmental Protection permit for temporary discharge to a combined sewer. Also required by the USACE and National Marine Fisheries, was preparation of an Essential Fish Habitat Study, in support of the Joint Permit application. Permitting activities included preparation of the various permit

applications, forms and supporting documentation, as well as follow up meetings and correspondence to finalize the authorizations.

- **Principal Engineer for the Design, Bidding, Contractor Selection, and Remedial Construction Phase at a Former Metals Manufacturing Facility under the NYSDEC VCP in Staten Island, New York.** Responsibilities included finalizing biddable construction documents, issuing to bidders, preparing addenda, and evaluating bids for presentation to the client. Following contractor selection Roux was heavily involved in coordinating with the client, regulators, and contractor for mobilization to the site in late 2006. During the construction Ms. Clarke provided support to the on-site construction manager regarding field changes, design revisions to account for unexpected conditions and contractor questions. The Final Engineering Report summarizing the construction activities was accepted by NYSDEC.
- **Principal-in-Charge of an Investigation And Remediation Project at a Former Petroleum Refinery and Current Distribution Facility in Buffalo, New York.** The site entered the NYSDEC BCP in 2006. Roux completed the BCP application and supported the application process. The work included assessing and remediating the potential environmental impacts associated with historical Site operations. These activities have included preparing multiple work plans and directing the activities of another consultant performing the fieldwork and preparing reports of results for field investigations including soil boring and sampling, well installation and groundwater sampling, aquifer pump testing, and groundwater/separate phase modeling. An in situ chemical oxidation system was designed, installed, and was operated as an IRM to remediate an area of free product and impacted groundwater discharging to the Buffalo River in OU-4.
    - For the same petroleum Site in Buffalo, New York, multiple Alternatives Analysis Reports (to document analysis of engineering options and remedy recommendation), Remedial Action Work Plans and remedial design documents have been prepared to address the environmental impacts associated with the five Operable Units (OU) on the Site. Remedial construction for OU-1 was completed in 2007 and included excavation and disposal of impacted soil. The Final Construction Certification Report for OU-1 was accepted by the NYSDEC. The Alternatives Analysis Report and Remedial Design for OU-4 were submitted and approved by NYSDEC. The remedy for OU-4 included excavation and on-site consolidation of river sediments and site soil, stabilization of 1,400 linear feet of river embankment using tiered slopes, rip rap, and reinforced bioengineering, slurry wall groundwater containment, low permeability capping, a stormwater collection system and constructed wetland treatment for stormwater. Various vegetative measures were incorporated into the design in order to promote vegetative growth and enhance wildlife habitats. The remedial construction was completed in 2013 and 2014, and preparation of the Final Construction Completion Report was completed in 2015. The Alternatives Analysis Reports for OU-2 and OU-3 were submitted to NYSDEC. For OU-2, bench scale studies of stabilization/solidification agents were completed and evaluated for treatment of lead and petroleum impacted soil. In addition, field pilot studies of multiple options to treat petroleum impacted soils were completed and evaluated. Design of a stormwater collection system for portions of OU-2 and OU-3 was completed in 2010, and construction was completed in 2014 under the direction of Ms. Clarke.
    - For the same petroleum terminal in Buffalo, New York, the work also included performing activities related to the operation of the remediation systems at the Site. These activities have included preparing a feasibility study work plan for improving water management systems at the site; preparing a work plan, directing the field work, and preparing an evaluation summary report for startup and testing of a portion of the groundwater extraction system at the Site; and assisting in preparation of plans to upgrade the existing treatment facilities at the Site.
    - For the same petroleum terminal in Buffalo, New York, the work also included preparation of design documents and a completion report for in-place closure of the site's former in-ground oil water separator. In addition, a vapor enhanced extraction pilot study work plan was prepared and implemented at the site for recovery of separate-phase product in one portion of the site located adjacent to the Buffalo River. The results of the VER pilot testing, along with the results of chemical oxidation pilot testing conducted at the site, have been summarized in a Remedial Action Selection report, which recommended implementation of chemical oxidation in this portion of the site. A conceptual plan for implementation of chemical oxidation was submitted with the selection document. The work also included maintaining contact with regulatory agencies regarding the status of activities at the Terminal; preparing compliance monitoring reports for submittal to the regulatory agencies; overall project coordination; and budget management and tracking.
- **Principal Engineer for the Investigation, Design, and Implementation of a Soil Remediation Project at a 4-acre Former Oil Terminal Under the NYSDEC Spills Program in Cold Spring Harbor, New York.** The remedy completed included excavation and offsite disposal of approximately

20,000 tons of petroleum contaminated and/or hazardous lead contaminated soil in accordance with the future use of the site under an Environmental Easement. Additional activities completed by Roux at the site included asbestos remediation followed by building demolition, UST removal, and cesspool remediation. Roux prepared a Final Engineering Report, which was accepted by NYSDEC and resulted in the closure of the spill number for the Site.

- **Principal Engineer for the Investigation, Design, and Implementation of a Soil Remediation Project at a Portion of a Former Oil Terminal in Sag Harbor, New York.** The remedy completed included excavation and offsite disposal of approximately 2,000 tons of petroleum contaminated soil from beneath an active public roadway under the NYSDEC spills program. The remedy included extensive traffic control and coordination with Village of Sag Harbor officials, dewatering, water treatment, temporary water discharge of treated water to Sag Harbor and restoration of the public roadway in accordance with the Village of Sag Harbor Department of Public Works requirements. Roux prepared a Final Engineering Report, which was accepted by NYSDEC and resulted in the closure of the spill number for the Site.
- **Principal Engineer for Brownfield Redevelopment of a Former Retail Service Station Site Under the NYSDEC BCP in Staten Island, New York.** There was soil, groundwater, and vapor contamination from petroleum-related constituents in the vicinity of the former gasoline piping and pump island (the petroleum source area), as well as historic fill across the entire site. The remedy, described in the Remedial Action Work Plan prepared by Roux, consisted of a sealed sheet pile containment wall around the petroleum source area, a Site Cover System across the entire site, comprised of concrete building slab/walkways, asphalt parking areas and limited landscaped areas and a sub-slab depressurization system to prevent vapor intrusion into the retail building. A certificate of completion from NYSDEC was obtained in 2020. Roux provided post-remediation operation, maintenance and monitoring (O, M&M) and reporting services under the SMP from 2020 to 2023.
- **Principal Engineer for the Investigation, Remedial Design, Construction Oversight and Operation and Maintenance of a Bioventing and Soil Vapor Extraction System at the Site of a Diesel UST Failure in Brooklyn, New York.** A free product recovery system was also designed, installed, and operated by Roux. Investigation activities included the use of the sonic drilling technique to advance twelve wells to 85 feet below grade through cobbles and boulders for delineation of separate phase product, soil, and groundwater impacts. Eight wells were converted to combination biovent/SVE wells. Design included specification of SVE and biovent blowers, piping, valves, and an automatic control system. Product only pumps were also designed and installed in three wells. Approximately 2,000 gallons of product were recovered by the two systems and the spill was closed by NYSDEC in 2011.
- **Principal Engineer for the Design and Specification of a Large-scale (750 scfm) Soil Vapor Extraction (SVE) Pilot System with Thermal Oxidation Off-gas Treatment for a Client in Brazil.** Responsibilities included equipment sizing and specification, selection of materials of construction, SVE well and equipment layout, description of general startup procedures and preparation of a pilot test work plan. The pilot test work plan included a description of the pilot test operating procedures to be followed, operating parameters to be monitored and data to be collected and analyzed. The work also included conducting the pilot test activities and generating a report that included plans for expanding the SVE system across the Site. The work also included technical support for evaluating and optimizing system performance.
- **Principal Engineer for the Design of a New Storm Water Collection System for a Metals Manufacturing Site Under the NYSDEC VCP in Staten Island, New York.** The design included evaluation and hydrologic modeling of the system using the USG Soil Conservation Service TR-55 hydrologic analysis model, inlet structure and pipe sizing and layout, outfall design and specification of materials and methods of construction for all system components.
- **Principal-in-Charge of the Operation, Maintenance, Monitoring and Reporting Activities at Multiple Active and Former Petroleum Storage and Distribution Terminals for a Large Petroleum Company, New York.** All sites have open NYSDEC spill numbers. The work includes operation, maintenance, and performance/compliance monitoring services at the sites that currently have active remediation systems installed and monitoring, sampling, and reporting services at sites without systems. The remediation systems include groundwater extraction and treatment, free product recovery, bio-sparging, and soil vapor extraction/air sparging. At these sites, Roux is responsible for: maintaining and troubleshooting the various system components to reduce downtime to the extent possible; repairing and/or replacing equipment as needed; coordinating the upgrading of the electrical systems, as needed, to meet current building code requirements; expanding systems to meet regulatory requirements, as needed; optimizing system performance; collecting performance monitoring samples and data to track the efficiency of the treatment systems; and collecting compliance monitoring data.
- **Principal Engineer for at Multiple Petroleum Terminals in New York State for Groundwater Quality and Surface Water Quality Sampling and Monitoring Well Gauging as Required**

**by the NYSDEC, as well as Quarterly Reporting for all Sites Under the NYSDEC Spills Program, New York.** The work has also included collection of soil quality data at several sites and performance of an electromagnetic survey to support the divestiture and redevelopment of one of these sites. Based on these results, soil removal activities were performed at one of the former terminals in order to obtain regulatory closure of the site. Roux successfully completed the remedial activities to the satisfaction of the regulator and received closure for the client of the open spill number. Regulatory closure of another of these former terminals was obtained based upon the results of ongoing groundwater monitoring and reporting.

- **Project Manager for the Remedial Design at a Superfund Site for the New York State Department of Environmental Conservation in Nanuet, New York.** The work included preparation of a preliminary design report, which evaluated two alternatives for handling hazardous soils and sediments at the site contaminated with volatile organic compounds. Each alternative was evaluated on the basis of technical feasibility, cost and schedule for implementation. Based upon this evaluation, off-site disposal was recommended over on-site treatment. The report presented a site-wide conceptual plan for remediation, including soil/sediment excavation, staging and sampling; stream diversion; excavation dewatering; temporary on-site groundwater treatment; and long-term monitoring. Duties also included managing and tracking all project budgets and serving as the main client contact.
- **Project Manager for Preparation of a Work Plan, Direction the Field Activities and Preparation of a Summary Report for Investigation of the Storm-water Collection System at a Petroleum Terminal in Buffalo, New York.** The objectives of the storm sewer investigation were to: prepare a detailed map of the Site's sewer system; re-establish connections that may have become blocked by debris; investigate the structural integrity of the storm sewers; locate areas of groundwater infiltration and assess infiltration rate and quality; assess wet and dry-weather flow and quality; and identify areas contributing surface water to the collection system, including hydrologic modeling using TR-55. Based on the results of the investigation, several improvements to the sewer system were recommended, including eliminating inlets to the system in areas of the site where no active operations currently take place and rehabilitation and/or installation of new sewers to restore flow by gravity to the treatment system.
- **Project Manager for a storm sewer study at the Former Metals Manufacturing Facility in Staten Island, New York.** Project Manager as part of the Voluntary Cleanup Program for the Site to identify contaminated infiltration sources, provide an accurate site drainage map, and verify contributing areas to each outfall. The investigation included field inspections, surveying, dye testing, and sampling during varying tidal conditions. The storm sewer map prepared was used for future sewer closure and site redevelopment planning.
- **Project Engineer for Design of a 2.6-mgd Groundwater Treatment System at the Fireman's Training Center for Nassau County Department of Public Works on Long Island, New York.** The work included design of air strippers, exhaust stacks, liquid-phase GAC treatment units, and all chemical feed and storage facilities, including unit sizing, selection of materials of construction, equipment layout, and coordination with other disciplines. The work also included the development of the "mass balance" for the facility.
- **Task Leader in Charge of Overseeing A Bioventing Pilot Study Conducted by a Subconsultant, to Treat Contaminated Vadose Zone Soils at the Fireman's Training Center Site in Nassau County, New York.** The work included development of a preliminary design report for the full-scale implementation of bioventing at the site based upon the results of the pilot study.
- **Project Engineer for the Design, Specification, Construction, and Operation of an Air Sparging and Soil Vapor Extraction Pilot at the Terminal of a Large Petrochemical Distributor, Long Island, New York.** The pilot was designed to treat contaminated ground water and vadose zone soils resulting from a one-million-gallon gasoline spill at the site. The work included development of the field sampling program and sampling and evaluation of various parameters to determine the pilot's radius of influence and effectiveness. The work also included performing data analysis and preparation of the pilot study report, which recommended full scale implementation of air sparging at the site. The site-wide implementation of air sparging and expansion of the site's existing vapor extraction system at the same Long Island petrochemical terminal was also part of the work. Responsibilities included design, specification, and layout of all mechanical equipment, vapor extraction, and air sparging wells and new vapor extraction/air sparging piping.
- **Project Engineer for the Design of a 0.50-mgd Groundwater Treatment Facility at a Petrochemical Terminal, Long Island, New York.** Responsibilities included the design, specification, and layout of mechanical equipment, including the air stripping tower, vapor phase granular activated carbon off-gas treatment, centrifugal blowers, ductwork, influent pump, and concrete wet well. Responsible for shop drawing review during the construction phase.
- **Project Manager for an Investigation at a Gasoline Service Station with Soil and Groundwater Contamination.** Responsible for reviewing and evaluating the work of another consultant that performed the soil and groundwater sampling

and conducted remedial activities at the site including investigation summary reports; remedial designs; remediation progress reports; correspondence with regulators; and plans for future work at the Site. The work also included mapping the groundwater flow patterns in the area of the service station and mapping the aerial and vertical extent of the groundwater contamination. Responsible for project coordination and budget management and tracking.

- **Project Manager for the Field Investigation, Feasibility Study, and Remedial Design at NYSDEC Superfund Site as a Standby Contractor to NYSDEC in Spring Valley, New York.** The work included the development of a work plan and site operations plan. The field investigations included Geoprobe soil borings; groundwater monitoring well installation; groundwater sampling; aquifer pump testing; and vapor extraction pilot testing. Work also included conducting the field operations for the vapor extraction pilot and producing a summary report of the field investigation results. The report presented an evaluation of the cost and feasibility of several alternatives for remediation of the site. It recommended reducing the level of effort of the remediation presented in the Record of Decision, based on lower levels of contamination encountered during the investigation. Duties also included project coordination, budget management and tracking, and development of subcontract agreements.
- **Project Engineer for Upgrades to the Spring Creek Auxiliary Water Pollution Control Plant for the City of New York.** The work included the evaluation, design, and specification of a two-stage odor control system, chemical storage and feed facilities and new effluent disinfection system.
- **Project Engineer Responsible for Preparation of Design Documents for the Replacement of the Sodium Hypochlorite Pumps and Piping at the Mamaroneck Wastewater Treatment Plant for Westchester County Department of Environmental Facilities in New York.**
- **Project Engineer for Design of Upgrades to the New Rochelle Wastewater Treatment Facility for Westchester County Department of Environmental Facilities in New York.** Designed upgrades to the main influent pump station, including rehabilitation of the existing influent pumps and replacement of the magnetic drives with new variable frequency drives. Responsibilities also included design of a submersible automatic duplex sump pump system, new primary sludge pumps and piping and new primary and secondary settling tank equipment. The work also included assisting the County during the bidding and contractor selection phase and preparing addenda to the contract documents.
- **Project Manager for the Construction of Upgrades to the Wastewater Treatment Facility in New Rochelle, New York.** Responsibilities included overseeing the shop drawing logging and distribution process; reviewing mechanical equipment shop drawings; addressing contractor questions regarding the contract documents; and coordinating with the resident engineer in the field and the electrical and general contractors.
- **Project Engineer for the Performance Evaluation of the Harriman Wastewater Treatment Plant for the Orange County Department of Environmental Facilities and Services, New York.** Responsibilities included documentation of the existing conditions at the plant and evaluation of the historical and current performance of the plant with respect to its potential for expansion. A summary report was prepared, which included evaluations of the existing plant processes with respect to standard design criteria, typical design practices and receiving water considerations. This summary report served as the basis for the facilities plan, prepared as the next phase of the project.
- **Project Engineer for the Facilities Plan for the Upgrade of the Harriman Wastewater Treatment Plant, New York.** Responsibilities included evaluation of alternatives for expanding the plant's treatment capacity. A report was prepared, which recommended the conversion of the existing oxidation ditches to sequencing batch reactors (SBR) in order to increase the plant's treatment capacity to 6.0 mgd within the limited space available on the site.
- **Project Engineer for the Gates-Chili-Ogden Pump Station and Force Main Design for Monroe County, New York.** The design consisted of a new 36 mgd wet pit/dry pit pump station, influent sewer, and force main. Responsibilities included evaluating influent pumping conditions, and design of the influent sewer, manual influent bar racks and a duplex automatic submersible sump pump system for the station.
- **Project Manager for the Flow Augmentation Needs Study (FANS) for Suffolk County Department of Public Works, New York.** Responsibilities included coordinating and implementing the annual wetland monitoring effort for collection of data to characterize the vegetation communities and surface water and groundwater conditions at four freshwater wetland sites in Suffolk County. Duties also included maintaining a database of all vegetation data collected; developing and refining equations to characterize the groundwater table and wetlands vegetation in all monitoring areas; evaluating potential impacts of sewering on sensitive wetlands; and evaluating the need for any mitigation of these sites as triggered by vegetation changes correlated to groundwater drawdown.

Responsibilities also included coordinating the production of a draft and final annual monitoring report summarizing the findings of the program.

**PRESENTATIONS**

*Sparging Targets Submerged Residual Saturation Contamination*, written with D. Bennett and L. Buchanan. Presented at the 66th New York Water Environment Federation Association Annual Meeting, New York, New York, February 1994.

*Suffolk County Wetlands – Flow Augmentation Needs Study*, written with M. A. Taylor and R. Southard. In Proceedings of the Annual Meeting, Hydrology and Hydrogeology of Urban and Urbanizing Areas. American Institute of Hydrology, April 1996.

# PROFESSIONAL PROFILE

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**EDUCATION**
BS, Geology University of Massachusetts, Amherst, 2006

**PROFESSIONAL LICENSES**
Licensed Site Professional Association (Associate)

## Eric Runstrom

### Senior Geologist I | Project Manager

**EXPERIENCE SUMMARY**
Mr. Runstrom has eighteen years of experience, including Senior Geologist I and Project Manager (2019-Present), Project Geologist (2013-2019), Staff Geologist (2011-2013) at Roux; and Geologist at Sovereign Consulting Inc. (2006-2010).

**TECHNICAL SPECIALTIES**
Mr. Runstrom's technical specialties include designing and implementing environmental remediation projects, conducting environmental site assessments and environmental due diligence. Focus on management of comprehensive site investigations including environmental assessment and risk characterization; evaluation of remedial alternatives; development and implementation of remedial work plans; regulatory reporting and permitting; quality control; and health and safety compliance. Mr. Runstrom has extensive experience managing site assessment, remedial construction and soil excavation projects including management of subcontractors, data collection and waste characterization and management. Mr. Runstrom also has experience with wetland regulations & sensitive resource area permitting for oil and gas industry rights-of-ways in MA, CT, RI, and NJ.

**REPRESENTATIVE PROJECTS**

- **Senior Project Manager, Major Oil Company.** Managed and oversaw remedial action and monitoring work scopes at a former refinery and active petroleum bulk storage facility in accordance with a Remedy Implementation Plan (RIP). The RIP addressed 8 Areas of Concern (AOCs) across the terminal and included soil excavation, use of engineered barriers and site controls, and passive and active LNAPL recovery. Short term response actions were conducted concurrently with ongoing comprehensive remedial actions in response to spills and/or release typically as either Release Abatement Measures (RAM) or Immediate Response Actions (IRA). Responsibilities involved the scheduling and coordination of RIP, RAM, and/or IRA activities with the client, terminal personnel, and subcontractors. Also prepared associated work scopes and budgets and assisted with the overall regulatory strategy for the site.
- **Senior Project Manager, Major Oil Company, Everett, Massachusetts.** Developed and implemented environmental assessment work plans for the assessment and delineation of petroleum hydrocarbons and metals (primarily lead and organic lead) impacted areas for a former refinery and active petroleum bulk storage facility. Managed development of updated site risk characterization and selection of remedial action alternatives to advance site towards permanent solution.
- **Project Manager, Major Oil Company.** Developed and managed a LNAPL investigation at a former refinery and active petroleum bulk storage facility. Work included delineation of 8 different plumes, advancement of over 50 soil borings, installation of over 40 monitoring wells, collection of over 100 soil samples and gauging and sampling of monitoring wells. Evaluated collected data and historical data to develop remedial action plans to address each LNAPL plume and advance site towards permanent solution.
- **Project Manager, Major Oil Company.** Developed and oversaw investigation and rehabilitation of storm water system structures and piping (SWS) for a former refinery and active petroleum bulk storage facility. Included remote video survey of approximately 2,500 feet of SWS to evaluate structural integrity of the stormwater system, identifying where petroleum seeps were infiltrating into the network, and implementing appropriate remedial response measures. Major activities included use of line jetting equipment to clean SWS and excavation activities to facilitate repair and abandonment of SWS, and associated

management and disposal of impacted soils and sediments. Included the oversight of subcontractors performing permit required CSEs with Marine Chemist certs.

- **Project Manager, Major Oil Company, Upstate New York.** Managed and oversaw soil excavation and abandoned subsurface pipeline cleaning and removal activities at 9-acre NYSDEC Brownfields Cleanup Program Site, located on one of the first oil storage and refining centers in the Northeast. Project included the removal and disposal of over 5,000 cubic yards of impacted soil and over 1,500 linear feet of piping. Work included planning and implementation of engineering and trenching protective system designs, development of soil excavation and pipe removal plans, confirmatory endpoint sampling plan, and waste management plan including steps to minimize and control dust, vapors, and odors.
- **Project Manager, Major Oil Company.** Developed and oversaw large scale survey and confirmatory testing of over 8,500 linear feet of suspected asbestos insulated pipelines. Project included planning and implementation of work plans to abate and dispose of approximately 3,000 linear feet of asbestos insulation. Work including several elevated work areas requiring the use of scaffolding and aerial lifts to safely access work areas in accordance with OSHA requirements. Included the management and oversight of subcontractors performing asbestos abatement and confirmatory testing activities, and proper management and disposal of asbestos containing waste.
- **Senior, Project & Staff Geologist, Phase I Environmental Site Assessments.** Conducted, oversaw, and managed multiple Phase I Environmental Site Assessments in accordance with ASTM E1527-13 throughout New England for due diligence of commercial and industrial facilities, and residential buildings. Associated activities included agency contact, database management and interpretation, site inspections, identification of recognized environmental conditions (RECs), and report preparation. Based on Phase I findings, provide recommendations to clients, legal counsel, and lenders on potential liabilities and, and recommendations for additional due diligence.
- **Staff Geologist-Project Manager, Major Oil Company, Pipeline Facilities.** Provided technical support for securing over 100 wetland and various construction and access permits (state, local, federal). Developed risk reduction plans, engineering design for stream & RR crossings. Work scopes included assisting with foreign lines, dent, and corrosion anomalies. Conducted site walks and oversaw wetland delineation activities, corresponded with state, local and federal agencies, and presented at local Conservation Committees to obtain required permits. Permits include CWA Order of Conditions, DOT access, road opening, NHESP VMP & OMP, Water Quality Cert., and US Army Corp.
- **Staff Geologist, Petroleum Product Bulk Storage and Distribution Facility, East Providence, Rhode Island.** Conduct field tasks such as groundwater monitoring and sampling, contractor oversite and management, product recovery system operation & maintenance. Responsible for remedial system sampling and maintenance, surface/groundwater treatment system sampling and repairs, and groundwater monitoring and sampling. Conducted groundwater product recovery & pump maintenance as well as hazardous waste inspections of waste recovery systems/ containers and the storm sewer & remedial system inspections.
- **Staff Geologist, Petroleum Bulk Storage and Distribution Facility, East Providence, Rhode Island.** Oversaw the installation of an Engineered Natural System (ENS) to treat shallow groundwater and surface water in East Providence, Rhode Island. Provided oversight of installation of permeable reactive barrier, subsurface flow constructed treatment wetland, and contingency treatment system. Work was completed to fulfil the requirements of the Rhode Island Department of Environmental Management.
- **Staff Geologist, Shipping Freight Facility Inspections, multiple locations, Massachusetts/Rhode Island/New Hampshire.** Provided stormwater permitting to multiple facilities throughout New England. Coordinated and conducted inspections of facilities. Prepared stormwater pollution prevention plans (SWPPPs) and Stormwater Management Plans (SWMPs) in accordance with Federal and state industrial discharge permits.

**PROFESSIONAL TRAININGS**

OSHA 29 CFR 1910.120 40-Hour Safety Training

OSHA 29 CFR 1910.120 8-Hour Annual Refresher

OSHA Excavation and Trenching Safety Regulations

Confined Space Safety Training

DOT HM-181/126F Certificate

Red Cross Certified, First Aid and CPR

Loss Prevention System Training

# PROFESSIONAL PROFILE

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**EDUCATION**
Bachelor of Science,
Environmental Geoscience,
State University of New York
at Buffalo, 2015

## Nicholas Suraci

### Project Scientist

**EXPERIENCE SUMMARY**
Mr. Suraci has Over 9 years professional experience in environmental engineering, science and consulting at numerous contaminated sites throughout the northeast United States as a Project Scientist (Roux Environmental Engineering and Geology, DPC July 2023 to Present) and as an Environmental Scientist (TurnKey Environmental Restoration, LLC January 2016 to July 2023).

**TECHNICAL SPECIALTIES**
Mr. Suraci is an expert in brownfield and hazardous waste site investigation and remediation; petroleum-impacted site remediation; due diligence for environmentally impaired properties; solid waste facility construction management, water treatment and management, and construction quality assurance monitoring and testing. He holds a BS in Environmental Geoscience from the University at Buffalo. Mr. Suraci has completed assessments, investigations and remediation projects on properties with a multitude of historic uses (e.g., petroleum storage refineries and terminals, gas stations, automobile dealerships, rail yards, foundries, dry cleaners, steel manufacturing, metal plating operations, junk yards), media types (surface and subsurface soil, groundwater, waste water, sediments, soil vapor, indoor air, building materials) and contaminants (e.g., volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), heavy metals, per- and polyfluoroalkyl substances (PFAS)). Mr. Suraci has completed a variety of remediation projects, ranging from simple underground storage tank (UST) removals to large-scale soil excavations, in-situ soil stabilization, water treatment system maintenance, and complex groundwater remediation programs, such as biological and/or chemical in-situ groundwater treatment and permeable reactive barriers for VOCs.

**REPRESENTATIVE PROJECTS**
**6804-6812 Main Street, Cherry Creek, New York**
Managed and oversaw underground gasoline storage tank system closure activities completed as part of fuel station upgrades for an existing gasoline station facility with significant soil and groundwater impacted with volatile organic compounds. The remediation approach included:

- Removal of four underground storage tanks, including all associated dispensing units and underground product piping.
- Soil excavation and disposal of approximately 2,060 tons of petroleum-impacted soil.
- Operation and management of a groundwater treatment system including filtration, multiple settling tanks, granular carbon treatment, and municipal sanitary sewer discharge of a total of 210,000 gallons of treated water. The groundwater treatment system was maintained in accordance with NYSDEC as well as local municipality regulations.

**Former Westin Truck Stop 4925 West Henrietta Road, Rochester, New York**
Managed and oversaw underground gasoline storage tank system closure activities completed as part of fuel station upgrades for an existing gasoline station and truck stop facility with significant soil and groundwater impacted with volatile organic compounds. The remediation approach included:

- Removal of five underground storage tanks, including all associated dispensing units and underground product piping.
- Soil excavation and disposal of approximately 3,235 tons of petroleum-impacted soil.
- Operation and management of a groundwater treatment system including filtration, multiple settling tanks, granular carbon treatment, and municipal sanitary sewer discharge of a total of 9,500 gallons of treated water. The groundwater treatment system was maintained in accordance with NYSDEC as well as local municipality regulations.

**2970 West Henrietta Road, Rochester, New York**
Managed and oversaw underground gasoline storage tank system closure activities completed as part of fuel station upgrades for an existing gasoline station and car wash facility with significant soil and groundwater impacted with volatile organic compounds. The remediation approach included:

- Removal of eight underground storage tanks, including all associated dispensing units and underground piping.
- Soil excavation and disposal of approximately 1,143 tons of petroleum-impacted soil.
- Operation and management of a groundwater treatment system including filtration, multiple settling tanks, granular carbon treatment, and municipal sanitary sewer discharge of a total of 25,081 gallons of treated water. The groundwater treatment system was maintained in accordance with NYSDEC as well as local municipality regulations.

**1841 Empire Boulevard, Webster, NY**
Managed, installed, and operated a temporary car wash wastewater pit bypass and treatment system during wastewater pit upgrade activities. The System consisted of a pump and multiple filtration socks. The treated water was discharged directly to the municipal sanitary system.

**500 South Union Street Site**
Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former dry cleaning facility in Spencerport, New York. The investigation included a hydrogeologic assessment, including exterior and interior soil borings, test pits and monitoring well installation, development and sampling, soil vapor testing and hydrogeologic assessment to design the in-situ groundwater treatment program. Remedial Action included:

- Installation of an active subslab depressurization system within the existing building to prevent migration of vapors into the building air.
- In-situ injection of treatment agent at 71 injection points located across the Site to enhance natural biodegradation of cVOCs in groundwater.
- Limited excavation and off-Site disposal of surface soil/fill exceeding commercial use soil cleanup objectives.
- Construction and maintenance of a soil cover system consisting of the existing building, pavement (asphalt), sidewalks, and soil cover in all other areas at a minimum of one foot thick over the demarcation layer, to prevent human exposure to remaining contaminated soil/fill remaining at the Site; The site is currently used as a multi-tenant commercial facility.

**229 Homer Street Site**
Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major petroleum storage facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as a soil vapor intrusion assessment. Remedial Action included:

- Approximately 5,815 tons of grossly contaminated soil GCS-impacted soil/fill was excavated and transported off-site for disposal at a commercial landfill.
- Approximately 1,946 linear feet of subsurface metallic product piping was exposed, tapped, evacuated of contents, removed, cleaned and recycled. Piping which extended beyond the property boundary was capped and/or grouted at the property line.
- Approximately 19 tons of piping was recycled as scrap metal. Cleaning of the pipes generated 4 drums of pipe scale, oil and water, which was transported off-site for incineration.
- Design, installation and operation of an air sparge/soil vapor extraction (AS/SVE) system to address GCS in the deeper soil/fill from approximately 5 to 15 fbgs and in the upper 5 ft of the water table (i.e., smear zone). The air sparge portion of the system includes 53 injection wells connected to an air compressor in a climate-controlled trailer via individual 1" polyethylene lines. The SVE system includes 14 extraction wells connected by 2" polyethylene lines to one of two blowers in a separate climate-controlled trailer. Emissions from the SVE system are controlled using a biofilter, which allows naturally occurring microbes to bioremediate the air stream and control the nuisance odors from the AS/SVE system.
- Construction and maintenance of a site cover system.

# PROFESSIONAL PROFILE

## Alex Wirth

### Technical Director


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**EDUCATION**

BS, Earth Science, Geology/Environmental Science, State University of New York College at Buffalo

**PROFESSIONAL TRAININGS**

OSHA 40-hour certified
OSHA 8-hour current
NYSDEC SWPPP Qualified Inspector
DOT Operator Qualification certified
Loss Prevention System certified

**EXPERIENCE SUMMARY**

Mr. Wirth is an experienced, proficient, and analytical engineering professional focused on providing progressive technical and management solutions. He encompasses over twenty-two years of project management experience; excellent knowledge in conceptual engineering, construction, planning, litigation support, settlement negotiations, design and cost estimating; proven interpersonal skills; and a superior record of financial management. He holds a BS in Earth Science and Geology from the State University of New York College at Buffalo. He is currently a Technical Director for Roux (2025-present). His past experience includes Principal/Senior Geologist at Rocterra, LLC (2011-2025), Contract Project Manager/Senior Geologist at Greenstar Environmental Solutions (2011-2025), Project Manager/Senior Geologist at Kleinfelder (2003-2015; 2018-2025 Part Time/Flex).

**TECHNICAL SPECIALTIES**

Mr. Wirth has conducted, managed or overseen investigations and remediations at many sites located across the Northeast and has experience within the Industrial, Pharmaceutical, Oil & Gas, and Brownfields/Real Estate markets. Mr. Wirth's areas of expertise include contaminant investigation and remediation, brownfield redevelopment, litigation technical support, and settlement negotiations.

**REPRESENTATIVE PROJECTS**

- Provided project management, investigation, remedial design, operation and optimization, litigation support, third-party oversight, and monitoring at a pharmaceutical manufacturing facility with a chlorinated solvent plume.
- Provided on-site management for the decommissioning of a landfill facility in New York. Activities included ongoing maintenance and long-term monitoring for PFAS, heavy metals, and PCB litigation support.
- Provided brownfield investigation, remediation, monitoring and responsible party settlement negotiations at multiple sites in New York.
- Provided third-party oversight and litigation support for a major petroleum release site including residential indoor air emergency response measures.
- Provided review and optimization of existing process engineering systems via mechanical and/or technology-based improvements, providing value-added services and engineering design solutions across sites in New York, New Jersey, and Pennsylvania.
- Provided litigation support for critical Environmental Impact Statement (EIS) and State Environmental Quality Review Act (SEQR) evaluations at an environmentally sensitive development site in New York.

# PROFESSIONAL PROFILE

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**EDUCATION**

PhD, Environmental Engineering, University of California, 2001
MS, Environmental Science (concentration in environmental chemistry), Indiana University, 1993
BA, Biochemistry, University of Texas, 1991

## James Hauri, PhD

### Senior Scientist I

**EXPERIENCE SUMMARY**

Dr. Hauri is a broad-based environmental scientist with more than twenty years of experience in environmental science, engineering, and chemistry. His professional experience includes Roux, Senior Scientist I (2022–Present); Assumption University, Associate Professor (tenured), (2007–2012, 2014–2022) and Assistant Professor (2001–2007); Exponent, Senior Scientist (part-time: 2014–2015; full-time: 2012–2014); Harvard University, School of Public Health, Visiting Scientist (part time: 2008–2012); CH2M-Hill, Environmental Consultant (2001); San Francisco Estuary Institute, Intern, (1997–1998); and Southwest Research Institute, Scientist (1993–1994).

**TECHNICAL SPECIALTIES**

Dr. Hauri's multidisciplinary background has included field sampling, environmental analytical chemistry, toxicity testing and data analysis. Much of his work has explored the nexus between the chemistry and ecotoxicity of environmental contaminants.

Dr. Hauri's areas of expertise include:

- Heavy metal speciation and toxicology;
- Environmental data analysis and validation;
- Analysis of ecotoxicology data; and
- Aquatic chemistry and contamination.

**REPRESENTATIVE PROJECTS**

**Chemistry and Toxicology**

- **Deep Water Horizon Oil Spill.** Evaluated the appropriateness of new methods to solubilize oil used with toxicity tests during the DWH spill. Compared the composition and concentration changes in polycyclic aromatic hydrocarbons (PAHs) associated with the new preparatory methods with field collected samples in order to determine if the toxicity tests performed were relevant to the actual toxicity expected to be seen in the field.
- **Alameda Corridor Transportation Authority (ACTA).** Provided technical expertise to gain a unique temporary discharge waiver for a multi-billion-dollar construction project in California. ACTA gained a waiver to discharge dewatering effluent during construction into the LA-Long Beach Harbor. The waiver regulated the effluent based on bioavailable (labile) metal concentration rather than total or dissolved concentrations, and then the project ensured non-detect labile metal concentration via the addition of EDTA.

**REPRESENTATIVE EXPERT RETENTIONS/APPEARANCES**

**Analytical Environmental Chemistry**

- Knurr, B. and J. Hauri (2021) Connecting Bomb Calorimetry to Environmental Issues: Two Bomb Calorimetry Experiments. Presented at the Fall ACS National Meeting, August 22-26. Atlanta, GA.
- Hauri, J. and B. Niece. (2018) Fingerprinting White Wines with Excitation-Emission Matrix Fluorescence. Poster presented at the Fall ACS National Meeting, August 19-23. Boston, MA.
- Hauri, J. (2017) Variation to the Excitation-Emission Matrix Fluorescence Characterization of Allochthonous Dissolved Organic Carbon due to pH changes. Poster presented 38th Annual Society of Environmental Toxicology and Chemistry National Meeting, 12 - 16 November, Minneapolis, MN.

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## PROFESSIONAL AFFILIATIONS

American Chemistry Society (ACS)

Society of Environmental Toxicology and Chemistry (SETAC)

NAC SETAC – board of directors 2005-2008, VP 2008-2009, Pres 2009-2010

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# ATTACHMENT 2

NYSDEC PFAS Sampling Guidance

NEW YORK STATE OF OPPORTUNITY.

Department of Environmental Conservation

# SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

## Under NYSDEC's Part 375 Remedial Programs

April 2023

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ERRATA SHEET for

*SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs* Issued January 17, 2020

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Title of Appendix I, page 32 | Appendix H | Appendix I | 2/25/2020 |
| Document Cover, page 1 | Guidelines for Sampling and Analysis of PFAS | Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs | 9/15/2020 |
| Data Assessment and Application to Site Cleanup Page 3 | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published | Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published | 3/28/2023 |
| Water Sample Results Page 3 | PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below. | NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below. | 3/28/2023 |
| Soil Sample Results Page 3 | Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values: | NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values: | 3/28/2023 |
| Protection of Groundwater Page 3 | PFOA (ppb) 1.1<br>PFOS (ppb) 3.7 | PFOA (ppb) 0.8<br>PFOS (ppb) 1.0 | 3/28/2023 |

| Citation and Page Number | Current Text | Corrected Text | Date |
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| Footnote 2 Page 3 | The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | 3/28/2023 |
| Testing for Imported Soil Page 4 | If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. | If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable. | 3/28/2023 |
| Routine Analysis, page 9 | "However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101." | "However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533." | 9/15/2020 |
| Additional Analysis, page 9, new paragraph regarding soil parameters | None | "In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils." | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Data Assessment and Application to Site Cleanup Page 10 | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC. | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC. | 9/15/2020 |
| Water Sample Results Page 10 | PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…)<br>If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10. | PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…)<br>If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10. | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Soil Sample Results, page 10 | "The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase." | "Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. "<br><br>[Interim SCO Table]<br>"PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.<br><br>As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. " | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Testing for Imported Soil Page 11 | Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required. | Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.<br><br>PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required. | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
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| Footnotes | None | [1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.<br>[2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | 9/15/2020 |
| Additional Analysis, page 9 | In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil… | In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil… | 1/8/2021 |
| Appendix A, General Guidelines, fourth bullet | List the ELAP-approved lab(s) to be used for analysis of samples | List the ELAP- certified lab(s) to be used for analysis of samples | 1/8/2021 |
| Appendix E, Laboratory Analysis and Containers | Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101. | Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101 | 1/8/2021 |
| Water Sample Results Page 9 | "In addition, further assessment of water may be warranted if either of the following screening levels are met:<br>a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or<br>b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L" | Deleted | 6/15/2021 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Routine Analysis, Page XX | Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). | Deleted | 5/31/2022 |
| Analysis and Reporting, Page XX | As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS. | Deleted | 5/31/2022 |
| Routine Analysis, Page XX | LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media. | EPA Method 1633 is the procedure to use for environmental samples. | |
| Soil Sample Results, Page XX | Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6 | Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6 | |
| Appendix A | "Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1" | "Include in the text ….EPA Method 1633" | |
| Appendix A | "Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101" | Deleted | |
| Appendix B | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |

| Citation and Page Number | Current Text | Corrected Text | Date |
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| Appendix C | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |
| Appendix D | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |
| Appendix G | | Updated to include all forty PFAS analytes in EPA Method 533 | |
| Appendix H | | Deleted | |
| Appendix I | Appendix I | Appendix H | |
| Appendix H | "These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report." | "These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)." | |
| Appendix H | "The holding time is 14 days…" | "The holding time is 28 days…" | |
| Appendix H, Initial Calibration | "The initial calibration should contain a minimum of five standards for linear fit…" | "The initial calibration should contain a minimum of six standards for linear fit…" | |
| Appendix H, Initial Calibration | Linear fit calibration curves should have an $R^2$ value greater than 0.990. | Deleted | |
| Appendix H, Initial Calibration Verification | Initial Calibration Verification Section | Deleted | |
| Appendix H | secondary Ion Monitoring Section | Deleted | |
| Appendix H | Branched and Linear Isomers Section | Deleted | |

# Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

## Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

## Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

## Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

## Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

### Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

### Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

## Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

### Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

### Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

| Guidance Values for Anticipated Site Use | PFOA (ppb) | PFOS (ppb) |
|---|---|---|
| Unrestricted | 0.66 | 0.88 |
| Residential | 6.6 | 8.8 |
| Restricted Residential | 33 | 44 |
| Commercial | 500 | 440 |
| Industrial | 600 | 440 |
| Protection of Groundwater[2] | 0.8 | 1.0 |

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

## Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

# Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

## General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

## Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- 
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

# Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

## General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

## Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

# Appendix C - Sampling Protocols for PFAS in Monitoring Wells

## General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

## Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

# Appendix D - Sampling Protocols for PFAS in Surface Water

## General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

## Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

# Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

## General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

## Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

# Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

**Procedure Name:** General Fish Handling Procedures for Contaminant Analysis

**Number:** FW-005

**Purpose:** This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

**Organization:** Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

**Version:** 8

**Previous Version Date:** 21 March 2018

**Summary of Changes to this Version:** Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

**Originator or Revised by:** Wayne Richter, Jesse Becker

**Date:** 26 April 2019

**Quality Assurance Officer and Approval Date:** Jesse Becker, 26 April 2019

**NEW YORK STATE**
**DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

# GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**
**DIVISION OF FISH AND WILDLIFE**
**FISH COLLECTION RECORD**



Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: □Electrofishing □Gill netting □Trap netting □Trawling □Seining □Angling □Other _____

Preservation Method: □Freezing □Other _____ Notes (SWFDB survey number): _____

| FOR LAB USE ONLY- LAB ENTRY NO. | COLLECTION OR TAG NO. | SPECIES | DATE TAKEN | LOCATION | AGE | SEX &/OR REPROD. CONDIT | LENGTH ( ) | WEIGHT ( ) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
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richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
# CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

| | | |
|---|---|---|
| SECOND RECIPIENT (Print Name) | TIME & DATE | PURPOSE OF TRANSFER |
| SIGNATURE | UNIT | |
| THIRD RECIPIENT (Print Name) | TIME & DATE | PURPOSE OF TRANSFER |
| SIGNATURE | UNIT | |
| FOURTH RECIPIENT (Print Name) | TIME & DATE | PURPOSE OF TRANSFER |
| SIGNATURE | UNIT | |
| RECEIVED IN LABORATORY BY (Print Name) | TIME & DATE | REMARKS |
| SIGNATURE | UNIT | |
| LOGGED IN BY (Print Name) | TIME & DATE | ACCESSION NUMBERS |
| SIGNATURE | UNIT | |

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

## NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

## HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

# Appendix G – PFAS Analyte List

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Perfluoroalkyl sulfonic acids | Perfluorobutanesulfonic acid | PFBS | 375-73-5 |
| | Perfluoropentanesulfonic acid | PFPeS | 2706-91-4 |
| | Perfluorohexanesulfonic acid | PFHxS | 355-46-4 |
| | Perfluoroheptanesulfonic acid | PFHpS | 375-92-8 |
| | Perfluorooctanesulfonic acid | PFOS | 1763-23-1 |
| | Perfluorononanesulfonic acid | PFNS | 68259-12-1 |
| | Perfluorodecanesulfonic acid | PFDS | 335-77-3 |
| | Perfluorododecanesulfonic acid | PFDoS | 79780-39-5 |
| Perfluoroalkyl carboxylic acids | Perfluorobutanoic acid | PFBA | 375-22-4 |
| | Perfluoropentanoic acid | PFPeA | 2706-90-3 |
| | Perfluorohexanoic acid | PFHxA | 307-24-4 |
| | Perfluoroheptanoic acid | PFHpA | 375-85-9 |
| | Perfluorooctanoic acid | PFOA | 335-67-1 |
| | Perfluorononanoic acid | PFNA | 375-95-1 |
| | Perfluorodecanoic acid | PFDA | 335-76-2 |
| | Perfluoroundecanoic acid | PFUnA | 2058-94-8 |
| | Perfluorododecanoic acid | PFDoA | 307-55-1 |
| | Perfluorotridecanoic acid | PFTrDA | 72629-94-8 |
| | Perfluorotetradecanoic acid | PFTeDA | 376-06-7 |
| Per- and Polyfluoroether carboxylic acids | Hexafluoropropylene oxide dimer acid | HFPO-DA | 13252-13-6 |
| | 4,8-Dioxa-3H-perfluorononanoic acid | ADONA | 919005-14-4 |
| | Perfluoro-3-methoxypropanoic acid | PFMPA | 377-73-1 |
| | Perfluoro-4-methoxybutanoic acid | PFMBA | 863090-89-5 |
| | Nonafluoro-3,6-dioxaheptanoic acid | NFDHA | 151772-58-6 |
| Fluorotelomer sulfonic acids | 4:2 Fluorotelomer sulfonic acid | 4:2-FTS | 757124-72-4 |
| | 6:2 Fluorotelomer sulfonic acid | 6:2-FTS | 27619-97-2 |
| | 8:2 Fluorotelomer sulfonic acid | 8:2-FTS | 39108-34-4 |
| Fluorotelomer carboxylic acids | 3:3 Fluorotelomer carboxylic acid | 3:3 FTCA | 356-02-5 |
| | 5:3 Fluorotelomer carboxylic acid | 5:3 FTCA | 914637-49-3 |
| | 7:3 Fluorotelomer carboxylic acid | 7:3 FTCA | 812-70-4 |
| Perfluorooctane sulfonamides | Perfluorooctane sulfonamide | PFOSA | 754-91-6 |
| | N-methylperfluorooctane sulfonamide | NMeFOSA | 31506-32-8 |
| | N-ethylperfluorooctane sulfonamide | NEtFOSA | 4151-50-2 |
| Perfluorooctane sulfonamidoacetic acids | N-methylperfluorooctane sulfonamidoacetic acid | N-MeFOSAA | 2355-31-9 |
| | N-ethylperfluorooctane sulfonamidoacetic acid | N-EtFOSAA | 2991-50-6 |
| Perfluorooctane sulfonamide ethanols | N-methylperfluorooctane sulfonamidoethanol | MeFOSE | 24448-09-7 |
| | N-ethylperfluorooctane sulfonamidoethanol | EtFOSE | 1691-99-2 |

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Ether sulfonic acids | 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) | 9Cl-PF3ONS | 756426-58-1 |
| | 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) | 11Cl-PF3OUdS | 763051-92-9 |
| | Perfluoro(2-ethoxyethane) sulfonic acid | PFEESA | 113507-82-7 |

# Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

## General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

## Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

| | |
|---|---|
| Temperature greatly exceeds 6ºC upon arrival at the lab* | Use professional judgement to qualify detects and non-detects as estimated or rejected |
| Holding time exceeding 28 days to extraction | Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded |

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

## Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

| | |
|---|---|
| %RSD >20% | J flag detects and UJ non detects |

## Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

| | |
|---|---|
| CCV recovery <70 or >130% | J flag results |

## Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

| Blank Result | Sample Result | Qualification |
|---|---|---|
| Any detection | <Reporting limit | Qualify as ND at reporting limit |
| Any detection | >Reporting Limit and >10x the blank result | No qualification |
| >Reporting limit | >Reporting limit and <10x blank result | J+ biased high |

## Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

| | |
|---|---|
| RPD >30% | Apply J qualifier to parent sample |

## Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

| | |
|---|---|
| Recovery <70% or >130% (lab derived criteria can also be used) | Apply J qualifier to detects and UJ qualifier to non detects |

## Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

| | |
|---|---|
| Recovery <70% or >130% (lab derived criteria can also be used) | Apply J qualifier to detects and UJ qualifier to non detects of parent sample only |
| RPD >30% | Apply J qualifier to detects and UJ qualifier to non detects of parent sample only |

## Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

| | |
|---|---|
| Recovery <50% or >150% | Apply J qualifier |
| Recovery <25% or >150% for poor responding analytes | Apply J qualifier |
| Isotope Dilution Analyte (IDA) Recovery <10% | Reject results |

## Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

## Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

## Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

# ATTACHMENT 3

Roux's Standard Operating Procedures

Date: May 5, 2000
Revision: April 16, 2015

## 1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sample handling and management which will allow consistent and accurate results. Valid chemistry data are integral to investigations that characterize media-quality conditions. This SOP is designed to ensure that once samples are collected, they are preserved, packed and delivered in a manner which will maintain sample integrity. The procedures outlined are applicable to most sampling events and any required modifications must be clearly described in the work plan.

## 2.0 CONSIDERATIONS

Sample containers, sampling equipment decontamination, quality assurance/quality control (QA/QC), sample preservation, and sample handling are all components of this SOP.

### 2.1 Sample Containers

Prior to collection of a sample, considerations must be given to the type of container that will be used to store and transport the sample. The type and number of containers selected is usually based on factors such as sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. In most cases, the overriding considerations will be the analytical methodology, or the state or federal regulatory requirements because these regulations generally encompass the other factors. The sample container selected is usually based on some combination of the following criteria:

a. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous material, glass is the recommended container type because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plasticizer to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of the glass containers in an aqueous matrix, plastic bottles (e.g., nalgene) must be used for samples collected for metals analysis. A separate, plastic container should accompany glass containers if metals analysis is to be performed along with other analyses. Likewise, other sample

characteristics may dictate that glass cannot be used. For example, in the case of a strong alkali waste or hydrofluoric solution, plastic containers may be more suitable because glass containers may be etched by these compounds and create adsorptive sites on the container's surface.

b. Volume of the Container

The volume of sample to be collected will be dictated by the analysis being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analysis. In most cases, the methodology dictates the volume of sample material required to complete the analysis. However, individual laboratories may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other QC checks.

To facilitate transfer of the sample from the sampler into the container and to minimize spillage and sample disturbance, wide-mouth containers are recommended when not precluded by method requirements. Aqueous volatile organic samples must be placed into 40-milliliter (ml) glass vials with polytetrafluoroethylene (PTFE) (e.g., TeflonTM) septums. Non-aqueous volatile organic samples for "low-level" volatile analysis should be collected in the same type of vials or using EnCore samplers provided by the laboratory. Non-aqueous volatile organic samples for "mid or high-level" volatile analysis may be collected in 4-ounce (oz) wide-mouth jars provided by the laboratory. These jars should have PTFE-lined screw caps.

c. Color of Container

Whenever possible, amber glass containers should be used to prevent photodegradation of the sample, except when samples are being collected for metals analysis. If amber containers are not available, then containers holding samples should be protected from light (i.e., place in cooler with ice immediately after filling).

d. Container Closures

Container closures must screw on and off the containers and form a leak-proof seal. Container caps must not be removed until the container is ready to be filled with the sample, and the container cap must be replaced (securely) immediately after filling it. Closures should be constructed of a material which is inert with respect to the sampled material, such as PTFE (e.g., TeflonTM). Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFE sheeting. If soil or sediment samples are being collected, the threads of the container must be wiped clean with a dedicated paper towel or cloth so the cap can be threaded properly.

e. Decontamination of Sample Containers

Sample containers must be laboratory cleaned by the laboratory performing the analysis. The cleaning procedure is dictated by the specific analysis to be performed on the sample. Sample containers must be carefully examined to ensure that all containers appear clean. Do not mistake the preservative as unwanted residue. The bottles should not be field cleaned. If there is any question regarding the integrity of the bottle, then the laboratory must be contacted immediately and the bottle(s) replaced.

f. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the laboratory waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles or coolers, and sample bottles must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross-contamination. When under chain of custody, sample bottles must be secured in locked vehicles, and custody sealed in shuttles or in the presence of authorized personnel. Information which documents that proper storage and transport procedures have been followed must be included in the field notebook and on appropriate field forms.

2.2 Decontamination of Sampling Equipment

Proper decontamination of all re-usable sampling equipment is critical for all sampling episodes. The SOP for Decontamination of Field Equipment and SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for decontamination of various types of equipment.

2.3 Quality Assurance/Quality Control Samples

QA/QC samples are intended to provide control over the proper collection and tracking of environmental measurements, and subsequent review, interpretation and validation of generated analytical data. The SOPs for Collection of Quality Control Samples, for Evaluation and Validation of Data, and for Field Record Keeping and Quality Assurance/Quality Control must be referred to for detailed guidance regarding these respective procedures. SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for QA/QC procedures.

2.4 Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under the following two scenarios:

a. Sample bottles are preserved at the laboratory prior to shipment into the field.

b. Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample could be collected, resulting in too much preservative in the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to chemical reactions caused by the addition of sample liquids to pre-preserved bottles. The use of pre-preserved bottles is acceptable; however, field sampling teams must always be prepared to add additional preservatives to samples if the aforementioned situations occur. Furthermore, care must be exercised not to overfill sample bottles containing preservatives to prevent the sample and preservative from spilling and therefore diluting the preservative (i.e., not having enough preservative for the volume of sample).

When samples are preserved after collection, special care must be taken. The transportation and handling of concentrated acids in the field requires additional preparation and adherence to appropriate preservation procedures. All preservation acids used in the field should be trace-metal or higher-grade.

2.5 Sample Handling

After the proper sample bottles have been received under chain-of-custody, properly decontaminated equipment has been used to collect the sample, and appropriate preservatives have been added to maintain sample integrity, the final step for the field personnel is checking the sample bottles prior to proper packing and delivery of the samples to the laboratory.

All samples should be organized and the labels checked for accuracy. The caps should be checked for tightness and any 40-ml volatile organic compound (VOC) bottles must be checked for bubbles. This can be achieved by gently tapping the bottom of the voa to dislodge potential air bubbles. Each sample bottle must be placed in an individual "zip-lock" bag to protect the label, and placed on ice. Clear packing tape may also be used to protect the integrity of the sample label. The bottles must be carefully packed to prevent breakage during transport. Use of bubble wrap is recommended. When several bottles have been collected for an individual sample, they should not be placed adjacent to each other in the cooler to prevent possible breakage of all bottles for a given sample. If there are any samples which are known or suspected to be highly contaminated, these should be placed in an individual cooler under separate chain-of-custody to prevent possible cross contamination. Sufficient ice (wet or blue packs) should be placed in the cooler to maintain the temperature at 4 degrees Celsius (°C) until delivery at the laboratory.

Consult the work plan to determine if a particular ice is specified as the preservation for transportation (e.g., the United States Environmental Protection

Agency does not like the use of blue packs because they claim that the samples will not hold at 4°C). If additional coolers are required, then they should be purchased.

The chain-of-custody form should be properly completed, placed in a "zip-lock" bag, and placed in the cooler. One copy must be maintained for the project files. The cooler should be sealed with packing tape and a custody seal. The custody seal number should be noted in the field book. Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time. If overnight mail is utilized, then the shipping bill must be maintained for the files and the laboratory must be called the following day to confirm receipt.

## 3.0 EQUIPMENT AND MATERIALS

3.1 General equipment and materials may include, but not necessarily be limited to, the following:

a. Sample bottles of proper size and type with labels.

b. Cooler with ice (wet or blue pack).

c. Field notebook, appropriate field form(s), chain-of-custody form(s), custody seals.

d. Black pen and indelible marker.

e. Packing tape, "bubble wrap", and "zip-lock" bags.

f. Overnight (express) mail forms, and laboratory addres or courier contact information

g. Health and safety plan (HASP).

h. Work plan/scope of work.

i. Pertinent SOPs for specified tasks and their respective equipment and materials.

3.2 Preservatives for specific samples/analytes as specified by the laboratory. Preservatives must be stored in secure, spillproof glass containers with their content, concentration, and date of preparation and expiration clearly labeled.

3.3 Miscellaneous equipment and materials including, but not necessarily limited to, the following:

a. Graduated pipettes.

b. Pipette bulbs.

c. Litmus paper.

d. Glass stirring rods.

e. Protective goggles.

f. Disposable gloves.

g. Lab apron.

h. First aid kit.

i. Portable eye wash station.

j. Water supply for immediate flushing of spillage, if appropriate.

k. Shovel and container for immediate containerization of spillage-impacted soils, if appropriate.

## 4.0 PROCEDURE

4.1 Examine all bottles and verify that they are clean and of the proper type, number, and volume for the sampling to be conducted.

4.2 Label bottles carefully and clearly with project name and number, site location, sample identification, date, time, and the sampler's initials using an indelible marker.

4.3 Collect samples in the proper manner (refer to specific sampling SOPs).

4.4 Conduct preservation activities as required after each sample has been collected. Field preservation must be done immediately and must not be done later than 30 minutes after sample collection.

4.5 Conduct QC sampling, as required.

4.6 Seal each container carefully and place in an individual "zip lock" bag.

4.7 Organize and carefully pack all samples in the cooler immediately after collection (e.g., bubble wrap). Insulate samples so that breakage will not occur.

4.8 Complete and place the chain-of-custody form in the cooler after all samples have been collected. Maintain one copy for the project file. If the cooler is to be transferred several times prior to shipment or delivery to the laboratory, it may be easier to tape the chain-of-custody to the exterior of the sealed cooler. When exceptionally hazardous samples are known or suspected to be present, this should be identified on the chain-of-custody as a courtesy to the laboratory personnel.

4.9 Add additional ice as necessary to ensure that it will last until receipt by the laboratory.

4.10 Seal the cooler with packing tape and a custody seal. Record the number of the custody seal in the field notebook and on the field form. If there are any exceptionally hazardous samples, then shipping regulations should be examined to ensure that the sample containers and coolers are in compliance and properly labeled.

4.11 Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time.

4.12 Maintain the shipping bill for the project files if overnight mail is utilized and call the laboratory the following day to confirm receipt.

END OF PROCEDURE

Date: January 9, 2011
Revision: May 12, 2015

## 1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish guidelines for the collection of soil samples for laboratory analysis. This SOP is applicable to soil samples collected from split-spoon, Geoprobe™ core samples, and Sonic core samplers during drilling, hand auger samples, grab samples from stockpiled soils, surface samples, test pit samples, etc.

## 2.0 CONSIDERATIONS

Soil samples may be collected in either a random or biased manner. Random samples can be based on a grid system or statistical methodology. Biased samples can be collected in areas of visible impact or suspected source areas. Soil samples can be collected at the surface, shallow subsurface, or at depth. When samples are collected at depth, the water content should be noted, since generally "soil sampling" is restricted to the unsaturated zone. Equipment selection will be determined by the depth of the sample to be collected. A thorough description of the sampling locations and proposed methods of sample collection should be included in the work plan.

Commonly, surface sampling refers to the collection of samples at a 0 to 6 inch depth interval. Certain regulatory agencies may define the depth interval of a surface sample differently, and this must be defined in the work plan. Collection of surface soil samples is most efficiently accomplished with the use of a stainless steel trowel or scoop. For samples at greater depths, a Geoprobe™ or other direct push sampling method, or a decontaminated bucket auger or power auger may be needed to advance the hole to the point of sample collection. If augering to depth, once the sampling depth is reached a clean bucket auger should be used to collect the sample. To collect samples at depths of greater than approximately six feet, the use of a drill rig (direct push, split spoon, etc) will usually be necessary. In some situations, such as an excavation or trench, sample locations are accessed with the use of a backhoe.

## 3.0 EQUIPMENT AND MATERIALS

a. Safety first. Obtain the appropriate Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP).

b. A work plan which outlines soil sampling requirements.

c. Field notebook, field form(s), maps, chain-of-custody forms, and custody seals.

d. Decontamination supplies (including: non-phosphate laboratory grade detergent, buckets, brushes, potable water, distilled water, plastic sheeting, etc.).

e. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).

f. Stainless steel spoons or spatulas.

g. Disposable Nitrile sampling gloves and cut-proof gloves.

h. Laboratory-supplied sample containers with labels.

i. Cooler with blue or wet ice.

j. Plastic sheeting.

k. Black pen and indelible marker.

l. Zip-lock bags and packing material.

m. Tape measure.

n. Paper towels or clean rags.

o. Masking and packing tape.

p. Overnight (express) mail forms or schedule courier pickup.

## 4.0 DECONTAMINATION

All reusable sampling equipment will be thoroughly cleaned according to the decontamination SOP (ROUX SOP 9.1). Where possible, thoroughly pre-cleaned and wrapped sampling equipment should be used and dedicated to individual sampling locations. Disposable items such as sampling gloves and plastic sheeting will be changed after each use and discarded in an appropriate manner.

## 5.0 PROCEDURE

5.1 Prior to collecting soil samples, ensure that all sampling equipment has been thoroughly cleaned according to the ROUX SOP 9.1 decontamination procedures. If samples are to be collected at depth, then the boring must be advanced with thoroughly cleaned equipment to the desired sampling horizon and a different thoroughly cleaned sampler must be used to collect the sample.

5.2 Using disposable gloves and a pre-cleaned, stainless steel spatula or spoon, extract the soil sample from the sampler, measure the recovery, and separate the wash from the true sample. Where allowed by regulatory agency(ies), disposable plastic spoons may be used. The gloves should not come in contact with the media being sampled and should be changed any time during sample collection when their cleanliness is compromised

When sampling shallow soils, if a thick, matted root zone, gravel, concrete, etc. is present at or near the surface, it should be removed before the sample is collected. The depth measurement for the sample begins at the top of the soil horizon, immediately following any removed materials.

When using direct push sampling methods, it is important to maintain the proper orientation of the sample when the sampling liners are removed from the sample tubes define precisely the depth at which an aliquot was collected. This is particularly important when multiple sample depths are collected from the same push.

When utilizing a split spoon sampling method, always discard the top several inches of material in the spoon before removing any portion for sampling. This material normally consists of borehole wall material that has sloughed off of the boregole wall after removal of the drill string prior to inserting the split spoon.

When utilizing a backhoe to collect soil samples from a trench or excavation, measures should be taken to ensure that the bucket is decontaminated and that no paint, grease, and rust is present prior to sample collection.

5.3 Place the sample in a laboratory-supplied, pre-cleaned sample container. Cut-proof gloves should be worn at all times when handling glassware. This should be done as quickly as possible and this is especially important when sampling for volatile organic compounds (VOCs). Samples to be analyzed for VOCs must be collected prior to other constituents.

If samples are to be analyzed for VOCs, they should be collected in a manner that minimizes disturbance of the sample. ***Samples for VOC analysis must not be homogenized.***

5.4 The sample container will be labeled with appropriate information such as, client name, site location, sample identification (location, depth, etc.), date and time of collection, and sampler's initials.

5.5 Using the remaining portion of soil from the sampler, log the sample in detail and record physical characteristics (color, odor, moisture, texture, density, consistency, organic content, layering, grain size, etc.). Refer to Soil Classification and logging SOP.

5.6 If soil samples are to be composited in the field, then equal portions from selected locations will be placed on a clean plastic sheet or in a Zip-lock bag and homogenized. make sure that each composite location (aliquot) consist of equal volumes,( i.e., same number of equal spoonfuls). Alternately, several samples may be submitted to the laboratory for compositing by weight. The method used is dependent upon regulatory requirements. Specific compositing procedures shall be approved by the appropriate regulatory agency and described in the work

plan. Samples to be analyzed for VOCs will not be composited unless required by a regulatory agency.

5.7 After the sample has been collected, labeled, and logged in detail, it is placed in a zip-lock bag and stored in a cooler with ice, at 4°C. Store the sample cooler in a secure location.

5.8 A chain-of-custody form is completed for all samples collected. One copy is retained and two are sent with the samples in a Zip-lock bag to the laboratory. A signed and dated custody seal is placed on the cooler prior to shipment.

5.9 Samples collected from Monday to Friday are typically to be delivered to the laboratory within 24 hours of collection. If Saturday delivery is unavailable, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if any analytes require a shorter delivery time.

5.10 The field notebook and appropriate forms should include, but not be limited to, the following: client name, site location, sample location, sample depth, sample identification, sample date and time collected, sampler's name, method of sample collection, number and type of containers, geologic description of material, description of decontamination procedures, etc. A site map should be prepared with exact measurements to each sample location in case follow-up sampling is necessary.

5.11 All reusable sampling equipment must be thoroughly cleaned in accordance with the ROUX SOP 9.1 decontamination procedures. Following the final decontamination (after all samples are collected), the sampling equipment is wrapped with plastic. Discard any gloves, plastic, etc. in an appropriate manner that is consistent with site conditions.

END OF PROCEDURE

Date: January 10, 2011
Revision: May 12, 2015

## 1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for screening soil samples for volatile organic vapors using a portable photoionization detector (PID). This SOP is applicable to soil samples collected from split-spoon, Geoprobe™ macro-core, Sonic cores and Shelby tube samplers during drilling, hand auger samples, and grab samples from stockpiled soils.

## 2.0 CONSIDERATIONS

The primary objective of photoionization screening of soil samples is to obtain a qualitative understanding of the distribution of volatile organic compounds (VOCs) in soil. The proper design of an organic vapor screening program requires an understanding of site hydrogeology, potential source areas, and potential constituents of concern. Sample locations and frequency must be fully defined in the work plan. The work plan should outline the type of lamp to be utilized in the PID based on the ionization potentials and response factors of the constituents of concern. The work plan must also clearly describe the heating or equilibration procedures to be employed if they differ from those described in this SOP. Regardless of the specific equilibration procedure employed, it is imperative that each sample be treated identically to allow the photoionization results from different locations to be compared. Observations such as water, clay, and organic content should be noted to facilitate interpretation of the data. Every effort should be made to collect a representative portion of soil from the sampling device.

## 3.0 EQUIPMENT AND MATERIALS

a. Safety first. Obtain the appropriate Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP).

b. A work plan which outlines photoionization screening requirements.

c. Decontamination supplies (including: non-phosphate laboratory grade detergent, buckets, brushes, potable water, distilled water, plastic sheeting, etc.).

d. Field notebook, field form(s), maps, chain-of-custody forms.

e. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).

f. Stainless steel spoons or spatulas.

g. Disposable plastic spoons.

h. Plastic sheeting.

i. Gallon size Zip-lock bags.

j. Photoionization detector (PID) with charging unit.

k. Calibration gases with regulator.

l. Indelible marker.

m. Masking tape.

n. Disposable Nitrile sampling gloves.

## 4.0 DECONTAMINATION

Where possible, thoroughly pre-cleaned and wrapped sampling equipment must be used and dedicated to individual sampling locations. Disposable items such as sampling gloves, aluminum foil, and sample jars will be changed after each use and discarded in an appropriate manner. If only photoionization results are to be obtained, then split-spoon samples and hand augers may be cleaned with a non-phosphate laboratory grade detergent and water wash and potable water rinse or steam cleaning, and a final distilled water rinse. However, if samples are to be collected concurrently for laboratory analytical results, then all reusable sampling equipment must be thoroughly decontaminated according to the ROUX SOP 9.1 for decontamination of field equipment.

## 5.0 CALIBRATION

5.1 The PID must be calibrated according to the manufacturer's specifications at a minimum frequency of once per day prior to collecting photoionization readings. In addition, periodic checks (e.g., every 2 hours or every ten samples) with the standard gas will be conducted to confirm that the calibration has not drifted.

5.2 The time, date, and calibration procedure must be clearly documented in the field notebook and the calibration log.

5.3 If at any time the photoionization results appear erratic or inconsistent with field observations, then the unit must be recalibrated. If calibration is difficult to achieve, then the unit's lamp should be checked for dirt or moisture and cleaned, as necessary. During humid or wet conditions, the unit should be calibrated on a more frequent basis as determined by field personnel.

## 6.0 PROCEDURE

6.1 Allow the temperature of the unit to equilibrate to its surrounding. This should take about five minutes.

6.2 Extract the soil sample from the sampler, quickly measure the recovery, and separate the wash from the true sample by using a dedicated, stainless steel spatula. Where allowed by regulatory agency(ies), disposable plastic spoons may be used.

6.2 Place the sample in a 1-Gallon Zip-lock bag (as quickly as possible to avoid loss of VOCs) filling the bag half full, if possible. Seal the bag and ensure an adequate seal has been created by pressing on the bag and observing if air discharges from the bag.

6.3 Label the bag with the boring/ID number, depth of sample, date of collection and sampler's initials. In addition, the field personnel will ensure the following: samples are taken at appropriate depths; unrepresentative portions of the sample are discarded properly; that the soil sampler (i.e., split spoon) is decontaminated properly between use; and the driller uses proper methods during sample collection and does not use oil or grease on tools entering the borehole.

6.4 Log the sample in detail and record physical characteristics (color, odor, moisture, texture, density, consistency, organic content, and layering). Refer to ROUX SOP 5.5 for soil classification and logging procedures.

6.5 Ensure that the PID has been calibrated and that the calibration information is documented in the field book. Pierce the Zip-lock bag with the probe from the PID and measure the relative concentration of VOCs in the headspace of the soil sample. The initial (peak) reading must be recorded.

6.6 Record the PID reading in the field notebook, on an appropriate field form, and on the base map, if appropriate. All readings should be recorded in parts per million (ppm).

6.7 Dispose of any soil/geologic material/cutting in a designated waste storage container (e.g. drum) consistent with site disposal requirements.

6.8 If only field screening results are to be obtained, then reusable sampling devices may be cleaned with a non-phosphate laboratory grade detergent and water wash and a potable water rinse. The sampler will then be rinsed with distilled water, assembled and placed on plastic sheeting for reuse. A more rigorous decontamination procedure is required when samples are also being collected for laboratory analysis. Refer to the SOP for collection of soil samples for laboratory analysis for additional information.

END OF PROCEDURE

Date: January 9, 2011
Revision: May 5, 2015

## 1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for decontamination of all field equipment potentially exposed to contamination during field investigation activities (i.e. drilling, soil and water sampling).

The objective of decontamination is to ensure that all field samplingequipment is decontaminated (free of potential contaminants): 1) prior to being brought onsite to avoid the introduction of potential contaminants to the site; 2) between drilling and sampling events/activities onsite to eliminate the potential for cross-contamination between boreholes and/or wells; and 3) prior to the removal of equipment from the site to prevent the transportation of potentially contaminated equipment offsite.

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC).

In considering decontamination procedures, state and federal regulatory agency requirements must be considered because of potential variability between state and federal requirements. Decontamination procedures must be in compliance with state and/or federal protocols in order that regulatory agency(ies) scrutiny of the procedures and data collected do not result in non acceptance (invalidation) of the work undertaken and data collected.

The equipment and materials list for decontamination activities may include, but not necessarily be limited to, the following:

a. A work plan and health and safety plan which outlines decontamination procedures and requirements.

b. Field notebook and field form(s).

c. Decontamination solutions, including as necessary: non-phosphate, laboratory-grade detergent; distilled/deionized water; potable water; cleaning solvents if needed [e.g., hexane, acetone, nitric acid).

d. Long and short handled brushes,

e. Bottle brushes

f. Drop cloth/plastic sheeting

g. Paper towels

h. Plastic or galvanized tubs or buckets

i. Pressure washers or steam cleaners

j. Solvent sprayers

k. Trash / bilge pumps

l. Aluminum foil

m. 55-gallon drums.

## 2.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a minimum decontamination procedure for drilling equipment. Drilling equipment decontamination procedures will be documented on an appropriate field form or in the field notebook, especially any variation from the method itemized below:

2.1 Safety first. Obtain the appropriate Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP). Prior to mobilization to a site, the expected types of contamination should be evaluated to determine if the field cleaning and decontamination activities will generate rinsates and other waste waters that might be considered RCRA hazardous waste or may require special handling.

2.2 The drill rig and all associated equipment should be properly decontaminated by the contractor before arriving at the site.

2.3 The augers, drilling casings, rods, samplers, tools, and any piece of equipment that can come in contact (directly or indirectly) with the soil, requires proper decontamination on-site prior to commencing drilling. The project work plan or HASP, and appropriate regulatory requirements, should be consulted to determine site-specific decontamination requirements.

2.4 The same decontamination procedures used prior to drilling will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the investigation.

2.5 All on-site steam cleaning or (decontamination) activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc. and should be performed on a decontamination pad that meets the following specifications:

1. The pad should be constructed in an area known or believed to be free of surface contamination.
2. A temporary pad should be lined with a water impermeable material with no seams within the pad. This material should be either easily replaced disposable) or repairable.The pad should be regularly inspected to ensure there are no leaks.

3. Water should be removed from the decontamination pad frequently.

2.6 If drilling activities are conducted in the presence of thick, sticky oils (e.g., PCB oil) which coat drilling equipment, then special decontamination procedures may have to be utilized before steam cleaning (e.g., hexane scrub and wash).

2.7 Containment of decontamination fluids may be necessary (e.g., rinseate from steam cleaning) or will be required (e.g., hexane), and disposal must be in accordance with state and/or federalregulatory requirements.

## 3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

The following is a minimum decontamination procedure for soil-sampling equipment (e.g., split spoons, stainless-steel spatulas). Soil-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

3.1 Safety first. Obtain JSA and PPE, as specified in the site HASP.

3.2 Wear disposable gloves while cleaning equipment to avoid cross-contamination and change gloves as needed.

3.3 Steam clean the sampler or rinse with potable water. If soil-sampling activities are conducted in the presence of thick, sticky oils (e.g., PCB oil) which coat sampling equipment, then special decontamination procedures may have to be utilized before steam cleaning and washing in detergent solution (e.g., hexane scrub and wash).

3.4 Prepare a non-phosphate, laboratory-grade detergent solution and distilled or potable water in a clean bucket.

3.5 Disassemble the sampler, as necessary and immerse all parts and other sampling equipment in the solution.

3.6 Scrub all equipment in the bucket with a brush to remove any adhering particles.

3.7 Rinse all equipment with copious amounts of potable water followed by distilled or deionized water.

3.8 Place clean equipment on a clean plastic sheet (e.g., polyethylene)

3.9 Reassemble the cleaned sampler, as necessary.

3.10 After equipment has been cleaned, all individuals involved in equipment handling should don clean gloves, or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil).

As part of the decontamination procedure for soil-sampling equipment, state and/or federal protocols must be considered. These may require procedures above

those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

## 4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

The following is a decontamination procedure for water-sampling equipment (e.g., bailers, pumps). Water-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

4.1 Safety first. Obtain the JSAs and PPE, as specified in the site HASP.

4.2 Decontamination procedures for bailers follow:

a. Wear disposable gloves while cleaning bailer to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a bucket.

c. Disassemble sampling equipment. Discard all used sampling tubes and cords in an appropriate manner. Disconnect all power sources from electrical equipment (i.e. pumps). Scrub each piece of equipment with a brush and solution.

d. Rinse all sampling equipment with copious amounts of potable, distilled or deionized water, Reassemble equipment as per the manufacturer's instructions.

f. Air dry.

g. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

4.3 Decontamination procedures for pumps follow:

a. Wear disposable gloves while cleaning pump to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a clean bucket, clean garbage can, or clean 55-gallon drum.

c. Flush the pump and discharge hose (if not disposable) with the detergent solution, and discard disposable tubing and/or cord in an appropriate manner.

d. Flush the pump and discharge hose (if not disposable) with potable water.

e. Place the pump on clear plastic sheeting.

f. Wipe any pump-related equipment (e.g., electrical lines, cables, discharge hose) that entered the well with a clean cloth and detergent solution, and rinse or wipe with a clean cloth and potable water.

g. Air dry.

h. Wrap equipment with a suitable material (e.g., clean plastic bag).

As part of the decontamination procedure for water-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

END OF PROCEDURE

# ATTACHMENT 4

Laboratory's Standard Operating Procedures

| | |
|---|---|
| Pace ANALYTICAL SERVICES | **ENV-SOP-MANS-0111 v01 Preparation and Analysis of PFAS in Aqueous, Solid, and Tissue by EPA Method 1633** |
| | **Effective Date: 08/07/2024** |

**Management Approval:**
John Trimble Approved on 8/7/2024 11:55:41 AM
Laura Vanasse Approved on 8/7/2024 11:32:33 AM
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Jason Hebert Approved on 8/7/2024 12:02:07 PM

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# 1.0 SCOPE & APPLICATION

This standard operating procedure (SOP) describes the laboratory procedure used by Alpha, a Pace Analytical Laboratory for the determination of the per- and polyfluoroalkyl substances (PFAS) by liquid chromatography/mass spectrometry (LC-MS/MS) following EPA 1633, published January 2024. This SOP is applicable to aqueous (all non-potable water and leachate), solid (soil, biosolids, sediment), and tissue matrices.

The instrumental portion of this method is for use only by analysts experienced with LC-MS/MS or under the close supervision of such qualified persons. The laboratory must demonstrate the ability to generate acceptable results using the procedures in Sections 11.3.1 and 11.3.2.

By their very nature, many components of PFAS present analytical challenges unique to this class of analytes. For example, PFAS analytes readily adhere to the walls of the sample containers and may also stratify in the container.

## 1.1 Target Analyte List, Limits of Detection & Quantitation (LOD & LOQ)

The target analytes that can be determined by this SOP and the associated LODs and LOQs are provided in Appendix A, Tables 1, 2, and 3.

LOQs are established in accordance with PAS policies and procedures for method validation, determination of detection limits (LOD), and quantitation limits (LOQ). Refer to laboratory SOP ID 1732 (Detection Limit (DL), Limit of Detection (LOD) & Limit of Quantitation (LOQ)) for additional information. DL and LOQ are routinely verified and updated when needed. DL and LOQ are always adjusted to account for actual sample amounts used and for dilution.

The reporting limit (RL) is the value to which analytes are reported as detected or non-detect in the final report. When the RL is less than the lower limit of quantitation (LLOQ), all detections and non-detects at the RL are qualitative. The LLOQ is the lowest point of the calibration curve used for each target analyte.

## 1.2 Reference Methods & Documents

This SOP is based on reference method EPA 1633 (2024). If the laboratory procedure is modified from the reference method, a list of modifications and rationale for the modifications is provided in Section 14.0. Modifications are permitted when allowed by the regulatory program for which test results will be used and when the modification has been validated comparable and equivalent to the reference method.

## 1.3 Quantitation Range

The quantitation range for each target analyte in this procedure is defined in Appendix A, Table 5: Calibration Standard Concentrations.

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### 1.4 Program Specific Requirements

Not Applicable.

## 2.0 SUMMARY OF METHOD

Environmental samples are prepared and extracted using method-specific procedures. Sample extracts are subjected to cleanup procedures designed to remove interferences. Analyses of the sample extracts are conducted by LC-MS/MS in the multiple reaction monitoring (MRM) mode. Sample concentrations are determined by isotope dilution or extracted internal standard quantification (see Section 9.2.1) using isotopically labeled compounds added to the samples before extraction.

Individual PFAS analytes are identified through peak analysis of the quantification and confirmation ions, where applicable. Where linear and branched isomers are present in the sample and either qualitative or quantitative standards containing branched and linear isomers are commercially available, the PFAS analyte is reported as a single analyte consisting of the sum of the linear and branched isomer concentrations.

Quantitative determination of target analyte concentrations is made with respect to an isotopically labeled PFAS standard; the concentrations are then used to convert raw peak areas in sample chromatograms to final concentrations.

Results for target analytes are recovery corrected by the method of quantification (i.e., either isotope dilution or extracted internal standard quantification, see Section 9.2.1). Recoveries of isotopically labeled extracted internal standards (EIS) are determined by comparison to the responses of one of seven non-extracted internal standards (NIS) and are used as general indicators of overall analytical quality.

The quality of the analysis is assured through reproducible calibration and testing of the extraction, cleanup, and LC-MS/MS systems.

- Aqueous samples are spiked with isotopically labeled standards (EIS), extracted using solid-phase extraction (SPE) cartridges and undergo cleanup using carbon before analysis.

- Solid samples are spiked with EIS, extracted into basic methanol, and cleaned up by carbon and SPE cartridges before analysis.

- Tissue samples are spiked with EIS, extracted in methanol with potassium hydroxide followed by acetonitrile, and cleaned up by carbon and SPE cartridges before analysis.

## 3.0 INTERFERENCES

Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and elevated baselines causing misinterpretation of chromatograms. Specific selection of reagents and solvents is required.

Clean all equipment prior to, and after, each use to avoid PFAS cross-contamination. Typical cleaning solvents include water, methanol, and methanolic ammonium hydroxide. The residual PFAS content of disposable plasticware and filters must be verified by batch/lot number and may be used without cleaning if PFAS levels are less than the Method Detection Limit (MDL).

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Prior to use, glassware must be solvent rinsed and then air dried. A solvent rinse procedure using methanolic ammonium hydroxide (1%) and methanol is recommended.

Sample manifold ports and transfer tubing should be inspected regularly for signs of wear and/or discoloration. When such observations are made, the associated components should be replaced.

All parts of the SPE manifold must be cleaned between samples by rinsing with methanolic ammonium hydroxide (1%) and air drying prior to use. Smaller parts, like the needles, adapters, reservoirs, transfer lines, and stopcocks associated with the manifold should be rinsed with tap water prior to rinsing with methanolic ammonium hydroxide (1%) and air drying. After loading the samples but prior to elution procedures, the chamber should be rinsed with methanolic ammonium hydroxide (1%).

All materials used in the analysis must be demonstrated to be free from interferences by running method blanks (Section 11.1.1) at the beginning and with each extraction batch (samples started through the extraction process on a given batch to a maximum of 20 field samples).

Reagent water (Section 8.1) can be used to simulate water samples and Ottawa sand and/or reagent-grade sand (Section 7.3) can be used to simulate soils. Fish fillets (tilapia/ cod), chicken breast or other similar animal tissue (see Section 7.3) may be used as the reference matrix for tissue. The laboratory must verify that the source product used does not contain PFAS in detectable amounts.

Interferences co-extracted from samples will vary considerably from source to source, depending on the diversity of the site being sampled. Interfering compounds may be present at concentrations several orders of magnitude higher than the native PFAS. Because low levels of PFAS are measured by this method, elimination of interferences is essential. The cleanup steps given in Section 9.3 can be used to reduce or eliminate these interferences and thereby permit reliable determination of the PFAS at the levels shown in Tables 1, 2 and 3. The most frequently encountered interferences are fluoropolymers; however, bile salts (e.g., Taurodeoxycholic Acid [TDCA]) may be present in various matrices, including fish and wastewaters, and can interfere in the chromatography. For this reason, analysis of a standard containing TDCA is required as part of establishing the initial chromatographic conditions (see Sections 8.3.2 and 8.3.3) and each analytical sequence (see Section 9.4).

## 4.0 DEFINITIONS

Refer to the Laboratory Quality Manual for a glossary of common lab terms and definitions.

- **Extracted Internal Standard (EIS) quantification:** The response of the target compound is compared to the response of the isotopically labeled analog of another compound with chemical and retention time similarities.
- **Isotope dilution (ID) quantitation:** A means of determining a naturally occurring (native) compound by reference to the same compound in which one or more atoms has been isotopically enriched. The labeled PFAS are spiked into each sample and allow identification and correction of the concentration of the native compounds in the analytical process.
- **Isotopically labeled compound:** An analog of a target analyte in the method which has been synthesized with one or more atoms in the structure replaced by a stable (non-radioactive) isotope of that atom. Common stable isotopes used are 13C (Carbon-13) or Deuterium (D or 2H). These labeled compounds do not occur in nature, so they can be used for isotope dilution quantitation or other method-specific purposes.

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- **Minimum Level of quantitation (ML):** The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence. It may be equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.
- **PAS:** Acronym for Pace® Analytical Services, LLC

## 5.0 HEALTH & SAFETY

The following sections provide general health and safety information about chemicals and materials that may be present in the laboratory.

- The toxicity or carcinogenicity of each chemical material used in the laboratory has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds should be as low as reasonably achievable.
- The laboratory maintains documentation of hazard assessments and OSHA regulations regarding the safe handling of the chemicals specified in each method. Safety data sheets for all hazardous chemicals are available to all personnel. Employees must abide by the health, safety and environmental (EHS) policies and procedures specified in this SOP and in the Pace® Chemical Hygiene / Safety Manual (COR-MAN-0001).
- Personal protective equipment (PPE) such as safety glasses, gloves, and a laboratory coat must be worn in designated areas and while handling samples and chemical materials to protect against physical contact with samples that contain potentially hazardous chemicals and exposure to chemical materials used in the procedure.
- Concentrated corrosives present additional hazards and are damaging to skin and mucus membranes. For procedures that require use of acids, use acids in a fume hood whenever possible with PPE designed for handing these materials. If eye or skin contact occurs, flush with large volumes of water. When working with acids, always add acid to water to prevent violent reactions. For procedures that that emit large volumes of solvents (evaporation/concentration processes), these activities must be performed in a fume hood or apparatus that reduces exposure.

## 6.0 SAMPLE COLLECTION, PRESERVATION, HOLDING TIME & STORAGE

PAS does not offer sample collection services for this test method. PAS advises customers to collect samples in accordance with a sampling plan and collection procedures appropriate to meet regulatory requirements and data quality objectives for the project. The minimum sample amounts required for the test are provided in this section.

PAS provides containers for the collection of samples upon client request. The routine container type and size is provided in the following table along with requirements for sample size, preservation and holding time. Refer to Bottle Order Preparation (ENV-SOP-WEST-0005), or however named, for procedures related to preparation of bottle kits.

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**Container Type, Minimum Sample Amount, Preservation, and Holding Time**

| Matrix | Container Size & Type[1] | Minimum Sample Amount[2] | Preservation | Holding Time |
|---|---|---|---|---|
| Aqueous (non-potable water) | 2 x 500 mL linerless HDPE<br>1 x 125 mL linerless HDPE[3] | 500 mL | Thermal: 0-6°C (or ≤ -20°C) | Collection to Preparation: 28 Days (or 90 Days)<br>Preparation to Analysis: 28 Days |
| Aqueous (leachate) | 2 x 125 mL linerless HDPE | 100 mL | Thermal: 0-6°C (or ≤ -20°C) | Collection to Preparation: 28 Days (or 90 Days)<br>Preparation to Analysis: 28 Days |
| Solid (sediment and soil) | 3 oz/ 90 mL linerless polypropylene wide mouth | 5 g | Thermal: 0-6°C or ≤ -20°C | Collection to Preparation: 90 Days<br>Preparation to Analysis: 28 Days |
| Solid (biosolid) | 3 oz/ 90 mL linerless polypropylene wide mouth | 0.5 g | Thermal: 0-6°C or ≤ -20°C | Collection to Preparation: 90 Days<br>Preparation to Analysis: 28 Days |
| Tissue[4] | 3 oz/ 90 mL linerless polypropylene wide mouth | 2 g | Thermal: ≤ -20°C | Collection to Preparation: 90 Days<br>Preparation to Analysis: 28 Days |

[1] *Default container type provided in sample kit. To allow room for expansion during freezing (if necessary), aqueous sample containers should not be overfilled. Aqueous sample containers should be filled only to the appropriate gradation marked on the container, or to the shoulder of the container if no gradations are provided.*

[2] *Nominal amount of sample required for each discrete test. Solid and biosolid sample amounts reflect dry weight.*

[3] *Used for pre-screening analyses.*

[4] *Container listed here will be used for tissue homogenate; samples may be received at the laboratory as whole fish or filets wrapped in aluminum foil or food grade polyethylene wrap. Ideally fish should be frozen upon collection and shipped to the laboratory as soon as possible.*

**Note:** Project-specific requirements dictate which storage condition applies. The storage condition to be used for each project must be formally documented in written form (QAPP or otherwise) before samples are received. Without any prior indication from the client, the lab will store all aqueous and solid/biosolid samples at 0-6°C until extraction, with a 28-day holding time (collection to prep) for aqueous matrices and a 90-day holding time (collection to prep) for solid/biosolid matrices.

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Thermal preservation is checked and recorded on receipt in accordance with laboratory SOP (ENV-SOP-WEST-0003, Sample Receipt and Login), or however named.

After receipt, samples are stored as listed above until sample preparation. Prepared sample extracts of all matrices are stored at 0-6°C until sample analysis.

After analysis, samples are retained as stated in the Pace® standard terms and conditions, unless otherwise specified in the analytical services contract. Samples are then disposed of in accordance with Federal, State, and Local regulations.

## 7.0 EQUIPMENT & SUPPLIES

Use of equivalent instrumentation, support equipment, and supplies from alternative vendors is acceptable so long as they meet the specifications as stated in the reference method.

Due to the possibility of adsorption of analytes onto glass, plastic containers are used for all standard, sample, and extraction preparations. Any time a new lot of SPE cartridges, solvents, cryovials, or autosampler vials are used, it must be demonstrated that a MB is reasonably free of contamination and that the criteria in Section 11.1.1 are met.

### 7.1 Instrumentation

- High-performance liquid chromatograph (HPLC) equipped with tandem quadrupole mass spectrometer – Sciex 5500+ or equivalent
- Agilent Zorbax RRHD Eclipse Plus C18, 2.1 x 50 mm (1.8 µm) analytical column (Agilent Part # 959757-902), or equivalent
- Guard cartridge/column – Agilent Zorbax Eclipse Plus C18, 2.1 x 5 mm, 1.8 um (Agilent Part# 821725-901), or equivalent
- Trap/delay column – InfinityLab PFC Delay Column, 4.6 x 30 mm (Agilent Part# 5062-8100), or equivalent

### 7.2 Support Equipment

- Oven – Capable of maintaining a temperature of 105 ± 5 ºC
- Analytical balance – Capable of weighing 0.0001 g
- Top loading balance – Capable of weighing 0.01 g
- Calibrated mechanical variable volume pipettes with disposable HDPE or polypropylene tips (10 µL to 5 mL) – used for preparation of calibration standards and spiked samples
- Point of Use water preparation system – Thermo Scientific Barnstead E-Pure; model 7119 – Used for QC samples to verify the systems are PFAS free
- Ultrasonic mixer – Fisherbrand; Model CPX3800 – 5.7L, 40 kHZ, 120V, 2.9 Amp with timer
- Analog or digital vortex mixer, single or multi-tube (Fisher Scientific 02-215-452, or equivalent)
- Variable speed mixing table (VWR Model 3500 Orbital Shaker, or equivalent)

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- Centrifuge (Beckman Allegra 6, Hettich Rotanta 460, or equivalent), capable of reaching at least 3000 rpm (~2000 RCF)
- Vacuum Pump – Sufficient capacity to maintain a vacuum of approximately 10 to 15 inches of mercury for extraction cartridges. GAST model # DOA-P704-AA, Waters Cat# 725000417, 115V, 60Hz, 4.2A
- Vacuum manifold for SPE Cartridges – Waters Cat# WAT200609: SPE Vacuum manifold, or equivalentCat
- Vacuum tubing – 1/4” ID, 5/8” OD, 3/16” wall; Fisher Scientific part# 14-176-6B or equivalent
- PE Transfer tubing – 1/8” X .062 x 500ft, Freelin Wade part# 1C-109-10 or equivalent.

### 7.3 Supplies

- Solid Phase Extraction (SPE) cartridges – Phenomenex part# CS0-9216, 250 mg WAX/20mL, or equivalent
- Carbon Cleanup cartridges – Phenomenex part# 8B-S528-CAJ, 50 mg GCB, or equivalent
- SPE reservoirs – 60 mL, Phenomenex part# AH0-7189, or equivalent
- SPE adapter caps – Supelco part# 57267 (Adapter cap for 12, 20 & 60 mL SPE tubes)
- Disposable liners for Vacuum Manifold – Waters part# 20685 or equivalent
- Silanized glass wool (Pyrex 3950 or equivalent)
- Reference matrix: Aqueous – reagent water
- Reference matrix: Solid – Ottawa sand
- Reference matrix: Tissue – fish fillets, chicken breast or similar animal tissue. First preference will be frozen cod fillets.
- Bottles – HDPE or PP, with linerless HDPE or polypropylene caps. Various sizes. QEC item # 6212-Q016/BC-150-PACE (500 mL), 6212-Q008BC-P (250 mL), 6213-U004BC-P (125 mL), 6214-003PPGBC-P (90 mL)
- Screw top vials, Polypropylene 0.7-mL with polypropylene caps – used in sample analysis and pre-screening (Waters Cat # 186005219 and 186004169 or equivalent)
- 15- and 50-mL conical polypropylene tubes with polypropylene screw caps for preparing and storing extract solutions and for collection of eluents (Fisher Scientific 05-527-90 and 14-432-22, or equivalent)
- 500-mL conical polypropylene centrifuge bottles for sample centrifugation (Fisher Scientific 07-200-621 or equivalent)
- Extract/Standard storage containers – 15-mL, 8-mL, or 4-mL narrow-mouth HDPE container - Thermo Scientific item# 2002-9050, 2002-9025, 2002-9125; 2.0-mL screw-top polypropylene cryogenic vials – Grainger item# 6EMV1/ Wheaton item# W985872;1.5-mL snap-cap polypropylene microcentrifuge tubes - Fisher item# 05-408-129; or equivalent
- pH Paper, range 0-14 - (VWR Cat# BD3539.606 or equivalent), 0.5-unit readability

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- Disposable glass and plastic pipets

## 8.0 REAGENTS & STANDARDS

Refer to laboratory SOP (ENV-SOP-MANS-0112, Reagent, Solvent, and Standard Control), or however named, for information regarding standard and reagent tracking and traceability. All reagents and stock standards are commercially prepared, when available. Expiration and storage requirements are defined per manufacturer.

### 8.1 Reagents

Use of equivalent reagents from alternative vendors is acceptable so long as the substitution meets the performance specifications required by the reference method.

- Acetic acid – ACS grade or equivalent, store at room temperature; VWR cat# BDH3098-3.8LP or equivalent
- Acetonitrile – UV grade or equivalent, verified before use, store at room temperature; Honeywell Cat# 018-4 or equivalent (for extraction)
- Ammonium acetate – ACS or equivalent, store at 2-8° C, replace 2 years after opening date; VWR BDH9204-500G or equivalent.
- 1M aqueous ammonium acetate (Waters Cat# 186006693-1) used for mobile phase additive; store as indicated by manufacturer.
- Ammonium hydroxide – certified ACS+ grade or equivalent, 30% in water, store at room temperature; Fisher A470-500 or equivalent
- Formic acid – greater than 96% purity or equivalent, store at room temperature; Acros 147930010 or equivalent
- Methanol – HPLC grade or better, 99.9% purity, store at room temperature; Honeywell CAT# 230-4 or equivalent
- Mobile Phase A – 2 mM ammonium acetate in 95:5 water/acetonitrile. Aliquot 0.4 mL of aqueous 5M ammonium acetate in 949.6 mL of water and 50 mL of acetonitrile. Alternatively, dissolve 0.154 g of neat ammonium acetate into 950 mL of water and 50 mL of acetonitrile. Store at room temperature; shelf life is 2 months.
- Mobile Phase B – Acetonitrile, Ultra HPLC grade or equivalent; OmniSolv AX0142-1 or equivalent
- Potassium hydroxide – certified ACS or equivalent, store at room temperature, replace after 2 years; Fisher P250-500 or equivalent.
- Reagent water – Laboratory reagent water, test by lot/batch number for residual PFAS content.

### 8.2 Standards

Use of equivalent standards from alternative vendors is acceptable so long as they are traceable to a national standard, when commercially available. Follow manufacturer's recommended storage conditions and expiration dates.

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#### 8.2.1 Primary PFAS Standard

- EPA Method 1633 Native PFAS Standard mix from Wellington Laboratories (item# EPA-1633STK) – used to prepare the calibration standards and to spike the reference QC samples prepared/analyzed with every batch of samples. Also used to prepare an intermediate standard for calibration standard preparation and low-level QC sample spiking, as described below.

#### 8.2.2 Secondary PFAS Standard

- Method 1633-PFCs-Calibration Standard mix from Absolute Standards (item# 65735) – used to prepare the ICV standard as described below.

#### 8.2.3 Extracted Internal Standard (EIS)

- Mass-labelled PFAS Extraction Standard mix from Wellington Laboratories (item# MPFAC-HIF-ES) – used to prepare analytical standards and spike each sample prior to extraction.

#### 8.2.4 Non-extracted Internal Standard (NIS)

- Mass-labelled PFAS Injection Standard mix from Wellington Laboratories (item# MPFAC-HIF-IS) – used to prepare analytical standards and spike sample extracts prior to instrumental analysis.

#### 8.2.5 Bile Salt (TDCA) Standard

- Neat Taurodeoxycholic acid from Cayman Chemical (item# 15935), or equivalent – used to prepare analytical standards for bile salt interference check.

### 8.3 Formulations

Prepare standard solutions from materials of known purity and composition or purchase as solutions or mixtures with certification to their purity, concentration, and authenticity. Observe the safety precautions in Section 5.

Purchase of commercial standard solutions or mixtures is highly recommended for this method; however, when these are not available, preparation of stock solutions from neat materials may be necessary. If the chemical purity is 98% or greater, the weight may be used without correction to calculate the concentration of the standard.

When not being used, store standard solutions in the dark at 4 °C, unless the vendor recommends otherwise, in tightly sealed screw-capped vials. Place a mark on the vial at the level of the solution so that solvent loss by evaporation can be detected. Replace the solution if solvent loss has occurred.

**Note:** 18O-mass labeled perfluoroalkyl sulfonates may undergo isotopic exchange with water under certain conditions, which lowers the isotopic purity of the standards over time.

The laboratory must maintain records of the certificates for all standards for traceability purposes. Copies of the certificates should be provided as part of the data packages in order to check that proper calculations were performed.

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### 8.3.1 Analytical and Preparation Reagents

Analytical and Preparation reagents are stored in plastic or glass containers under ambient conditions. Expiries are listed with each reagent.

- Instrument Blank Mix (IBLK Mix) – Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid – add ammonium hydroxide (3.3 mL, 30%), reagent water (1.67 mL) and acetic acid (0.625 mL) to methanol (94.4 mL); store at room temperature, replace after 1 month. This solution is used to prepare the instrument blank (Sections 8.3.3.3 and 9.2.5) and sample extract dilutions.
- Mobile Phase A – 2 mM ammonium acetate in 95:5 water: acetonitrile. Aliquot 2.0 mL of aqueous 1M ammonium acetate in 948 mL of water and 50 mL of acetonitrile. Store at room temperature; replace after 2 months or less.
- Mobile Phase B – Acetonitrile, HPLC grade or equivalent; Omnisolv AX0142-1 or equivalent
- Acetic acid (0.1%) - dissolve acetic acid (1 mL) in reagent water (1 L); store at room temperature, replace after 3 months.
- Aqueous ammonium hydroxide (3%) – add ammonium hydroxide (10 mL, 30%) to reagent water (90 mL), store at room temperature, replace after 3 months.
- Methanolic ammonium hydroxide (0.3%) – add ammonium hydroxide (1 mL, 30%) to methanol (99 mL), store at room temperature, replace after 1 month.
- Methanolic ammonium hydroxide (1%) – add ammonium hydroxide (3.3 mL, 30%) to methanol (97 mL), store at room temperature, replace after 1 month.
- Methanolic ammonium hydroxide (2%) – add ammonium hydroxide (6.6 mL, 30%) to methanol (93.4 mL), store at room temperature, replace after 1 month.
- Formic acid (aqueous, 0.1 M) – dissolve formic acid (4.6 g / 3.77 mL) in reagent water (1 L), store at room temperature, replace after 2 years.
- Formic acid (aqueous, 0.3 M) – dissolve formic acid (13.8 g / 11.31 mL) in reagent water (1 L), store at room temperature, replace after 2 years.
- Formic acid (aqueous, 5% v/v) – mix 5 mL formic acid with 95 mL reagent water, store at room temperature, replace after 2 years.
- Formic acid (aqueous, 50% v/v) – mix 50 mL formic acid with 50 mL reagent water, store at room temperature, replace after 2 years.
- Formic acid (methanolic 1:1, 0.1 M formic acid/methanol) – mix equal volumes of methanol and 0.1 M formic acid, store at room temperature, replace after 2 years.
- Methanolic potassium hydroxide (0.05 M KOH) – add 3.3 g of potassium hydroxide to 1 L of methanol, store at room temperature, replace after 3 months.

### 8.3.2 Intermediate Standards

Intermediate standards are stored in plastic containers as listed below. Expiries are listed with each formulation.

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- TDCA Stock Solution: Dissolve 10 mg of neat TDCA into 5 mL of MeOH; final concentration equals 2000 µg/mL. Store frozen (<0°C) when not in use; replace after 1 year, or sooner if degradation is observed.
- STK-10X Solution: Dilute 200 µL of EPA-1633STK with 1.8 mL of MeOH for a final volume of 2 mL; final concentrations vary by analyte – 25, 50, 100, 125, 250, or 625 ng/mL. Store at 0-6°C when not in use; replace every time a new lot of 1633STK is used, or after 1 month.

### 8.3.3 Working Solutions

Working solutions are stored in plastic containers under refrigerated conditions at 0-6°C and expire 1 month from the date of preparation.

#### 8.3.3.1 Calibration Standards

A series of calibration solutions containing the target analytes and the EIS and NIS is used to establish the initial calibration of the analytical instrument. The concentration of the method analytes in the solutions varies to encompass the working range of the instrument, while the concentrations of the EIS and NIS (and TDCA) remain constant. The calibration solutions are prepared using the standards and intermediate standards described above. The final solvent composition will match the solvent mix of sample extracts, which contain methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid. Calibration standard solutions do not undergo solid phase extraction/cleanup. Prepare the calibration standard solutions according to the table below. Following all formulations listed in this SOP will require 3 ampoules of the 1633STK mix to prepare a full calibration set; other final volumes may be prepared. If the lab follows all formulations in this SOP as written, the remaining volumes of 1633STK and STK-10X solutions after preparing the calibration should be enough to spike approximately 40 sets of aqueous batch QC. The remainder of MPFAC-HIF-ES and MPFAC-HIF-IS mixes should provide enough volume to spike approximately 40-45 samples.

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| Component[1] | L1 | L2 (LOQ) | L3 | L4 | L5 (CCV) | L6 | L7 | L8 | L9 |
|---|---|---|---|---|---|---|---|---|---|
| STK-10X | 20 | 16 | 40 | | | | | | |
| EPA-1633STK | | | | 20 | 100 | 100 | 200 | 400 | 500 |
| MPFAC-HIF-ES | 25 | 10 | 10 | 10 | 25 | 10 | 10 | 10 | 10 |
| MPFAC-HIF-IS | 25 | 10 | 10 | 10 | 25 | 10 | 10 | 10 | 10 |
| TDCA Stock | 25 | | | | 25 | | | | 10 |
| IBLK Mix | 4905 | 1964 | 1940 | 1960 | 4825 | 1880 | 1780 | 1580 | 1470 |
| Final Volume | 5000 | 2000 | 2000 | 2000 | 5000 | 2000 | 2000 | 2000 | 2000 |

[1]*All values listed are µL*

#### 8.3.3.2 Initial Calibration Verification Standard (ICV)

Prepare the ICV standard using the Absolute Standards 1633 PFC Mix, following the table below; expected concentration for all compounds in the ICV will be 10 ng/mL. The ICV is prepared from a separate, second source (or separate manufacturer lot) than that used for the calibration solutions. If a second source or lot is unavailable, a separate preparation using the same stocks is acceptable.

| Component | Volume used (µL) |
|---|---|
| 1633 PFC Mix | 20 |
| MPFAC-HIF-ES | 20 |
| MPFAC-HIF-IS | 20 |
| IBLK Mix | 3940 |
| ICV Final Volume | 4000 |

#### 8.3.3.3 Instrument Blank

A solvent blank is analyzed at the beginning of each analytical sequence, to demonstrate clean instrumental background, and after samples containing high levels of target compounds (e.g., calibration, CCV) to monitor carryover from the previous injection. The instrument blank consists of clean reagent fortified with the EIS and NIS for quantitation purposes. Prepare the IBLK using the IBLK mix (Section 8.3.1) and an appropriate volume of EIS and NIS; alternatively, prep the IBLK from 1887 µL of 1% Methanolic ammonium hydroxide, 80 µL of reagent water, 12.5 µL of acetic acid, and 10 µL each of EIS and NIS.

## 9.0 PROCEDURE

### 9.1 Equipment Preparation

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### 9.1.1 Instrument Setup

#### 9.1.1.1 Routine Instrument Operating Conditions

Example LC Gradient

| Step | Total Time (min) | Flow Rate (µL/min) | A: 5% Acetonitrile w/ 10mM Ammonium Acetate (%) | B: Acetonitrile (%) |
|---|---|---|---|---|
| 1 | 0.00 | 400 | 80 | 20 |
| 2 | 6.00 | 400 | 0 | 100 |
| 3 | 6.50 | 400 | 0 | 100 |
| 4 | 6.51 | 400 | 80 | 20 |
| 5 | 8.50 | 400 | 80 | 20 |

Example MS Parameters

| MS Parameter | Setting or Value |
|---|---|
| Sample Loop | 100 µL |
| Injection Volume | 2 µL |
| Column Oven Temperature | 40° C |
| MRM Scan Window | 60 sec |
| Curtain Gas (CUR) | 30.0 |
| Collision Gas (CAD) | 9 |
| Ion Spray Voltage (IS) | -4500 V |
| Source Temperature (TEM) | 450° C |
| Ion Source Gas 1 (GS1) | 30.0 |
| Ion Source Gas 2 (GS2) | 50.0 |

#### 9.1.1.2 Mass Calibration

The mass spectrometer must undergo mass calibration to ensure accurate assignments by the instrument. This mass calibration must be performed at least annually to maintain instrument sensitivity and stability. Mass calibration must be repeated on an as-needed basis (e.g., QC failures, ion masses fall outside of the instrument required mass window, major instrument maintenance, or if the instrument is moved). Mass calibration must be performed using the calibration compounds and procedures prescribed by the manufacturer. The procedures used for mass calibration and mass calibration verification must evaluate an ion range that encompasses the ion range (Q1 and Q2 m/z) of the analytes of interest of this method.

#### 9.1.1.3 Mass Calibration Verification

A mass calibration verification must be performed following mass calibration, prior to standard and sample analyses. Mass verification checks must also be performed after any subsequent mass calibrations. The laboratory must follow the instructions for the individual instrument software to confirm the mass calibration, mass resolution and peak relative response. If the manufacturer's

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instructions include options for evaluation of mass resolution, the tightest resolution requirements (typically called unit resolution) must be met.

#### 9.1.1.4 Retention Time (RT) calibration

Once RT windows have been confirmed for each target analyte, EIS, and NIS compound, then once per ICAL and at the beginning of the analytical sequence, the position of all target analyte, EIS, and NIS peaks shall be set using the midpoint standard of the ICAL curve when ICAL is performed. When an ICAL is not performed, the initial CCV retention times or the midpoint standard of the ICAL curve can be used to establish the RT window position.

The RTs for the target analytes, EIS, and NIS compounds must fall within 0.4 minutes of the predicted retention times from the midpoint standard of the ICAL or initial daily CCV, whichever was used to establish the RT window position for the analytical batch. All branched isomer peaks identified in either the calibration standard or the qualitative (technical grade) standard also must fall within 0.4 minutes of the predicted retention times from the midpoint standard of the ICAL or initial daily CCV. For all target analytes with exact corresponding isotopically labeled analogs, target analytes must elute within 0.1 minutes of the associated EIS compound.

When establishing the chromatographic conditions, it is important to consider the potential interference of bile salts (i.e. TDCA) during analyses of samples. Analytical conditions must be set to allow a separation of at least 1 minute between TDCA and the retention time window of PFOS. The method requires this evaluation when establishing the chromatographic conditions, regardless of the sample matrices to be analyzed.

### 9.1.2 Support Equipment

Refer to laboratory SOP (ENV-SOP-WEST-0036 Balance Calibration Verification, ENV-SOP-WEST-0123 Pipette and Bottle Top Verification), or however named, for additional information on calibration requirements for support equipment that may be used in this procedure.

## 9.2 Calibration

Refer to corporate POL ENV-POL-CORQ-0005, *Acceptable Calibration Practices for Instrument Testing*, for general laboratory calibration policies and procedures.

### 9.2.1 Calibration Frequency

Prior to the analysis of samples, and after a successful mass calibration check, each LC-MS/MS system must be calibrated at a minimum of 6 standard concentrations (Section 8.3.3.1 and Appendix A, Table 5). This method procedure calibrates and quantifies 40 PFAS target analytes, using the isotopically labeled compounds added to the sample prior to extraction, by one of two approaches (see Appendix A, Table 4 for quantitation associations):

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- Isotope Dilution quantification (ID), whereby the response of the target compound is compared to the response of its isotopically labeled analog; twenty-four target compounds are quantified in this way.
- Extracted Internal Standard quantification (EIS), whereby the response of the target compound is compared to the response of the isotopically labeled analog of another compound with chemical and retention time similarities; sixteen target compounds are quantified in this way.

Each LC-MS/MS system must be calibrated whenever the laboratory takes corrective action that might change or affect the initial calibration criteria, or if either the CCV or ISC acceptance criteria have not been met.

Each time a modification is made to this method, the laboratory is required to repeat the procedure in Sections 11.3.1 and 11.3.2. If calibration will be affected by the change, the instrument must be recalibrated.

### 9.2.2 Calibration Levels

Calibration standards are stored in plastic containers under refrigerated conditions (0-6°C).

Concentrations for calibration solutions are presented in Appendix A, Table 5. A minimum of six contiguous calibration standards are required for a valid analysis when using a linear calibration model, with at least five of the six calibration standards being within the quantitation range (e.g., from the LOQ to the highest calibration standard). If a second-order calibration model is used, then a minimum of seven calibration standards are required, with at least six of the seven calibration standards within the quantitation range. The lowest level calibration standard must be at a concentration less than or equal to the Limit of Quantitation (LOQ) and must meet a signal-to-noise ratio of 3:1 for the quantitation and confirmation ions that exist and must meet ion ratio requirements described in Section 10.1.1.3. If the analyte has no confirmation ion, then a 10:1 signal to noise ratio is required. All initial calibration requirements listed in Section 9.2.4 and 9.2.5 must be met.

**Note:** Additional calibration standards, at levels lower than the lowest calibration standard listed in the method, may be added to accommodate a lower limit of quantitation if the instrument sensitivity allows. Calibration standards at the high end of the calibration may be eliminated if the linearity of the instrument is exceeded or at the low end if those calibration standards do not meet the S/N ratio criterion of 3:1 (for quantitation and confirmation ions that exist; 10:1 for analytes with no confirmation ion), so long as the required number of calibration points is met. All analytes with commercially available stable isotope analogues must be quantified using isotope dilution.

### 9.2.3 Calibration Sequence

Calibration standards must be analyzed in sequence from lowest to highest concentration to minimize the chance that carryover from a higher concentration standard will boost the area of a lower concentration standard. A typical sequence for days when calibration is required is shown below.

| Description | Comment |
|---|---|
| ICAL L1 | |

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| Description | Comment |
|---|---|
| ICAL L2 | Also used as ISC (Section 9.2.4.4) |
| ICAL L3 | |
| ICAL L4 | |
| ICAL L5 | Also used as bracketing/closing CCV (Section 9.2.4.5) |
| ICAL L6 | |
| ICAL L7 | |
| ICAL L8 | |
| ICAL L9 | |
| IBLK | Any detections must be <MDL |
| ICV | %R must be 70 – 130% |
| CCV (ISC) | %R must be 70-130%; begins and ends Analytical Sequence |

### 9.2.4 Calibration Evaluation

If the criteria for initial calibration are not met, inspect the system for problems and take corrective actions to achieve the criteria. This may require the preparation and analysis of fresh calibration standards. All initial calibration criteria must be met before any samples or required blanks are analyzed.

#### 9.2.4.1 Curve Fit

One of the following two approaches must be used to evaluate the linearity of the instrument calibration. Weighting (typically 1/x or 1/x2) is allowed for linear and non-linear regressions.

- Option 1: Calculate the relative standard deviation (RSD) of the Relative Response (RR) or Response Factor (RF) values of the initial calibration standards for each native compound and isotopically labeled compound. See Section 10.2.1 for calculation of RR and RF. The RSD must be ≤ 20% to establish instrument linearity.

- Option 2: Calculate the relative standard error (RSE) for each native compound and EIS compound for all the initial calibration standards that were analyzed. The RSE for all method analytes must be ≤ 20% to establish instrument linearity.

If these criteria cannot be met, corrective action should be taken to restrict the range of calibration, reanalyze and/or reprepare the ICAL standards, or perform instrument maintenance and/or re-optimization.

If more than the minimum number of standards are analyzed and levels are excluded from the calibration, only the lowest or highest standards may be excluded, except as noted here. The removal of calibration levels from the interior of the curve is allowed only when there is sound technical reason for doing so and when the level is removed for all analytes; for example, when it can be proven that the wrong standard was analyzed for the calibration level or there is obvious evidence that the instrument malfunctioned during injection of the standard. The removal of any calibration level from the interior of the curve must be approved by the department supervisor/manager. Management approval and

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the rationale for the level removal must be documented and kept with the technical record.

#### 9.2.4.2 Relative Error (% RE)

Although not required by the method, it may be useful to compare the actual responses for each standard to the calibration model; percent error of >30% between the calculated and expected concentrations of an analyte in any standard may be cause for concern.

#### 9.2.4.3 Initial Calibration Verification (ICV)

As part of the IDOC and once after each ICAL, analyze an ICV sample prepared from a second source (different from the source of the ICAL standards). If a second vendor is not available, then a different lot of the standard from the same vendor should be used. The ICV should be prepared and analyzed just like a CCV. Acceptance criteria for the ICV are identical to the CCVs: the calculated concentration for each analyte must be within ± 30% of the expected value. If measured analyte concentrations are not of acceptable accuracy, correct the problem and rerun the ICV. If the problem persists, repeat the ICAL. Samples are not to be analyzed until the ICAL has been verified by acceptable ICV accuracy.

#### 9.2.4.4 Instrument Sensitivity Check (ISC)

The lowest calibration standard within the quantitation range must be analyzed at the beginning of the analytical sequence. The signal-to-noise ratio of the ISC must be ≥ 3:1 for the quantification ions and the confirmation ions, or ≥ 10:1 if the analyte only has a quantification ion. Recovery of the native and EIS compounds for the ISC must be within 70-130%. If the requirements cannot be met, the problem should be corrected before analyses can proceed.

The lowest calibration standard within the quantitation range must be analyzed at the beginning of the analytical sequence. The signal-to-noise ratio of the ISC must be ≥ 3:1 for the quantification ions and the confirmation ions, or ≥ 10:1 if the analyte only has a quantification ion. Recovery of the native and EIS compounds for the ISC must be within 70-130%. If the requirements cannot be met, the problem should be corrected before analyses can proceed.

#### 9.2.4.5 Continuing Calibration Verification (CCV)

After a passing MS resolution and a successful initial calibration is achieved and prior to the analysis of any samples, the calibration is verified by injecting an aliquot of the appropriate concentration ICAL standard, analyzed with the same conditions used during the ICAL. CCV is performed at the beginning of each analytical sequence, after every ten samples, and at the end of the analytical sequence. In this context, a “sample” is defined as a field sample: MBs, CCVs, LCSs, MSs, FDs, TBs and MSDs are not counted as samples. All CCV analyses are performed using a mid-level ICAL standard, except for the daily Instrument Sensitivity Check, as noted above.

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Calculate concentration for each native and EIS compound in the CCV; the recovery of native and EIS compounds for the CCVs must be within 70 – 130%. If the CCV criteria are not met, take corrective action (possibly including recalibration) and reanalyze any extracts that were analyzed between the last passing CCV and the one that failed. Alternately, the analyst may immediately analyze two CCVs for confirmation. If both confirmation CCV analyses meet the recovery criteria, analysis may proceed; however, the analyst must rerun any samples that were analyzed after the failing CCV and before the 2 passing CCVs. If either of the 2 confirmation CCV analyses fails to meet the acceptance criteria take corrective action and recalibrate the LC-MS/MS.

If an individual target compound recovery in a CCV is above the upper control limit and all associated samples are ND for that compound, the data for those samples may be reported. In such cases, a narrative statement must be included in the report indicating the specific compound result that was biased high in the CCV, and that samples were ND for that compound and thus reportable.

#### 9.2.5 Initial Calibration Blank (ICB) / Continuing Calibration Blank (CCB)

One instrument blank (IBLK) is analyzed immediately following the highest ICAL standard analyzed (ICB), each analysis day prior to sample analysis, and following each bracketing CCV in a sequence (CCB), to check for carryover and instrument contamination. The concentration of each analyte must be ≤ the MDL-equivalent concentration in each IBLK/ICB/CCB. If the IBLK does not pass this requirement after the highest ICAL standard, the acquisition method should be adjusted to reduce the amount of carryover observed. Alternately, the calibration should be performed using a lower concentration for the highest standard until the acceptance criteria is met.

If unacceptable contamination is persistent in blanks, analyze additional instrument blanks until the response of the analyte is no longer detectable, or perform additional troubleshooting steps to identify and minimize other potential sources of PFAS contamination.

### 9.3 Sample Preparation

This section describes the sample preparation procedures for aqueous samples (Section 9.3.3), solid samples (soil, sediment or biosolid; Section 9.3.6), and tissue samples (Section 9.3.9). For solid samples, percent solids are determined using the procedures in Section 9.3.2. This section also describes the solid phase extraction (SPE) and extract cleanup protocols for all matrices.

**Note:** The laboratory may choose to pre-screen some samples prior to performing the analysis, following the protocol described in Appendix D. For aqueous samples, use the smaller secondary container to perform the pre-screening. If high levels of PFAS are present in the sample, a lower volume is required for analysis.

Do not use any fluoropolymer articles or task wipes in these extraction procedures. Use only HDPE or polypropylene wash bottles and centrifuge tubes. Reagents and solvents for cleaning may be kept in glass containers.

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### 9.3.1 Homogenization & Subsampling

Refer to laboratory SWI ENV-SWI-WEST-0128, Subsampling of Soil / Solid Samples, or however named, for information regarding the handling, homogenization, and splitting of samples to ensure that a representative aliquot is used for preparation.

The laboratory may subsample the aqueous samples as described in Appendix E; however, subsampling must meet project-specific requirements. The laboratory must notify the client that subsampling has occurred. Subsampling is acceptable for samples which require greater than a 10X dilution for over-range detections (or are known/expected to be highly contaminated), and for samples which fail the acceptance criteria for EIS compounds (see Appendix B, Tables 10-12). Other sample matrix characteristics which may require subsampling are described in Appendix G. When subsampling is required to manage high concentrations, no less than 250 µL of aqueous or leachate samples may be subsampled - if greater dilution is required, serial dilution must be employed. When subsampling is required to manage challenging matrices, no less than 1 mL of samples may be subsampled. For solid and tissue samples, no less than 10% of the target sample mass should be used for reduced-mass extractions, to help ensure the extracted mass is representative of the bulk sample. This means no less than 0.5 g for solids and no less than 0.2 g for tissues may be used for sample preparation.

Tissue sample homogenization will be performed in the Pace Green Bay facility, following SOP ENV-SOP-GBAY-0129 v05 *Sample Homogenization Compositing and Sub-Sampling*.

### 9.3.2 Determination of Percent Solids

Aqueous samples received with visually observable solids will be handled following the decision tree presented in Appendix G. No TSS pre-test will be performed on aqueous samples prior to preparation.

Percent solids analysis must be performed on all solid samples (excluding tissues) prior to preparation and analysis. All solid samples will be logged in for both 1633 and percent solids analysis. The percent solids analysis will follow the Method SM2540G protocol.

### 9.3.3 Aqueous Sample Processing

Per the parent method, this protocol is applicable to aqueous samples containing up to 100 mg/L solids per sample, and the procedure requires the preparation of the entire sample where possible. Smaller sample volumes may be analyzed for samples containing solids greater than specified for this method, or when unavoidable due to high levels of PFAS. The typical sample size is 500 mL; however, sample size may vary, depending on project requirements, applicable regulations, and sample characteristics. The sample is to be analyzed in its entirety and should not be filtered.

Leachate samples are analyzed using a 100 mL sample volume. Therefore, they must not be included in the same sample preparation batch as aqueous samples analyzed using 500 mL sample volumes. Otherwise, leachate samples are handled identically to all other aqueous samples.

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1) Visually inspect each sample and note any matrix characteristics which may pose challenges during SPE and require additional processing; see Appendix G for more information.

2) Weigh each sample bottle (with the lid) to the nearest 0.1 g. The volume of the aqueous sample analyzed is determined by weighing the full sample bottle and then the empty sample bottle after extraction is complete.

3) Prepare a method blank and two LCSs using PFAS-free water in HDPE bottles. Select a volume of water that is typical of the samples in the batch (i.e., 500 mL; 100 mL for leachate samples). Spike one LCS sample with native standard solution at 2x the LOQ (64 µL of STK-10X mix). This aliquot (LLLCS) will serve to verify the LOQ. Spike the other LCS sample at a concentration near the mid-level calibration point (40 µL of EPA-1633STK). This aliquot will serve as the traditional LCS.

**Note:** If matrix spikes are required for a specific project, spike the field sample bottles designated for use as MS/MSD samples in the same manner as the LCS.

4) Spike 20 µL of EIS solution (Section 8.2.3) directly into the sample in the original bottle (or subsampled bottle) as well as to the bottles prepared for the QC samples. Mix by capping and inverting the sample containers.

5) Check that the pH is 6.5 ± 0.5. If necessary, adjust pH with 50% formic acid or ammonium hydroxide (or with 5% formic acid and 3% aqueous ammonium hydroxide). The sample is now ready for solid phase extraction (SPE) and cleanup.

### 9.3.4 Solid Phase Extraction of Aqueous Samples

**Note:** Carbon cleanup is required. Carbon cleanup may remove analytes if the sample has a very low organic carbon content (this is unusual for non-drinking water environmental samples). This will be apparent if the isotope dilution standard recoveries are significantly higher on the reanalysis.

1) Pack clean silanized glass wool to half the height of a WAX SPE cartridge barrel; repeat for the total number of samples in the batch.

2) For each sample and QC aliquot, set up the vacuum manifold with one WAX SPE cartridge plus a reservoir adaptor and reservoir for each cartridge; label each reservoir with the associated sample ID. If using plastic transfer lines instead of reservoirs, ensure the connecting caps are snug in each cartridge and the transfer lines are placed within the appropriate sample; label each cartridge tube with the associated sample ID.

3) Pre-condition the cartridges by washing them with 15 mL of 1% methanolic ammonium hydroxide followed by 5 mL of 0.3M formic acid. Perform each rinse separately. Do not allow the WAX SPE to go dry. Discard the wash solvents.

4) Pour the sample into the reservoir (do not use a pipette), taking care to avoid splashing while loading; or, if using transfer lines, begin opening the stopcocks on the vacuum manifold. Adjust the vacuum/stopcocks to pass each sample through

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the cartridge at approximately 5-10 mL/min; discard the eluate. Retain the empty sample bottle for later rinsing (Section 9.3.5).

**Note:** In the event the SPE cartridge begins to clog during aqueous sample loading, abandon the loading step and attempt to rinse and dry the clogged cartridge, following the protocol below. The cartridge is then ready for elution. If the clogging prevents the rinse from passing through the cartridge, it will not be possible to collect an extract for the associated sample. See Appendix G for more information.

5) Rinse the walls of the reservoir with 5 mL reagent water twice, followed by 5 mL of 1:1 0.1M formic acid/methanol and pass those rinses through the cartridge using vacuum. If using sample transfer lines for loading, add the 3 rinses to the bottle and load through the transfer lines to the cartridge, one reagent at a time. Dry the cartridge by pulling air through for approximately 5 minutes. Discard the rinse solution.

6) After the WAX cartridges are sufficiently dry, rinse the GCB cartridges with 5 mL of 1% methanolic ammonium hydroxide; discard the rinsate. Do not allow the GCB to go completely dry.

7) Connect the outlet of the WAX cartridges to the inlet of the GCB cartridges to stack them on the manifold and allow for cleanup of the extract as part of elution. Ensure that the WAX cartridges are returned to their original locations on the manifold to avoid cross contamination. Continue to the elution steps in the next section.

### 9.3.5 Elution of Aqueous Sample Extracts

1) Place clean collection tubes inside the manifold, ensuring that the extract delivery tips do not touch the walls of the tubes. Resume vacuum and ensure a proper seal is achieved. DO NOT add NIS to these collection tubes.

2) Add 5 mL of 1% methanolic ammonium hydroxide to each empty sample bottle. Cap the bottle and rotate to ensure all internal surfaces of each bottle are rinsed; avoid vigorous shaking when rinsing the 500 mL aqueous sample bottles with only 5 mL of methanol – any evaporation/vaporization will contribute to loss of extract here. After rinsing the inside of the sample bottle, pour the rinse from the bottle or use a plastic transfer pipette to transfer the rinse to the SPE reservoir, using it to wash the walls of the reservoir. If using sample transfer lines, simply transfer this rinse from each sample container to its associated cartridge using vacuum. Allow the elution solvent to soak the SPE sorbent for 2 minutes before using vacuum to pull the elution solvent through the cartridge and into the collection tubes in a slow, dropwise manner.

3) Air dry the empty sample bottle after the rinse is transferred. Weigh the empty bottle with the cap on and subtract that from the weight of the bottle with sample, determined in Section 9.3.3, step 2.

4) Add 25 µL of concentrated acetic acid and 20 µL of NIS mix to each sample extract in its collection tube and vortex to mix. Transfer a portion of each extract into an autosampler vial for LC-MS/MS analysis. Cap the collection tubes containing the remaining extracts and store at 0 - 6 °C.

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### 9.3.6 Solid Sample (excluding tissues) Processing

Any solid sample received containing <50% solids (>50% moisture; >10 g target mass for 5 g dry weight) should be re-logged and prepared as a biosolid, using a target dry weight of 0.5 g. Any solid or biosolid sample received containing <5% solids (>95% moisture; >10 g target mass for 0.5 g dry weight) should be re-logged and prepared as a leachate sample, using no more than 100 mL of sample for extraction.

1) Mix the sample in its original jar. If it is impractical to mix the sample within its container, transfer the sample to a larger container. Mix the sample thoroughly, stirring from the bottom to the top and in a circular motion along the sides of the jar, breaking particles up by pressing against the side of the container. The homogenized sample should be even in color and have no separate layers. Store the homogenized material in its original container or in multiple smaller containers.

2) Determine the percent solids as per Section 9.3.2.

**Note:** The target sample weight for sediment or soil is 5 g dry weight. The target sample weight for biosolids is 0.5 g dry weight. Small amounts of reagent-free water used for method blanks (10% of sample weight or less) can be added to unusually dry samples. This is an option, not a requirement.

3) Check the LIMS system for the percent solids data associated with the samples to be prepared. Using the percent solids data and the calculation below, weigh out an aliquot of each solid sample, not dried, into a 50 mL polypropylene centrifuge tube. Sample mass should be within ±0.2 g of target mass for soil and sediment samples, and within ±0.02 g of target mass for biosolids samples. Sample aliquot should provide 5 g dry weight ($Wi_{Dry}$ below) for soil and sediment or 0.5 g dry weight for biosolids. Because biosolid samples are analyzed with a 0.5 g sample mass, they must not be included in the same sample preparation batch as solid samples analyzed with 5 g sample masses. Any solid sample received containing <50% solids (>50% moisture; >10 g target mass for 5 g dry weight) should be re-logged and prepared as a biosolid, using a target dry weight of 0.5 g. Any solid or biosolid sample received containing <5% solids (>95% moisture; >10 g target mass for 0.5 g dry weight) should be re-logged and prepared as a leachate sample, using no more than 100 mL of sample for extraction.

$$Solid\ Sample\ Target\ Mass\ (g) = \frac{Wi_{Dry}\ (g)}{\%\ solids\ (decimal)}$$

4) Prepare batch QC samples using 5 g of reference solid wetted with 2.5 g of reagent water for the method blank and two LCSs (use 0.5 g of reference solid with 0.25 g of reagent water for biosolid extraction batches). The addition of reagent water to the sand provides a matrix closer in composition to real-world samples. Spike one LCS sample with native standard solution at 2x the LOQ (80 µL of STK-10X mix). This aliquot (LLLCS) will serve to verify the LOQ. Spike the other LCS sample at a concentration near the mid-level calibration point (40 µL of EPA-1633STK). This aliquot will serve as the traditional LCS.

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**Note:** If matrix spikes are required for a specific project, spike the field sample bottles designated for use as MS/MSD samples in the same manner as the LCS.

5) Spike 20 µL of EIS solution (Section 8.2.3) directly into each centrifuge tube containing the aliquoted field and QC samples. Vortex or shake the sample to disperse the standard and allow to equilibrate for approximately 30 minutes.

6) Add 15 mL of 0.3% methanolic ammonium hydroxide to each centrifuge tube. Vortex to disperse, then shake for 30 minutes on a variable speed mixing table. Centrifuge at 3000 rpm (~2000 RCF) for 10 minutes and transfer the supernatant to a clean, labeled 50 mL polypropylene centrifuge tube.

7) Add 15 mL of 0.3% methanolic ammonium hydroxide to the remaining solid sample in each centrifuge tube. Vortex to disperse, then shake for 30 minutes on a variable speed mixing table. Centrifuge at 3000 rpm (~2000 RCF) for 10 minutes and decant the supernatant from the second extraction into the centrifuge tube with the supernatant from the first extraction.

8) Dilute to approximately 40 mL with reagent water. A separate centrifuge tube marked at the 40 mL level may be kept for a visual reference to get the approximate volume. Samples containing excess water may yield extracts that are greater than 40 mL in volume; therefore, do not add water to these.

9) Check that the pH is 6.5 ± 0.5. If necessary, adjust pH with 50% formic acid or ammonium hydroxide (or with 5% formic acid and 3% aqueous ammonium hydroxide). The extract is now ready for solid phase extraction (SPE) and cleanup.

### 9.3.7 Solid Phase Extraction of Solid Samples

1) Pack clean silanized glass wool to half the height of a WAX SPE cartridge barrel; repeat for the total number of samples in the batch.

2) For each sample and QC aliquot, set up the vacuum manifold with one WAX SPE cartridge plus a reservoir adaptor and reservoir for each cartridge; label each reservoir with the associated sample ID. If using plastic transfer lines instead of reservoirs, ensure the connecting caps are snug in each cartridge and the transfer lines are placed within the appropriate sample; label each cartridge tube with the associated sample ID.

3) Pre-condition the cartridges by washing them with 15 mL of 1% methanolic ammonium hydroxide followed by 5 mL of 0.3M formic acid. Perform each rinse separately. Do not allow the WAX SPE to go dry. Discard the wash solvents.

4) Pour the sample into the reservoir (do not use a pipette), taking care to avoid splashing while loading; or, if using transfer lines, begin opening the stopcocks on the vacuum manifold. Adjust the vacuum/stopcocks to pass each sample through the cartridge at approximately 5-10 mL/min; discard the eluate. Retain the empty sample bottle for later rinsing (Section 9.3.8).

5) Rinse the walls of the reservoir with 5 mL reagent water twice, followed by 5 mL of 1:1 0.1M formic acid/methanol and pass those rinses through the cartridge using

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vacuum. If using sample transfer lines for loading, add the 3 rinses to the bottle and load through the transfer lines to the cartridge, one reagent at a time. Dry the cartridge by pulling air through for approximately 5 minutes. Discard the rinse solution.

6) After the WAX cartridges are sufficiently dry, rinse the GCB cartridges with 5 mL of 1% methanolic ammonium hydroxide; discard the rinsate. Do not allow the GCB to go completely dry.

7) Connect the outlet of the WAX cartridges to the inlet of the GCB cartridges to stack them on the manifold and allow for cleanup of the extract as part of elution. Ensure that the WAX cartridges are returned to their original locations on the manifold to avoid cross contamination. Continue to the elution steps in the next section.

### 9.3.8 Elution of Solid Sample Extracts

1) Place a clean collection tube in the manifold rack for each sample and QC aliquot, ensuring the extract delivery needles are not touching the walls of the tubes. Resume vacuum and ensure a proper seal is achieved. DO NOT add NIS to these collection tubes.

2) Rinse the inside of each sample's centrifuge tube using 5 mL of 1% methanolic ammonium hydroxide. Then pour the rinse from each bottle (or use a plastic transfer pipette) to transfer the rinse to the associated SPE reservoir, washing the walls of the reservoir. If using sample transfer lines, simply transfer this rinse from each sample container to its associated cartridge using vacuum. Allow the elution solvent to soak the SPE sorbent for 2 minutes, then use vacuum to pull the elution solvent through the cartridge and into the collection tubes in a slow, dropwise manner.

3) Add 25 µL of concentrated acetic acid and 20 µL of NIS mix to each sample extract in its collection tube and vortex to mix. Transfer a portion of each extract into an autosampler vial for LC-MS/MS analysis. Cap the collection tubes containing the remaining extracts and store at 0 - 6 °C.

### 9.3.9 Tissue Sample Processing

Prior to processing tissue samples, the laboratory must determine the exact tissue to be analyzed. Common requests for analysis of fish tissue include whole fish with the skin on, whole fish with the skin removed, edible fish fillets (filleted in the field or by the laboratory), specific organs, and other portions. Once the appropriate tissue has been determined, the samples must be prepared and homogenized.

Pace utilizes the Green Bay location for tissue homogenization, following ENV-SOP-GBAY-0129 (Sample Homogenization, Compositing, and Subsampling; specifically, Section 9.4).

1) For each sample, weigh a 2 g aliquot of homogenized tissue into a 50 mL polypropylene centrifuge tube. Reseal the container with the remaining homogenized portion of the sample and return it to frozen storage in case it needs to be used for reanalysis. The default sample weight for tissue is 2 g wet weight; however, a 1 g sample may be used. Higher sample weights are not recommended for this method.

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2) Prepare the batch QC samples using 2 g of reference tissue matrix for the method blank and two LCSs. Spike one LCS sample with native standard solutions at 2x the LOQ (80 µL of STK-10X mix). This aliquot (LLLCS) will serve to verify the LOQ. Spike the other LCS sample at a concentration near the mid-level calibration point (40 µL of EPA1633-STK). This aliquot will serve as the traditional LCS.

**Note:** If matrix spikes are required for a specific project, spike the field sample bottles designated for use as MS/MSD samples in the same manner as the LCS.

3) Spike 20 µL of EIS solution (Section 8.2.3) directly into each field and QC sample. Vortex and allow to equilibrate for approximately 30 minutes.

4) Add 15 mL of 0.05M KOH in methanol to each sample. Vortex to disperse the tissue then place tubes on a variable speed mixing table to shake for 1 hour. Centrifuge at 3000 rpm (~2000 RCF) for 10 minutes and collect the supernatant in a 125mL sample bottle.

5) Add 10 mL of acetonitrile to remaining tissue in the centrifuge tube, vortex to mix and disperse the tissue. Sonicate for 30 minutes. Centrifuge at 3000 rpm (~2000 RCF) for 10 minutes and collect the supernatant, adding it to the 125mL bottle containing the initial extract.

6) Dilute to approximately 75 mL with reagent water. A separate bottle marked at the 75 mL level may be used to get the approximate volume.

7) Check that the pH is 6.5 ± 0.5. If necessary, adjust pH with 50% formic acid or ammonium hydroxide (or with 5% formic acid and 3% aqueous ammonium hydroxide). The extract is now ready for solid phase extraction (SPE) and cleanup.

### 9.3.10 Solid Phase Extraction of Tissue Samples

1) Pack clean silanized glass wool to half the height of a WAX SPE cartridge barrel; repeat for the total number of samples in the batch.

2) For each sample and QC aliquot, set up the vacuum manifold with one WAX SPE cartridge plus a reservoir adaptor and reservoir for each cartridge; label each reservoir with the associated sample ID. If using plastic transfer lines instead of reservoirs, ensure the connecting caps are snug in each cartridge and the transfer lines are placed within the appropriate sample; label each cartridge tube with the associated sample ID.

3) Pre-condition the cartridges by washing them with 15 mL of 1% methanolic ammonium hydroxide followed by 5 mL of 0.3M formic acid. Perform each rinse separately. Do not allow the WAX SPE to go dry. Discard the wash solvents.

4) Pour the sample into the reservoir (do not use a pipette), taking care to avoid splashing while loading; or, if using transfer lines, begin opening the stopcocks on the vacuum manifold. Adjust the vacuum/stopcocks to pass each sample through the cartridge at approximately 5-10 mL/min; discard the eluate. Retain the empty sample bottle for later rinsing (Section 9.3.8).

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5) Rinse the walls of the reservoir with 5 mL reagent water twice, followed by 5 mL of 1:1 0.1M formic acid/methanol and pass those rinses through the cartridge using vacuum. If using sample transfer lines for loading, add the 3 rinses to the bottle and load through the transfer lines to the cartridge, one reagent at a time. Dry the cartridge by pulling air through for approximately 5 minutes. Discard the rinse solution.

6) After the WAX cartridges are sufficiently dry, rinse the GCB cartridges with 5 mL of 1% methanolic ammonium hydroxide; discard the rinsate. Do not allow the GCB to go completely dry.

7) Connect the outlet of the WAX cartridges to the inlet of the GCB cartridges to stack them on the manifold and allow for cleanup of the extract as part of elution. Ensure that the WAX cartridges are returned to their original locations on the manifold to avoid cross contamination. Continue to the elution steps in the next section.

#### 9.3.11 Elution of Tissue Sample Extracts

1) Place a clean collection tube in the manifold rack for each sample and QC aliquot, ensuring the extract delivery needles are not touching the walls of the tubes. Resume vacuum and ensure a proper seal is achieved. DO NOT add NIS to these collection tubes.

2) Rinse the inside of each sample's centrifuge tube using 5 mL of 1% methanolic ammonium hydroxide. Then pour the rinse from each bottle (or use a plastic transfer pipette) to transfer the rinse to the associated SPE reservoir, washing the walls of the reservoir. If using sample transfer lines, simply transfer this rinse from each sample container to its associated cartridge using vacuum. Allow the elution solvent to soak the SPE sorbent for 2 minutes, then use vacuum to pull the elution solvent through the cartridge and into the collection tubes in a slow, dropwise manner.

3) Add 25 µL of concentrated acetic acid and 20 µL of NIS mix to each sample extract in its collection tube and vortex to mix. Transfer a portion of each extract into an autosampler vial for LC-MS/MS analysis. Cap the collection tubes containing the remaining extracts and store at 0 - 6 °C.

### 9.4 Analysis

#### 9.4.1 Sequence Preparation

Analysis of sample extracts for PFAS by LC-MS/MS is performed running manufacturer's data acquisition software. The mass spectrometer is run with unit mass resolution in the multiple reaction monitoring (MRM) mode.

1) Perform mass calibration and mass calibration verification, establish the operating conditions, and perform an initial calibration prior to analyzing samples. Only after all performance criteria are met may blanks, MDLs, IDOC/LCS, and samples be analyzed.

2) Each day of analysis, the column must be thoroughly flushed with 100% Acetonitrile for at least 30 minutes to clear any accumulated impurities and interferences from the sample pathway and equilibrate the system. It is also good practice to open the purge valve(s) on the pumps for the first ~1 minute of flush time and/or use the "purge"

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function available as part of the pump functionality. Additionally, it is good practice to purge the autosampler injector flow path daily prior to analysis by using the "purge" function, if available. The column should then be equilibrated to the analysis starting conditions by flushing for approximately 15 mins with 50:50 Mobile Phase A: Mobile Phase B and finally approximately 15 mins with 80:20 Mobile Phase A: Mobile Phase B (acquisition starting conditions). Ensure that system pressure is stable.

3) Following any initial priming injections on days when a calibration is not needed, an ISC and an instrument blank will be analyzed to demonstrate system suitability and the absence of system contamination prior to sample analysis.

4) After acceptable ISC and IBLK results are confirmed, load and submit extracted samples for analysis, typically starting with batch QC with field samples following. A CCV and CCB must be analyzed after every 10 (or fewer) field samples.

### 9.4.2 Routine Analytical Sequence

After a successful initial calibration has been completed, samples may be analyzed; an example analytical sequence is provided below. The volume injected for samples and QCs must be identical to the volume used for calibration. Standards and sample extracts must be brought to room temperature and vortexed prior to aliquoting into an instrument vial to ensure homogeneity of the extract.

- ISC
- CCV
- Instrument Blank
- Method Blank
- LLLCS
- LCS
- Samples (10 or fewer)
- CCV
- CCB
- Samples (10 or fewer)
- CCV

If the results are acceptable, the closing CCV analysis may be used as the opening solution for the next analytical sequence.

If the response exceeds the calibration range for any sample, extracts are diluted as per Section 9.4.3 to bring all target responses within the calibration range.

**Note:** If the analytes that exceed the calibration range in the original analysis are known to not be of concern for the specific project (e.g., are not listed in a discharge permit), then the laboratory may consult with the client regarding the possibility of reporting that sample from the undiluted analysis.

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#### 9.4.3 Sample Dilutions

If the measured concentration for any compound exceeds the calibration range of the system, dilute an aliquot of the sample extract with the IBLK mix solution by a factor no greater than 10x, refortify the NIS compounds to initial concentration, and analyze the diluted extract. If the responses for each applicable EIS in the diluted extract meet the S/N and retention time requirements in Section 10.1.1, and the EIS recoveries from the analysis of the diluted extract, corrected for the dilution, are within the limits presented in Table 10, 11 or 12 (according to sample matrix), then the compounds associated with those EISs may be quantified. The EIS recoveries, compound concentrations, detection limits, and LOQs are adjusted to account for the dilution.

If the EIS responses in the diluted extract do not meet the S/N and retention time requirements listed in Section 10.1.1, then the compound cannot be measured reliably in the diluted extract. In such cases, subsample a smaller aliquot of any affected aqueous sample and dilute it to 500 mL with reagent water and re-extract the sample. For solid sample matrices, prepare a smaller aliquot of soil, biosolid, sediment, or tissue and re-extract the sample. The reduced sample volume (or mass) chosen for the re-extraction should reflect the dilution applied to the original extract (i.e., if the original aqueous sample extract was analyzed at a 10X dilution, 50 mL should be subsampled for the re-extraction). See Section 9.3.1 for more guidance. The reported compound concentrations, detection limits, and LOQs are adjusted to account for the reduced sample volume (or mass) that is extracted.

If the recovery of any isotopically labeled compound is outside of the acceptance limits (Appendix B) in the original, undiluted analysis, a diluted aqueous sample or smaller aliquot (for solids and tissue) should be prepared and analyzed.

## 10.0 DATA ANALYSIS & CALCULATIONS

### 10.1 Data Analysis

#### 10.1.1 Qualitative Identification

A native, EIS, or NIS compound is positively identified in a standard, blank, sample, or QC sample when all criteria in Sections 10.1.1.1 through 10.1.1.3 are met.

##### 10.1.1.1 Signal-to-Noise Ratio (S/N)

Peak responses of the quantitation and confirmation ions must be at least three times the background noise level (S/N 3:1). The quantitation ion must have a S/N ≥ 10:1 if there is no confirmation ion. If the S/N ratio is not met in a standard or QC sample due to high background noise, the laboratory must correct the issue (e.g., perform instrument troubleshooting). If the S/N ratio is not met in a blank or sample, then the analyte is to be considered a non-detect.

##### 10.1.1.2 RT Criteria

Target analyte, EIS analyte, and NIS analyte RTs must fall within 0.4 minutes of the predicted retention times from the midpoint standard of the ICAL or initial daily CCV, whichever was used to establish the RT window position for the

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analytical batch. The retention time window used must be of sufficient width to detect earlier-eluting branched isomers. For all method analytes with exact corresponding isotopically labeled analogs, method analytes must elute within 0.1 minutes of the associated EIS.

#### 10.1.1.3 Ion Ratio Criteria

For any reported compound detection, the ratio of the total (branched and linear isomer) quantification ion response to the total (branched and linear isomer) confirmation ion response – referred to as the Ion Ratio – must fall within ± 50% of the ratio observed in the mid-point ICAL standard. The ion ratio requirement does not apply for PFBA, PFPeA, NMeFOSE, NEtFOSE, PFMPA, and PFMBA because suitable secondary transitions are unavailable (not detectable or inadequate S/N).

### 10.1.2 Manual Integration

Manual integration is sometimes necessary to correct inaccurate automated integrations but must never be used to meet QC criteria or to substitute for proper instrument maintenance and/or method set-up. To assure that all manual integrations are justified and proper all manual integrations must be performed, documented, reviewed, and approved in accordance with corporate SOP ENV-SOP-CORQ-0006, *Manual Integration*. Refer to this SOP for guidance on manual integration techniques and required procedures.

#### 10.1.2.1 Branched Isomer Integration

The response of all isomers in the quantitative standards should be used to define integration parameters and ion ratios. In samples, the total integrated response should include the branched isomer peaks that have been identified in the quantitative standard, if present. For compounds with identified branched and linear isomer peaks, the reported concentration is the sum of all isomers. If standards (either quantitative or qualitative) containing a mix of isomers are not available for purchase for a particular compound, only the linear isomer can be identified and quantitated in samples.

#### 10.1.2.2 Qualification

If the field sample result does not meet all criteria stated in Section 10.1.1, and all sample preparation avenues (e.g., extract cleanup, sample dilution, etc.) have been exhausted, the result may only be reported with a data qualifier alerting the data user that the result could not be confirmed because it did not meet the method-required criteria and therefore should be considered an estimated value. If the criteria listed above are not met for the standards, the laboratory must stop analysis of samples and correct the issue.

## 10.2 Calculations

Refer to laboratory SOP (ENV-SOP-WEST-0124, Common Laboratory Calculations), or however named, for equations used to perform common calculations.

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### 10.2.1 ICAL Relative Response (RR) and Response Factor (RF)

The response ratio (RR) for each native compound calibrated by isotope dilution is calculated according to the equation below, separately for each of the calibration standards, using the areas of the quantification ions shown in Table 4. RR is used for the 24 compounds measured by true isotope dilution quantification.

$$RR = \frac{Area_t M_{EIS}}{Area_{EIS} M_t}$$

Where:

$Area_t$ = Measured area of the quantitation ion for the target analyte.

$Area_{EIS}$ = Measured area of the quantitation ion for the corresponding labeled PFAS used as the EIS in the calibration standards.

$M_{EIS}$ = Concentration of the isotopically labeled PFAS uses as the EIS in the calibration standards (ng/L)

$M_t$ = Concentration of the target analyte in the calibration standard (ng/L)

Similarly, the response factor (RF) for each native compound calibrated by extracted internal standard is calculated according to the equation below. RF is used for the 16 compounds measured by extracted internal standard quantification.

$$RF = \frac{Area_t M_{EIS}}{Area_{EIS} M_t}$$

Where:

$Area_t$ = Measured area of the quantitation ion for the target analyte.

$Area_{EIS}$ = Measured area of the quantitation ion for the corresponding labeled PFAS used as the EIS in the calibration standards.

$M_{EIS}$ = Concentration of the isotopically labeled PFAS uses as the EIS in the calibration standards (ng/L)

$M_t$ = Concentration of the target analyte in the calibration standard (ng/L)

A response factor ($RF_S$) is calculated for each EIS compound in the calibration standard using the equation below. $RF_S$ is used for the 24 isotopically labeled compounds measured by non-extracted internal standard quantification.

$$RF_S = \frac{Area_{EIS} M_{NIS}}{Area_{NIS} M_{EIS}}$$

Where:

$Area_{EIS}$ = Measured area of the quantitation ion for the EIS compound added to the sample before extraction.

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$Area_{NIS}$ = Measured area of the quantitation ion for the NIS compound in the calibration standard.

$M_{NIS}$ = Concentration of the NIS compound in the calibration standard (ng/L).

$M_{EIS}$ = Concentration of the EIS compound in the calibration standard (ng/L).

### 10.2.2 Target Analyte Concentration

Concentrations of the target analytes are determined with respect to the extracted internal standard (EIS) which is added to the sample prior to extraction (see Table 4). Other equations may be used if the laboratory demonstrates that those equations produce the same numerical result as produced by the equation below.

$$\boldsymbol{Concentration\ (ng/Lor ng/g) = \frac{Area_N M_{EIS}}{Area_{EIS}(\overline{RR}\ or\ \overline{RF})}\ x\ DF\ x \frac{Vf}{Vi}}$$

Where:

$Area_N$ = The measured area of the quantitation ion for the native (unlabeled) PFAS.

$Area_{EIS}$ = The measured area of the quantitation ion for the EIS.

$M_{EIS}$ = The expected concentration of the EIS in the extract (ng/L)

$\boldsymbol{\overline{RR}}$ = Average response ratio used to quantify target compounds by the isotope dilution method.

$\boldsymbol{\overline{RF}}$ = Average response ratio used to quantify target compounds by the extracted internal standard method.

DF = Dilution Factor. If no extract dilution was performed, then DF=1.

Vf = Final extract volume (L)

Vi = Initial sample volume (L) or weight (g)

### 10.2.3 EIS Concentration

The EIS compounds are quantitated with respect to an NIS, as shown in Table 4, using the response ratios or response factors from the most recent initial calibration. Other equations may be used if the laboratory demonstrates that those equations produce the same numerical result as produced by the equation below.

$$Concentration\ (ng/L\ or\ ng/g) = \frac{Area_{EIS} M_{NIS}}{Area_{NIS}\overline{RF_S}}\ x\ DF\ x \frac{Vf}{Vi}$$

Where:

$Area_{EIS}$ = The measured area of the quantitation ion for the EIS.

$Area_{NIS}$ = The measured area of the quantitation ion for the associated NIS.

$M_{NIS}$ = The expected concentration of the NIS in the extract (ng/L)

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$\overline{RF_S}$ = Average response factor used to quantify the EIS compound by the non-extracted internal standard method.

DF = Dilution Factor. If no extract dilution was performed, then DF=1.

Vf = Final extract volume (L)

Vi = Initial sample volume (L) or weight (g)

### 10.2.4 Relative Error (%RE)

$$\%\ Relative\ Error = \left(\frac{x'i - xi}{xi}\right) x\ 100$$

Where:

xi = True value of the calibration standard

x'i = Measured concentration of the calibration standard

### 10.2.5 Percent Relative Standard Deviation

$$\%\ Relative\ Standard\ Deviation = \left(\frac{S}{\bar{\bar{x}}}\right) x\ 100$$

Where:

S = Standard Deviation

X = Mean

### 10.2.6 Standard Deviation

$$S = \left(\frac{\sum (x_i - \bar{x})^2}{(n-1)}\right)$$

Where:

*S* = standard deviation

*n* = size of the population

$x_i$ = each value of the population

$\bar{x}$ = population mean

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#### 10.2.7 Mean

$$\bar{x} = \frac{\left(\sum_{i=1}^{n} x_i\right)}{n}$$

Where:

$\bar{x}$ = population mean

$x_i$ = each value of the population

n = number of values in the population

### 10.3 Reporting

All results for aqueous samples will be reported in ng/L. All results for solid samples will be reported in ng/g, on a dry-weight basis, and the percent solids for each sample will be reported separately. All results for tissue samples will be reported in ng/g, on a wet-weight basis. All QC data will be reported with the sample results. See Appendix A for specific reporting limits in all matrices.

Unless specified otherwise by a regulatory authority or in a discharge permit, results for analytes that meet the identification criteria are reported down to the concentration of the LOQ established by the laboratory.

Results for any analyte found in a sample or extract that has been diluted will be reported at the least dilute level for which the measured concentration is within the calibration range (e.g., above the LOQ for the analyte and below the highest calibration standard) and in which isotopically labeled compound recoveries are within their respective QC acceptance criteria. This may require reporting results for some analytes from different analyses.

Recoveries of all associated EIS compounds will be reported for all field samples and QC Quality Control & Method Performance

### 10.4 Quality Control

Prepare and analyze the following QC samples with each batch of samples. Refer to Appendix B for acceptance criteria and required corrective action(s).

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| QC Check | Acronym | Frequency |
|---|---|---|
| Method Blank | MB | 1 per batch of 20 or fewer samples. |
| Laboratory Control Sample | LCS | 1 per batch of 20 or fewer samples. |
| Low Level Laboratory Control Sample | LLLCS | 1 per batch of 20 or fewer samples. |
| Matrix Spike | MS | 1 pair per batch of 20 or fewer samples (if required/requested) |
| MS Duplicate | MSD | |
| Sample Duplicate | DUP | 1 per AFFF or F3 sample. |
| Extracted Internal Standard | EIS | All CAL standards, batch QC and field samples. |
| Non-extracted Internal Standard | NIS | All CAL standards, batch QC and field samples. |

The minimum quality control requirements of this method consist of an initial demonstration of laboratory capability, analysis of samples spiked with isotopically labeled compounds to evaluate and document data quality, and analysis of standards and blanks as tests of continued performance. Laboratory performance is compared to established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

If the method is to be applied to a sample matrix other than water (e.g., soils, biosolids, tissue), the appropriate alternative reference matrix is substituted for the reagent water matrix in all performance tests.

The laboratory must make an initial demonstration of the ability to generate acceptable precision and recovery with this method. This demonstration is described in Section 11.3.2.

Analyses of method blanks (MBs) are required on an on-going basis to demonstrate the extent of background contamination in any reagents or equipment used to prepare and analyze field samples. The procedures and criteria for analyses of MBs are described in Section 11.1.1.

The laboratory must spike all samples with isotopically labeled compounds to monitor method performance. These evaluations are described in Sections 11.1.4 and 11.1.5. When results of these spikes indicate atypical method performance for samples, the samples are diluted to evaluate whether the performance issue is caused by the sample matrix. Procedures for dilution are given in Section 9.4.3.

The laboratory must, on an ongoing basis, demonstrate that the analytical system is in control through calibration verification (CCV) and the analysis of blanks and ongoing precision and recovery standards spiked at low (LLLCS) and mid-level concentrations (LCS). These procedures are given in Sections 9.2.4.5, 11.1.1 and 11.1.2.

### 10.4.1 Method Blank (MB)

A method blank is analyzed with each extraction batch to demonstrate freedom from contamination. The matrix for the method blank must be similar to the sample matrix for the batch (e.g., reagent water blank, solids matrix blank, or tissue blank [Section 7.3]).

Analyze the extract of the method blank aliquot before the analysis of the LCSs.

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If any PFAS is found in the MB 1) at a concentration greater than the LOQ for the analyte, 2) at a concentration greater than one-third the regulatory compliance limit, or 3) at a concentration greater than one-tenth the concentration in a sample in the extraction batch, whichever is greatest, analysis of samples must be halted, and the problem corrected. Other project-specific requirements may apply; therefore, the laboratory may adopt more stringent acceptance limits for the method blank at their discretion. If the contamination is traceable to the extraction batch, samples affected by the blank must be re-extracted and analyzed along with a new MB and LCS/LLLCS, provided enough sample volume is available and the samples are still within holding time. Reanalysis or re-extraction is not required if the samples are not impacted. Samples are not impacted when the MB detection is not present in the sample, or the sample concentration is ≥10x the concentration of the detection in the MB.

If the new blank also exhibits contamination and additional volume of the associated sample(s) is not available for re-extraction and analysis, the laboratory must document and report the failures (e.g., as qualifiers on results), unless the failures are not required to be reported as determined by the regulatory/control authority.

### 10.4.2 Laboratory Control Sample (LCS) / Low-Level LCS (LLLCS)

Analyze the extract of the LCS and LLLCS to ensure the analytical process is under control.

Compute the percent recovery of the native compounds by the appropriate quantification method depending on the compound. Compute the percent recovery of each isotopically labeled compound by the non-extracted internal standard quantitation method.

For the target analytes and EIS compounds, compare the recovery to the LCS and LLLCS limits given in Tables 7 through 10 (or 12). LCS, LLLCS, and EIS results must meet the acceptance criteria in these tables. If all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and aqueous samples may proceed. If, however, any individual concentration falls outside of the given range, the extraction/concentration processes are not being performed properly for that compound. In this event correct the problem, re-extract all affected samples, including any QC samples, and repeat the analysis. Samples are unaffected if the LCS or LLLCS recovery is above the acceptance criteria and the sample is ND for the failing compound.

### 10.4.3 Matrix Spike (MS)

Matrix spikes generally are not required for methods that employ isotope dilution quantification because deleterious effects of the matrix should be evident in the recoveries of the EIS compounds spiked into every sample. The analysis of matrix spike samples may help diagnose the potential impact of matrix interferences for specific target analytes or sample matrices. See Appendix E for MS/MSD, MS/DUP sample selection guidance.

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#### 10.4.4 Extracted Internal Standard (EIS)

To assess method performance on the sample matrix, the laboratory must spike all samples with the EIS solution. Analyze each sample according to the procedures in this SOP. Compute the percent recovery of the EIS compound concentration using the NIS quantitation method and the equation in Section 10.2.3.

The recovery of each EIS compound in an aqueous sample must be within the limits in Table 10, which are the required QC acceptance limits for aqueous samples, including landfill leachates. The recovery of each EIS compound in soil, sediment, or biosolid samples must be within the limits in Table 11. The recovery of each EIS compound in tissue samples must be within the limits in Table 12. The limits presented in Tables 10, 11, and 12 are the required QC acceptance limits for these matrices derived from the multi-laboratory validation study. If the recovery of any EIS falls outside of these limits, method performance is unacceptable for that EIS in that sample. Additional cleanup procedures or limited dilution of the sample extract may be employed to attempt to bring the EIS recovery within the acceptance normal range.

If the recovery cannot be brought within the acceptance limits after extract dilution or additional cleanup procedures have been employed, then the laboratory must take a smaller aliquot of any affected aqueous sample, dilute it to 500 mL with reagent water and prepare and analyze the diluted sample, or must prepare and analyze a smaller aliquot of soil, sediment, biosolid, or tissue sample, per Section 9.4.3.

#### 10.4.5 Non-extracted Internal Standard (NIS)

To assess method performance, the laboratory must spike all sample extracts with the NIS solution. Analyze each sample extract according to the procedures in this SOP. Percent recovery of the NIS compound is calculated by comparing the measured response in each analysis to the average response of the same compound measured in the ICAL.

Calculate the ratio of the NIS peak areas from the QC and field samples relative to the mean area of the corresponding NIS in the most recent initial calibration to check for possible bad injections of NIS solution or loss of instrument sensitivity.

The NIS areas in the field samples and QC samples must be within 50 to 200% of the mean area of the corresponding NIS in the most recent initial calibration (i.e., within a factor of 2). If the areas are low for all the field samples and QC samples in the batch, it suggests a loss of instrument sensitivity, while low areas in only some field or QC samples suggests a possible bad injection.

### 10.5 Instrument QC

Perform the following checks to verify instrument performance. Refer to Appendix B for acceptance criteria and required corrective action.

| Instrument Check | Acronym | Frequency |
|---|---|---|
| Mass Calibration | | Annually and on as-needed basis |
| Mass Calibration Verification | | After mass calibration |

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| Instrument Check | Acronym | Frequency |
|---|---|---|
| Initial Calibration | ICAL | Prior to analysis, and on as-needed basis |
| Initial Calibration Verification | ICV | Following each ICAL |
| Instrument Blank | IBLK/ICB | Daily prior to analysis and after high standards |
| Instrument Sensitivity Check | ISC | Daily prior to analysis |
| Continuing Calibration Verification | CCV | At the beginning (ISC) and every 10 samples |
| Continuing Calibration Blank | CCB | After each bracketing CCV |
| RT Window | RTW | During ICAL and at the beginning of each analytical sequence |

## 10.6 Method Performance

### 10.6.1 Method Validation

Refer to corporate SOP ENV-SOP-CORQ-0011, *Method Validation and Instrument Verification*, for general requirements and procedures for method validation.

Establish Detection Limit (DL) and limits of quantitation (LOQ) at initial method set up and verify the DL and LOQ on an on-going basis thereafter. Refer to corporate policy and/or SOP for DL and LOQ requirements and procedures.

### 10.6.2 Demonstration of Capability (DOC)

Refer to laboratory SOP ENV-SOP-WEST-0122 Demonstration of Capability, or however named, for information regarding the laboratory's procedures for initial and ongoing Demonstration of Capability.

Prior to unsupervised (independent) work on any client sample, analysts that prepare or analyze samples must have successful initial demonstration of capability (IDOC) and must successfully demonstrate on-going proficiency on an annual basis (see below for details). Successful means the initial or on-going DOC met criteria, documentation of the DOC is complete, and the DOC record is in the employee’s training file.

Each DOC requires the extraction and analysis of four aliquots of the reference matrix type to be tested, prepared in the same way as the mid-level LCS. At least one method blank, matching the matrix being analyzed, must be prepared with the DOC batch. If more than one MB was prepared and analyzed with the DOC batch, all blank results must be reported. All sample processing steps that are to be used for processing samples, including preparation and extraction, must be included in this test.

Using the results of the four analyses, compute the average percent recovery (%REC) and the relative standard deviation (RSD) of the concentration of each target compound. There are no mean or RSD criteria for EIS compounds in the DOC; %REC of each DOC sample should meet the criteria in Appendix B, Tables 10, 11, or 12, depending on the matrix.

For each target compound, compare RSD and %REC to the corresponding limits for initial precision and recovery in Appendix B, Tables 7, 8, or 9, depending on the matrix.

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If RSD and %REC for all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin. If, however, any individual RSD exceeds the precision limit or any individual %REC falls outside the range for recovery, system performance is unacceptable for that compound. Correct the problem and repeat the test.

## 11.0 Data Review & Corrective Action

### 11.1 Data Review

The data review process of Pace® Analytical Services includes a series of checks performed at different stages of the process by different people to ensure that SOPs were followed, the analytical record is complete and properly documented, QC criteria were met, proper corrective actions were taken for QC failure and other nonconformance(s), and test results are reported with proper qualification, when necessary.

The review and checks that are performed by the employee performing the task is called primary review.

All data and test results are also peer reviewed. This process, known as secondary review, is performed to verify SOPs were followed, that calibration, instrument performance, and QC criteria were met and/or proper corrective actions were taken, qualitative ID and quantitative measurement is accurate, all manual integrations are justified, documented, and approved in accordance with the Pace® Analytical Services SOP for manual integration, calculations are correct, the analytical record is complete and traceable, and that results are properly qualified.

Lastly, a third-level review, called a completeness check, is performed by reporting or project management staff to verify the test report is complete.

Refer to laboratory SWI ENV-SWI-WEST-0087 SVOA Data Review Work Instructions for specific instructions and requirements for each step of the data review process.

### 11.2 Corrective Action

Corrective action is required when QC or sample results are not within acceptance criteria.

Refer to Appendix B for a complete summary of QC, acceptance criteria, and recommended corrective actions for QC associated with this test method.

If corrective action is not taken or was not successful, the decision/outcome must be documented in the analytical record. The primary analyst has primary responsibility for taking corrective action when QA/QC criteria are not met. Secondary data reviewers must verify that appropriate action was taken and/or that results reported with QC failure are properly qualified.

Corrective action is also required when carryover is suspected and when results are over range. Samples analyzed after a high concentration sample must be checked for carryover and reanalyzed if carryover is suspected. Carryover is usually indicated by low concentration detects of the analyte in successive samples analyzed after the high concentration sample.

Sample results at concentrations above the upper limit of quantitation must be diluted and reanalyzed. The result in the diluted samples should be within the working concentration range

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of the instrument calibration. If dilution is not performed, any result reported above the upper range is considered a qualitative measurement and must be qualified as an estimated value.

## 12.0 POLLUTION PREVENTION & WASTE MANAGEMENT

Refer to laboratory guide ENV-GUI-WEST-0020 Hazardous Waste Management and Disposal, or however named, for waste handling and management practices pertaining to the waste streams created at this facility.

Pace® proactively seeks ways to minimize waste generated during work processes. Some examples of pollution prevention include but are not limited to reduced solvent extraction, solvent capture, use of reusable cycletainers for solvent management, and real-time purchasing.

The EPA requires that laboratory waste management practices comply with all applicable federal and state laws and regulations. Excess reagents, samples, and method process wastes are characterized and disposed of in an acceptable manner in accordance with the Pace® Chemical Hygiene Plan / Safety Manual. Refer to this manual for these procedures.

## 13.0 MODIFICATIONS

The procedures in this SOP have been modified from the reference test method as follows:

| Modification | Section of Reference Method Modified | Justification for Modification | Validation of Modification |
|---|---|---|---|
| Updated EIS quantitation matching for select compounds (PFMPA, 7:3FTCA, ADONA, 9Cl-PF3ONS, 11Cl-PF3OUdS) | Section 20, Table 10 | Improved performance, more appropriate correlation | MDL, IDOC, PT |
| Updated product ion used for measurement of 13C4-PFOA from m/z 172 to m/z 372 | Section 20, Table 10 | Match ion transition used for EIS 13C8-PFOA and native PFOA | MDL, IDOC, PT |
| Increased SPE sorbent bed to 250mg, tube size to 20mL | Section 6.7.1 | Wider cartridge improves sample loading, reduces chances of clogs | MDL, IDOC, PT |
| Increased allowable sample loading rate to 5-10 mL/min | Section 12.1.4 | Reduced Sample processing time | MDL, IDOC, PT |
| Omit TSS for aqueous samples | Section 11.1 (11.1.1.5), 11.2.4 | Reduced sample processing time | MDL, IDOC, PT |
| Solid matrix extraction: reduced liquid-solid shake/decant steps to 2; omitted concentration step | Section 11.3 (11.3.4, 11.3.6, 11.3.9) | Improved performance & reduced sample processing time | MDL, IDOC, PT |
| GCB cartridges: eliminated dGCB + syringe filtration | Section 11.3.7, 11.4.7, 12.1, 12.2.3, 12.2.4, 12.3.3, 12.4.3 | Improved performance, reduced sample processing time, & ease of use | MDL, IDOC, PT |

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| Modification | Section of Reference Method Modified | Justification for Modification | Validation of Modification |
|---|---|---|---|
| Tissue matrix extraction: reduced liquid-solid shake/decant steps to 2; reduced shake time; omitted concentration step | Section 11.4.4, 11.4.6, 11.4.8 | Improved performance & reduced sample processing time | MDL, IDOC, PT |
| Clearly defined the characteristics used to distinguish Aqueous vs. Biosolid vs. Solid matrices | n/a | Increased clarity in process decision making, improved first-run performance | MDL, IDOC, PT |

When applicable, comparability and/or equivalency studies necessary to validate the modification as required per corporate SOP ENV-SOP-CORQ-0011, *Method Validation and Instrument Verification*, are retained by local quality personnel for historical reference.

## 14.0 RESPONSIBILITIES

- PAS employees that perform any part this procedure in their work activities must have a signed Read and Acknowledgement Statement (R&A) in their training file for the version(s) of the SOP that were in effect during the time the employee performed the activity.
- PAS supervisors and managers, however named, are responsible for training employees on the procedures in this SOP, implementing the SOP in the work area, and monitoring on-going adherence to the SOP in the work area(s) they oversee.
- PAS employees are responsible for following the procedures in this SOP. Unauthorized deviations or departures from this SOP are not allowed except with documented approval from the local QM and only when those deviations do not violate the Pace® Code of Ethics or Professional Conduct (COR-POL-0004) or associated policy and procedure(s). Hand-edits or manual changes to the SOP are not permitted. If a change is desired or necessary, Pace® employees must follow the procedures for document revision specified in corporate SOPs ENV-SOP-CORQ-0015, *Document Management* and ENV-SOP-CORQ-0016, *SOP for Creation of SOP and SWI.*

## 15.0 ATTACHMENTS

- Appendix A: Routine Analyte Limits (DL, LOQ), Analytical Parameters, and Calibration
- Appendix B: QC Summary & Corrective Action; Table: Method Acceptance Criteria
- Appendix C: State/Program Specific Requirements
- Appendix D: Sample Pre-screening Instructions
- Appendix E: Aqueous Sample Subsampling Instructions
- Appendix F: MS/MSD, MS/DUP Selection Protocols
- Appendix G: Aqueous Sample Management Decision Guide
- Appendix H: Aqueous Sample Centrifugation Protocol

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- Appendix I: Separation and Analysis of Liquid-Solid Biphasic Matrices
- Appendix J: TCLP/SPLP by 1633
- Appendix K: Wipe Analysis by 1633
- Appendix L: Articles of Commerce Analysis via Cryomill Processing
- Appendix M: Procedure for Total Oxidizable Precursors (TOP)

## 16.0 REFERENCES


- ENV-POL-CORQ-0005, *Acceptable Calibration Practices*, current version.
- ENV-SOP-CORQ-0006, *Manual Integration*, current version.
- ENV-SOP-CORQ-0011, *Method Validation and Instrument Verification*, current version.
- ENV-SOP-CORQ-0015, *Document Management*, current version.
- ENV-SOP-CORQ-0016, *Standard Operating Procedures and Standard Work Instructions,* current version.
- COR-POL-0004, *Code of Ethics and Professional Conduct*, current version.
- COR-MAN-001, *Pace® Safety Manua*l, current version.
- ENV-MAN-WEST-0001, *Quality Manual*, current version.
- TNI Standard, “Volume 1 Management and Technical Requirements for Laboratories Performing Environmental Analysis”, current version.
- “Working with Carcinogens,” Department of Health, Education, & Welfare, Public Health Service, Centers for Disease Control, NIOSH, Publication 77-206, August 1977, NTIS PB-277256.
- “OSHA Safety and Health Standards, General Industry,” OSHA 2206, 29 CFR 1910.
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## 17.0 REVISION HISTORY

**Revisions Made from Prior Version**

| Section | Description of Change |
|---|---|
| | N/A: new document |

**Document Succession: This version replaces the following document(s):**

| Document Number | Version | Document Title | Effective Date: |
|---|---|---|---|
| N/A | N/A | N/A | N/A |

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## Appendix A: Routine Analyte Limits (DL, LOQ), Analytical Parameters, and Calibration

DL and LOQ are always adjusted to account for actual amounts used and for dilution. Values listed are as of effective date of this SOP. DL and LOQ are subject to change. Contact quality personnel for current information. See Table 4 below for more information regarding analyte detection and quantitation.

**Table 1: Standard Analyte List – Aqueous and Landfill Leachate Matrices**

| Analyte Abbreviation | CAS # | Aqueous (ng/L) | | Leachate (ng/L) | |
|---|---|---|---|---|---|
| | | DL | LOQ | DL | LOQ |
| PFBA | 375-73-5 | 0.527 | 6.4 | 2.64 | 32 |
| PFPeA | 2706-91-4 | 0.359 | 3.2 | 1.79 | 16 |
| PFHxA | 355-46-4 | 0.245 | 1.6 | 1.22 | 8 |
| PFHpA | 375-92-8 | 0.238 | 1.6 | 1.19 | 8 |
| PFOA | 1763-23-1 | 0.263 | 1.6 | 1.31 | 8 |
| PFNA | 68259-12-1 | 0.266 | 1.6 | 1.33 | 8 |
| PFDA | 335-77-3 | 0.210 | 1.6 | 1.05 | 8 |
| PFUnA | 79780-39-5 | 0.178 | 1.6 | 0.892 | 8 |
| PFDoA | 375-73-5 | 0.214 | 1.6 | 1.07 | 8 |
| PFTrDA | 2706-91-4 | 0.187 | 1.6 | 0.934 | 8 |
| PFTeDA | 355-46-4 | 0.160 | 1.6 | 0.801 | 8 |
| PFBS | 375-73-5 | 0.402 | 1.6 | 2.01 | 8 |
| PFPeS | 2706-91-4 | 0.206 | 1.6 | 1.03 | 8 |
| PFHxS | 355-46-4 | 0.133 | 1.6 | 0.665 | 8 |
| PFHpS | 375-92-8 | 0.201 | 1.6 | 1.00 | 8 |
| PFOS | 1763-23-1 | 0.264 | 1.6 | 1.32 | 8 |
| PFNS | 68259-12-1 | 0.203 | 1.6 | 1.02 | 8 |
| PFDS | 335-77-3 | 0.140 | 1.6 | 0.699 | 8 |
| PFDoS | 79780-39-5 | 0.242 | 1.6 | 1.21 | 8 |
| 4:2 FTS | 757124-72-4 | 0.910 | 6.4 | 4.55 | 32 |
| 6:2 FTS | 27619-97-2 | 4.82 | 6.4 | 24.1 | 32 |
| 8:2 FTS | 39108-34-4 | 1.22 | 6.4 | 6.11 | 32 |
| PFOSA | 754-91-6 | 0.097 | 1.6 | .484 | 8 |
| NMeFOSA | 31506-32-8 | 0.226 | 1.6 | 1.13 | 8 |
| NEtFOSA | 4151-50-2 | 0.351 | 1.6 | 1.76 | 8 |

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| Analyte Abbreviation | CAS # | Aqueous (ng/L) | | Leachate (ng/L) | |
|---|---|---|---|---|---|
| | | DL | LOQ | DL | LOQ |
| NMeFOSAA | 2355-31-9 | 0.483 | 1.6 | 2.41 | 8 |
| NEtFOSAA | 2991-50-6 | 0.478 | 1.6 | 2.39 | 8 |
| NMeFOSE | 24448-09-7 | 1.30 | 16 | 6.52 | 80 |
| NEtFOSE | 1691-99-2 | 1.10 | 16 | 5.50 | 80 |
| HFPO-DA | 13252-13-6 | 1.60 | 6.4 | 8.02 | 32 |
| ADONA | 919005-14-4 | 0.376 | 6.4 | 1.88 | 32 |
| PFMPA | 377-73-1 | 0.244 | 3.2 | 1.22 | 16 |
| PFMBA | 863090-89-5 | 0.360 | 3.2 | 1.80 | 16 |
| NFDHA | 151772-58-6 | 0.541 | 3.2 | 2.71 | 16 |
| 9Cl-PF3ONS | 756426-58-1 | 0.442 | 6.4 | 2.21 | 32 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.447 | 6.4 | 2.23 | 32 |
| PFEESA | 113507-82-7 | 0.330 | 3.2 | 1.65 | 16 |
| 3:3 FTCA | 356-02-5 | 0.535 | 8 | 2.68 | 40 |
| 5:3 FTCA | 914637-49-3 | 4.26 | 40 | 21.3 | 200 |
| 7:3 FTCA | 812-70-4 | 3.18 | 40 | 15.9 | 200 |

**Table 2: Standard Analyte List – Solid and Biosolid Matrices**

| Analyte Abbreviation | CAS # | Solid (ng/g) | | Biosolid (ng/g) | |
|---|---|---|---|---|---|
| | | DL | LOQ | DL | LOQ |
| PFBA | 375-73-5 | 0.028 | 0.8 | 0.28 | 8 |
| PFPeA | 2706-91-4 | 0.038 | 0.4 | 0.38 | 4 |
| PFHxA | 355-46-4 | 0.016 | 0.2 | 0.16 | 2 |
| PFHpA | 375-92-8 | 0.012 | 0.2 | 0.12 | 2 |
| PFOA | 1763-23-1 | 0.026 | 0.2 | 0.26 | 2 |
| PFNA | 68259-12-1 | 0.012 | 0.2 | 0.12 | 2 |
| PFDA | 335-77-3 | 0.035 | 0.2 | 0.35 | 2 |
| PFUnA | 79780-39-5 | 0.013 | 0.2 | 0.13 | 2 |
| PFDoA | 375-73-5 | 0.021 | 0.2 | 0.21 | 2 |
| PFTrDA | 2706-91-4 | 0.016 | 0.2 | 0.16 | 2 |
| PFTeDA | 355-46-4 | 0.024 | 0.2 | 0.24 | 2 |
| PFBS | 375-73-5 | 0.020 | 0.2 | 0.20 | 2 |

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| Analyte Abbreviation | CAS # | Solid (ng/g) | | Biosolid (ng/g) | |
|---|---|---|---|---|---|
| | | DL | LOQ | DL | LOQ |
| PFPeS | 2706-91-4 | 0.027 | 0.2 | 0.27 | 2 |
| PFHxS | 355-46-4 | 0.020 | 0.2 | 0.20 | 2 |
| PFHpS | 375-92-8 | 0.045 | 0.2 | 0.45 | 2 |
| PFOS | 1763-23-1 | 0.031 | 0.2 | 0.31 | 2 |
| PFNS | 68259-12-1 | 0.029 | 0.2 | 0.29 | 2 |
| PFDS | 335-77-3 | 0.015 | 0.2 | 0.15 | 2 |
| PFDoS | 79780-39-5 | 0.022 | 0.2 | 0.22 | 2 |
| 4:2 FTS | 757124-72-4 | 0.078 | 0.8 | 0.78 | 8 |
| 6:2 FTS | 27619-97-2 | 0.148 | 0.8 | 1.48 | 8 |
| 8:2 FTS | 39108-34-4 | 0.259 | 0.8 | 2.59 | 8 |
| PFOSA | 754-91-6 | 0.011 | 0.2 | 0.11 | 2 |
| NMeFOSA | 31506-32-8 | 0.026 | 0.2 | 0.26 | 2 |
| NEtFOSA | 4151-50-2 | 0.022 | 0.2 | 0.22 | 2 |
| NMeFOSAA | 2355-31-9 | 0.086 | 0.2 | 0.86 | 2 |
| NEtFOSAA | 2991-50-6 | 0.044 | 0.2 | 0.44 | 2 |
| NMeFOSE | 24448-09-7 | 0.121 | 2.0 | 1.21 | 20 |
| NEtFOSE | 1691-99-2 | 0.081 | 2.0 | 0.81 | 20 |
| HFPO-DA | 13252-13-6 | 0.039 | 0.8 | 0.39 | 8 |
| ADONA | 919005-14-4 | 0.030 | 0.8 | 0.30 | 8 |
| PFMPA | 377-73-1 | 0.017 | 0.4 | 0.17 | 4 |
| PFMBA | 863090-89-5 | 0.024 | 0.4 | 0.24 | 4 |
| NFDHA | 151772-58-6 | 0.083 | 0.4 | 0.83 | 4 |
| 9Cl-PF3ONS | 756426-58-1 | 0.029 | 0.8 | 0.29 | 8 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.040 | 0.8 | 0.40 | 8 |
| PFEESA | 113507-82-7 | 0.046 | 0.4 | 0.46 | 4 |
| 3:3 FTCA | 356-02-5 | 0.092 | 1.0 | 0.92 | 10 |
| 5:3 FTCA | 914637-49-3 | 0.236 | 5.0 | 2.36 | 50 |
| 7:3 FTCA | 812-70-4 | 0.365 | 5.0 | 3.65 | 50 |

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**Table 3: Standard Analyte List – Tissue Matrices**

| Analyte Abbreviation | CAS # | DL (ng/g) | LOQ (ng/g) |
|---|---|---|---|
| PFBA | 375-73-5 | 0.215 | 2.0 |
| PFPeA | 2706-91-4 | 0.088 | 1.0 |
| PFHxA | 355-46-4 | 0.044 | 0.5 |
| PFHpA | 375-92-8 | 0.062 | 0.5 |
| PFOA | 1763-23-1 | 0.070 | 0.5 |
| PFNA | 68259-12-1 | 0.099 | 0.5 |
| PFDA | 335-77-3 | 0.102 | 0.5 |
| PFUnA | 79780-39-5 | 0.093 | 0.5 |
| PFDoA | 375-73-5 | 0.052 | 0.5 |
| PFTrDA | 2706-91-4 | 0.067 | 0.5 |
| PFTeDA | 355-46-4 | 0.039 | 0.5 |
| PFBS | 375-73-5 | 0.044 | 0.5 |
| PFPeS | 2706-91-4 | 0.029 | 0.5 |
| PFHxS | 355-46-4 | 0.075 | 0.5 |
| PFHpS | 375-92-8 | 0.093 | 0.5 |
| PFOS | 1763-23-1 | 0.084 | 0.5 |
| PFNS | 68259-12-1 | 0.065 | 0.5 |
| PFDS | 335-77-3 | 0.056 | 0.5 |
| PFDoS | 79780-39-5 | 0.062 | 0.5 |
| 4:2 FTS | 757124-72-4 | 0.222 | 2.0 |
| 6:2 FTS | 27619-97-2 | 0.934 | 2.0 |
| 8:2 FTS | 39108-34-4 | 0.249 | 2.0 |
| PFOSA | 754-91-6 | 0.051 | 0.5 |
| NMeFOSA | 31506-32-8 | 0.139 | 0.5 |
| NEtFOSA | 4151-50-2 | 0.115 | 0.5 |
| NMeFOSAA | 2355-31-9 | 0.089 | 0.5 |
| NEtFOSAA | 2991-50-6 | 0.106 | 0.5 |
| NMeFOSE | 24448-09-7 | 0.598 | 5.0 |
| NEtFOSE | 1691-99-2 | 0.410 | 5.0 |
| HFPO-DA | 13252-13-6 | 0.072 | 2.0 |

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| Analyte Abbreviation | CAS # | DL (ng/g) | LOQ (ng/g) |
|---|---|---|---|
| ADONA | 919005-14-4 | 0.139 | 2.0 |
| PFMPA | 377-73-1 | 0.078 | 1.0 |
| PFMBA | 863090-89-5 | 0.086 | 1.0 |
| NFDHA | 151772-58-6 | 0.113 | 1.0 |
| 9Cl-PF3ONS | 756426-58-1 | 0.179 | 2.0 |
| 11Cl-PF3OUdS | 763051-92-9 | 0.228 | 2.0 |
| PFEESA | 113507-82-7 | 0.069 | 1.0 |
| 3:3 FTCA | 356-02-5 | 0.145 | 2.5 |
| 5:3 FTCA | 914637-49-3 | 1.54 | 12.5 |
| 7:3 FTCA | 812-70-4 | 1.26 | 12.5 |

**Table 4: Identification and Quantification Information for Target Analytes, Extracted Internal Standards and Non-extracted Internal Standards.**

| Analyte Name | CAS # | Analyte Abbreviation | Parent Ion Mass | Quantification Ion Mass | Confirmation Ion Mass | Quantification Reference Compound |
|---|---|---|---|---|---|---|
| Perfluorobutanoic acid | 375-73-5 | PFBA | 213 | 169 | NA | 13C4-PFBA |
| Perfluoropentanoic acid | 2706-91-4 | PFPeA | 263 | 219 | 69 | 13C5-PFPeA |
| Perfluorohexanoic acid | 355-46-4 | PFHxA | 313 | 269 | 119 | 13C5-PFHxA |
| Perfluoroheptanoic acid | 375-92-8 | PFHpA | 363 | 319 | 169 | 13C4-PFHpA |
| Perfluorooctanoic acid | 1763-23-1 | PFOA | 413 | 369 | 169 | 13C8-PFOA |
| Perfluorononanoic acid | 68259-12-1 | PFNA | 463 | 419 | 219 | 13C9-PFNA |
| Perfluorodecanoic acid | 335-77-3 | PFDA | 513 | 469 | 219 | 13C6-PFDA |
| Perfluoroundecanoic acid | 79780-39-5 | PFUnA | 563 | 519 | 269 | 13C7-PFUnA |
| Perfluorododecanoic acid | 375-73-5 | PFDoA | 613 | 569 | 319 | 13C2-PFDoA |
| Perfluorotridecanoic acid | 2706-91-4 | PFTrDA | 663 | 619 | 169 | 13C2-PFDoA |
| Perfluorotetradecanoic acid | 355-46-4 | PFTeDA | 713 | 669 | 169 | 13C2-PFTeDA |
| Perfluorobutanesulfonic acid | 375-73-5 | PFBS | 299 | 80 | 99 | 13C3-PFBS |
| Perfluoropentansulfonic acid | 2706-91-4 | PFPeS | 349 | 80 | 99 | 13C3-PFHxS |
| Perfluorohexanesulfonic acid | 355-46-4 | PFHxS | 399 | 80 | 99 | 13C3-PFHxS |

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| Analyte Name | CAS # | Analyte Abbreviation | Parent Ion Mass | Quantification Ion Mass | Confirmation Ion Mass | Quantification Reference Compound |
|---|---|---|---|---|---|---|
| Perfluoroheptanesulfonic acid | 375-92-8 | PFHpS | 449 | 80 | 99 | 13C8-PFOS |
| Perfluorooctanesulfonic acid | 1763-23-1 | PFOS | 499 | 80 | 99 | 13C8-PFOS |
| Perfluorononanesulfonic acid | 68259-12-1 | PFNS | 549 | 80 | 99 | 13C8-PFOS |
| Perfluorodecanesulfonic acid | 335-77-3 | PFDS | 599 | 80 | 99 | 13C8-PFOS |
| Perfluorododecanesulfonic acid | 79780-39-5 | PFDoS | 699 | 80 | 99 | 13C8-PFOS |
| 1H,1H, 2H, 2H-Perfluorohexane sulfonic acid | 757124-72-4 | 4:2 FTS | 327 | 307 | 81 | 13C2-4:2FTS |
| 1H,1H, 2H, 2H-Perfluorooctane sulfonic acid | 27619-97-2 | 6:2 FTS | 427 | 407 | 81 | 13C2-6:2FTS |
| 1H,1H, 2H, 2H-Perfluorodecane sulfonic acid | 39108-34-4 | 8:2 FTS | 527 | 507 | 81 | 13C2-8:2FTS |
| Perfluorooctanesulfonamide | 754-91-6 | PFOSA | 498 | 78 | 478 | 13C8-PFOSA |
| N-methyl perfluorooctanesulfonamide | 31506-32-8 | NMeFOSA | 512 | 219 | 169 | D3-NMeFOSA |
| N-ethyl perfluorooctanesulfonamide | 4151-50-2 | NEtFOSA | 526 | 219 | 169 | D5-NEtFOSA |
| N-methyl perfluorooctanesulfonamidoacetic acid | 2355-31-9 | NMeFOSAA | 570 | 419 | 483 | D3-NMeFOSAA |
| N-ethyl perfluorooctanesulfonamidoacetic acid | 2991-50-6 | NEtFOSAA | 584 | 419 | 526 | D5-NEtFOSAA |
| N-methyl perfluorooctanesulfonamidoethanol | 24448-09-7 | NMeFOSE | 616 | 59 | NA | D7-NMeFOSE |
| N-ethyl perfluorooctanesulfonamidoethanol | 1691-99-2 | NEtFOSE | 630 | 59 | NA | D9-NEtFOSE |
| Hexafluoropropylene oxide dimer acid (GenX) | 13252-13-6 | HFPO-DA | 285 | 169 | 185 | 13C3-HFPODA |
| 4,8-Dioxa-3H-perfluorononanoic acid | 919005-14-4 | ADONA | 377 | 251 | 85 | 13C4-PFHpA |
| Perfluoro-3-methoxypropanoic acid | 377-73-1 | PFMPA | 229 | 85 | NA | 13C4-PFBA |
| Perfluoro-4-methoxybutanoic acid | 863090-89-5 | PFMBA | 279 | 85 | NA | 13C5-PFPeA |
| Nonafluoro-3,6-dioxaheptanoic acid | 151772-58-6 | NFDHA | 295 | 201 | 85 | 13C5-PFHxA |

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| Analyte Name | CAS # | Analyte Abbreviation | Parent Ion Mass | Quantification Ion Mass | Confirmation Ion Mass | Quantification Reference Compound |
|---|---|---|---|---|---|---|
| 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid | 756426-58-1 | 9Cl-PF3ONS | 531 | 351 | 533→353 | 13C8-PFOS |
| 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid | 763051-92-9 | 11Cl-PF3OUdS | 631 | 451 | 633→453 | 13C8-PFOS |
| Perfluoro(2-ethoxyethane)sulfonic acid | 113507-82-7 | PFEESA | 315 | 135 | 83 | 13C5-PFHxA |
| 3-Perfluoropropyl propanoic acid (FPrPA) | 356-02-5 | 3:3FTCA | 241 | 177 | 117 | 13C5-PFPeA |
| 2H,2H,3H,3H-Perfluorooctanoic acid (FPePA) | 914637-49-3 | 5:3FTCA | 341 | 237 | 217 | 13C5-PFHxA |
| 3-Perfluoroheptyl propanoic acid (FHpPA) | 812-70-4 | 7:3FTCA | 441 | 337 | 317 | 13C9-PFNA |
| **Extracted Internal Standard Compounds (EIS)** | | | | | | |
| Perfluoro-n-[13C4] butanoic acid | NA | 13C4-PFBA | 217 | 172 | NA | 13C3-PFBA |
| Perfluoro-n-[13C5] pentanoic acid | NA | 13C5-PFPeA | 268 | 223 | NA | 13C2-PFHxA |
| Perfluoro-n-[1,2,3,4,6-13C5] hexanoic acid | NA | 13C5-PFHxA | 318 | 273 | NA | 13C2-PFHxA |
| Perfluoro-n-[1,2,3,4-13C4] heptanoic acid | NA | 13C4-PFHpA | 367 | 322 | NA | 13C2-PFHxA |
| Perfluoro-n-[13C8] octanoic acid | NA | 13C8-PFOA | 421 | 376 | NA | 13C4-PFOA |
| Perfluoro-n-[13C9] nonanoic acid | NA | 13C9-PFNA | 472 | 427 | NA | 13C5-PFNA |
| Perfluoro-n-[1,2,3,4,5,6-13C6] decanoic acid | NA | 13C6-PFDA | 519 | 474 | NA | 13C2-PFDA |
| Perfluoro-n-[1,2,3,4,5,6,7-13C7] undecanoic acid | NA | 13C7-PFUnA | 570 | 525 | NA | 13C2-PFDA |
| Perfluoro-n-[1,2-13C2] dodecanoic acid | NA | 13C2-PFDoA | 615 | 570 | NA | 13C2-PFDA |
| Perfluoro-n-[1,2-13C2] tetradecanoic acid | NA | 13C2-PFTeDA | 715 | 670 | NA | 13C2-PFDA |
| Perfluoro-1-[2,3,4-13C3] butanesulfonic acid | NA | 13C3-PFBS | 302 | 80 | NA | 18O2-PFHxS |
| Perfluoro-1-[1,2,3-13C3] hexanesulfonic acid | NA | 13C3-PFHxS | 402 | 80 | NA | 18O2-PFHxS |

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| Analyte Name | CAS # | Analyte Abbreviation | Parent Ion Mass | Quantification Ion Mass | Confirmation Ion Mass | Quantification Reference Compound |
|---|---|---|---|---|---|---|
| Perfluoro-1-[13C8] octanesulfonic acid | NA | 13C8-PFOS | 507 | 80 | NA | 13C4-PFOS |
| 1H,1H,2H,2H-Perfluoro-1-[1,2-13C2] hexanesulfonic acid | NA | 13C2-4:2FTS | 329 | 81 | NA | 18O2-PFHxS |
| 1H,1H,2H,2H-Perfluoro-1-[1,2-13C2] octanesulfonic acid | NA | 13C2-6:2FTS | 429 | 81 | NA | 18O2-PFHxS |
| 1H,1H,2H,2H-Perfluoro-1-[1,2-13C2] decanesulfonic acid | NA | 13C2-8:2FTS | 529 | 81 | NA | 18O2-PFHxS |
| Perfluoro-1-[13C8] octanesulfonamide | NA | 13C8-PFOSA | 506 | 78 | NA | 13C4-PFOS |
| N-methyl-D3-perfluoro-1-octanesulfonamide | NA | D3-NMeFOSA | 515 | 219 | NA | 13C4-PFOS |
| N-ethyl-D5-perfluoro-1-octanesulfonamide | NA | D5-NEtFOSA | 531 | 219 | NA | 13C4-PFOS |
| N-methyl-D3-perfluoro-1-octanesulfonamidoacetic acid | NA | D3-NMeFOSAA | 573 | 419 | NA | 13C4-PFOS |
| N-ethyl-D5-perfluoro-1-octanesulfonamidoacetic acid | NA | D5-NEtFOSAA | 589 | 419 | NA | 13C4-PFOS |
| N-methyl-D7-perfluorooctanesulfonamidoethanol | NA | D7-NMeFOSE | 623 | 59 | NA | 13C4-PFOS |
| N-ethyl-D9-perfluorooctanesulfonamidoethanol | NA | D9-NEtFOSE | 639 | 59 | NA | 13C4-PFOS |
| Tetrafluoro-2-heptafluoropropoxy-13C3-propanoic acid | NA | 13C3-HFPO-DA | 287 | 169 | NA | 13C2-PFHxA |
| **Non-extracted Internal Standard Compounds (NIS)** | | | | | | |
| Perfluoro-n-[2,3,4-13C3] butanoic acid | NA | 13C3-PFBA | 216 | 172 | NA | NA |
| Perfluoro-n-[1,2-13C2]hexanoic acid | NA | 13C2-PFHxA | 315 | 270 | NA | NA |
| Perfluoro-n-[1,2,3,4-13C4]octanoic acid | NA | 13C4-PFOA | 417 | 172 | NA | NA |
| Perfluoro-n-[1,2,3,4,5-13C5] nonanoic acid | NA | 13C5-PFNA | 468 | 423 | NA | NA |

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| Analyte Name | CAS # | Analyte Abbreviation | Parent Ion Mass | Quantification Ion Mass | Confirmation Ion Mass | Quantification Reference Compound |
|---|---|---|---|---|---|---|
| Perfluoro-n-[1,2-13C2]decanoic acid | NA | 13C2-PFDA | 515 | 470 | NA | NA |
| Perfluoro-1-hexane[18O2]sulfonic acid | NA | 18O2-PFHxS | 403 | 84 | NA | NA |
| Perfluoro-n-[1,2,3,4-13C4] octanesulfonic acid | NA | 13C4-PFOS | 503 | 80 | NA | NA |

**Table 5: Calibration Standard Concentrations (ng/mL)**

| Compound | L1 | L2 (ISC) | L3 | L4 | L5 (CCV) | L6 | L7 | L8 | L9 |
|---|---|---|---|---|---|---|---|---|---|
| **Perfluoroalkyl carboxylic acids** | | | | | | | | | |
| PFBA | 0.4 | 0.8 | 2 | 10 | 20 | 50 | 100 | 200 | 250 |
| PFPeA | 0.2 | 0.4 | 1 | 5 | 10 | 25 | 50 | 100 | 125 |
| PFHxA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFHpA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFOA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFNA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFDA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFUnA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFDoA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFTrDA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| PFTeDA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| **Perfluoroalkyl sulfonic acids** | | | | | | | | | |
| PFBS | 0.089 | 0.178 | 0.444 | 2.22 | 4.44 | 11.1 | 22.2 | 44.4 | 55.5 |
| PFPeS | 0.094 | 0.188 | 0.470 | 2.35 | 4.70 | 11.8 | 23.5 | 47.0 | 58.8 |
| PFHxS | 0.091 | 0.182 | 0.456 | 2.28 | 4.56 | 11.4 | 22.8 | 45.6 | 57.0 |
| PFHpS | 0.095 | 0.190 | 0.476 | 2.38 | 4.76 | 11.9 | 23.8 | 47.6 | 59.5 |
| PFOS | 0.093 | 0.186 | 0.464 | 2.32 | 4.64 | 11.6 | 23.2 | 46.4 | 58.0 |
| PFNS | 0.096 | 0.192 | 0.480 | 2.40 | 4.80 | 12.0 | 24.0 | 48.0 | 60.0 |
| PFDS | 0.096 | 0.193 | 0.482 | 2.41 | 4.82 | 12.1 | 24.1 | 48.2 | 60.3 |
| PFDoS | 0.097 | 0.194 | 0.484 | 2.42 | 4.84 | 12.1 | 24.2 | 48.4 | 60.5 |
| **Fluorotelomer sulfonic acids** | | | | | | | | | |
| 4:2FTS | 0.375 | 0.750 | 1.87 | 9.37 | 18.7 | 46.9 | 93.7 | 187 | 234 |
| 6:2FTS | 0.380 | 0.761 | 1.90 | 9.51 | 19.0 | 47.6 | 95.1 | 190 | 238 |
| 8:2FTS | 0.384 | 0.768 | 1.92 | 9.6 | 19.2 | 48 | 96 | 192 | 240 |
| **Perfluorooctane sulfonamides** | | | | | | | | | |

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| Compound | L1 | L2 (ISC) | L3 | L4 | L5 (CCV) | L6 | L7 | L8 | L9 |
|---|---|---|---|---|---|---|---|---|---|
| PFOSA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| NMeFOSA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| NEtFOSA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| **Perfluorooctane sulfonamidoacetic acids** | | | | | | | | | |
| NMeFOSAA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| NEtFOSAA | 0.1 | 0.2 | 0.5 | 2.5 | 5 | 12.5 | 25 | 50 | 62.5 |
| **Perfluorooctane sulfonamide ethanols** | | | | | | | | | |
| NMeFOSE | 1 | 2 | 5 | 25 | 50 | 125 | 250 | 500 | 625 |
| NEtFOSE | 1 | 2 | 5 | 25 | 50 | 125 | 250 | 500 | 625 |
| **Per- and polyfluoroether carboxylic acids** | | | | | | | | | |
| HFPO-DA | 0.4 | 0.8 | 2 | 10 | 20 | 50 | 100 | 200 | 250 |
| ADONA | 0.378 | 0.756 | 1.89 | 9.45 | 18.9 | 47.25 | 94.5 | 189 | 236.25 |
| PFMPA | 0.2 | 0.4 | 1 | 5 | 10 | 25 | 50 | 100 | 125 |
| PFMBA | 0.2 | 0.4 | 1 | 5 | 10 | 25 | 50 | 100 | 125 |
| NFDHA | 0.2 | 0.4 | 1 | 5 | 10 | 25 | 50 | 100 | 125 |
| **Ether sulfonic acids** | | | | | | | | | |
| 9Cl-PF3ONS | 0.373 | 0.746 | 1.87 | 9.33 | 18.7 | 46.7 | 93.3 | 187 | 233 |
| 11Cl-PF3OUdS | 0.377 | 0.754 | 1.89 | 9.43 | 18.9 | 47.2 | 94.3 | 189 | 236 |
| PFEESA | 0.178 | 0.357 | 0.892 | 4.46 | 8.92 | 22.3 | 44.6 | 89.2 | 112 |
| **Fluorotelomer Carboxylic Acids** | | | | | | | | | |
| 3:3FTCA | 0.5 | 1 | 2.5 | 12.5 | 25 | 62.5 | 125 | 250 | 312.5 |
| 5:3FTCA | 2.5 | 5 | 12.5 | 62.5 | 125 | 312.5 | 625 | 1250 | 1560 |
| 7:3FTCA | 2.5 | 5 | 12.5 | 62.5 | 125 | 312.5 | 625 | 1250 | 1560 |
| **Extracted Internal Standards (EIS)** | | | | | | | | | |
| 13C4-PFBA | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 13C5-PFPeA | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 13C5-PFHxA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 13C4-PFHpA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 13C8-PFOA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 13C9-PFNA | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 13C6-PFDA | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 13C7-PFUnA | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 13C2-PFDoA | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 13C2-PFTeDA | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 13C3-PFBS | 2.33 | 2.33 | 2.33 | 2.33 | 2.33 | 2.33 | 2.33 | 2.33 | 2.33 |
| 13C3-PFHxS | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 |
| 13C8-PFOS | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |
| 13C2-4:2FTS | 4.69 | 4.69 | 4.69 | 4.69 | 4.69 | 4.69 | 4.69 | 4.69 | 4.69 |

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| Compound | L1 | L2 (ISC) | L3 | L4 | L5 (CCV) | L6 | L7 | L8 | L9 |
|---|---|---|---|---|---|---|---|---|---|
| 13C2-6:2FTS | 4.76 | 4.76 | 4.76 | 4.76 | 4.76 | 4.76 | 4.76 | 4.76 | 4.76 |
| 13C2-8:2FTS | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 13C8-PFOSA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| D3-NMeFOSA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| D5-NEtFOSA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| D3-NMeFOSAA | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| D5-NEtFOSAA | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| D7-NMeFOSE | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| D9-NEtFOSE | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| 13C3-HFPODA | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| **Non-Extracted Internal Standards (NIS)** | | | | | | | | | |
| 13C3-PFBA | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 13C2-PFHxA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 13C4-PFOA | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| 13C5-PFNA | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 13C2-PFDA | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 18O2-PFHxS | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 |
| 13C4-PFOS | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 | 2.40 |

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## Appendix B: QC Summary & Corrective Action Table; Method Acceptance Criteria

### Table 6: QC Summary & Corrective Action

| QC Item | Frequency | Acceptance Criteria | Corrective Action | Qualification |
|---|---|---|---|---|
| Demonstration of Capability (DOC) | Initially, prior to analyzing field samples and annually thereafter. | See Method Acceptance Criteria for each matrix in the Tables below. | Identify and correct source of problem, repeat. | None. Do not proceed with analysis. |
| Mass Calibration | Annually and on as-needed basis. | Must meet manufacturer's acceptance criteria. | Identify and correct source of problem, repeat. | None. Do not proceed with analysis. |
| Mass Calibration Verification | After each Mass Calibration performed. | Must meet manufacturer's acceptance criteria. | Identify and correct source of problem, repeat Mass Calibration. | None. Do not proceed with analysis. |
| Initial Calibration (ICAL) | At instrument set up, after CCV failure and/or major maintenance. | Must meet one of the curve fit options presented in Section 9.2.4. | Identify and correct source of problem, repeat. | None. Do not proceed with analysis. |
| Initial Calibration Verification (ICV) | After Each ICAL. | All analytes must be within ± 30% of their true values. (%R) | Identify and correct source of problem, re-analyze. If repeat failure, repeat ICAL. Analysis may proceed if it can be demonstrated that the ICV exceedance has no impact on analytical measurements. For example, the ICV %R is high, CCV is within criteria, and the analyte is not detected in sample(s). | Qualify analytes with ICV out of criteria when results are unaffected; otherwise, correct the problem and repeat ICV. |
| Initial Calibration Blank (ICB) | After highest concentration ICAL standard. | Must meet criteria specified in Section 9.2.5: all detections ≤MDL concentration. | Identify and correct source of contamination or performance issue. Alternately, calibrate using a lower concentration standard for the highest point. | No samples shall be analyzed until ICB has met acceptance criteria. |
| RT Window Position | Once per ICAL and at the beginning of the analytical window. | Position is set using the mid-point of the ICAL on the day ICAL is performed; otherwise, opening CCV is used. RT Window is ± 60 secs from RT position. | NA | NA |
| Instrument Sensitivity Check (ISC) | Daily before sample analysis. | All native and isotopically labelled compounds within ± 30% recovery. | Identify and correct source of problem and reanalyze ISC. If problem persists, repeat ICAL. | No samples shall be analyzed until ISC has met acceptance |

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| QC Item | Frequency | Acceptance Criteria | Corrective Action | Qualification |
|---|---|---|---|---|
| | | | | criteria. See Section 9.2.4.5 for exceptions. |
| Bile Salts Check | With each ICAL and daily with each CCV | Bile Salt peak detected >1 min outside RT window for PFOS. | Identify and correct source of problem, then reevaluate Bile Salts separation from PFOS. | No samples shall be analyzed until Bile Salts Check has met acceptance criteria. |
| Continuing Calibration Verification (CCV) | Daily before sample analysis, after every 10 samples, and at end of analytical sequence. | All native and isotopically labelled compounds within ±30% recovery. | See Section 9.2.4.5 for required corrective actions based on circumstance. | Qualify analytes with CCV out of criteria. |
| Instrument Blank (IBLK) / Continuing Calibration Blank (CCB) | Daily prior to analysis and after high standards, including CCV. | Must meet criteria specified in Section 9.2.5: all detections ≤MDL concentration. | Identify and correct source of contamination or performance issue. Reanalyze IBLK. | No samples shall be analyzed until IBLK has met acceptance criteria. |
| Extracted Internal Standards (EIS) | Every field sample, standard and QC sample. | See Method Acceptance Criteria for each matrix in the Tables below. | If batch QC is acceptable, reanalyze to confirm. If confirmed, re-extract and reanalyze samples. If reprep is within acceptance, report reprep data. If failure is confirmed by reprep, qualify as matrix impacted. | Qualify outages and explain in case narrative. |
| Non-extracted Internal Standards (NIS) | Every field sample, standard and QC sample. | NIS areas in all samples must be within 50 – 200% of the average area of the corresponding NIS in the ICAL. | Troubleshoot instrument performance. Reanalyze samples. | Qualify outages and explain in case narrative. |
| Method Blank (MB) | 1 per batch of 20 or fewer samples. | Must meet criteria specified in Section 10.4.1: all detections ≤MDL concentration. | If IBLK is acceptable, reanalyze MB to confirm. If confirmed, re-extract and reanalyze associated impacted samples (if sufficient sample remains). If insufficient sample remains for reprep, narrate and report data associated with unacceptable MB. See Section 10.4.1 for more details. | Qualify outages and explain in case narrative. |

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| QC Item | Frequency | Acceptance Criteria | Corrective Action | Qualification |
|---|---|---|---|---|
| LCS/LLLCS | 1 pair per batch of 20 or fewer samples. | See Method Acceptance Criteria for each matrix in the Tables below; must meet criteria specified in Section 10.4.2. | If most recent ISC/CCV is acceptable, reanalyze LCS to confirm. If low-failure results are confirmed, re-extract and reanalyze associated samples (if sufficient sample remains). If insufficient sample remains for reprep, narrate and report data associated with low-failure LCS. If high-failure results are confirmed and sample(s) is ND for failing compound, narrate and report sample data. | Qualify outages and explain in case narrative. |
| MS/MSD | 1 pair per batch of 20 or fewer samples. (If requested) | RSD ≤30% between MS/MSD | If possible, reprep to confirm. | Qualify outages and explain in case narrative. |
| Laboratory Duplicate | 1 per AFFF sample; 1 per prep batch for all other matrices (if requested). | RSD ≤30% between parent/DUP | If possible, reprep to confirm. | Qualify outages and explain in case narrative. |

**Table 7: DOC/LCS/LLLCS Acceptance Limits for Aqueous & Landfill Leachate Matrices**

| Target Analyte | DOC Mean Recovery (%) | DOC RSD (%) | LCS/LLLCS Recovery (%) |
|---|---|---|---|
| PFBA | 70-135 | 21 | 70-140 |
| PFPeA | 70-135 | 23 | 65-135 |
| PFHxA | 70-135 | 24 | 70-145 |
| PFHpA | 70-135 | 28 | 70-150 |
| PFOA | 65-155 | 27 | 70-150 |
| PFNA | 70-140 | 28 | 70-150 |
| PFDA | 65-140 | 26 | 70-140 |
| PFUnA | 70-135 | 29 | 70-145 |
| PFDoA | 70-130 | 21 | 70-140 |
| PFTrDA | 60-145 | 29 | 65-140 |
| PFTeDA | 70-145 | 27 | 60-140 |
| PFBS | 70-140 | 23 | 60-145 |
| PFPeS | 70-135 | 25 | 65-140 |
| PFHxS | 70-135 | 27 | 65-145 |
| PFHpS | 70-140 | 30 | 70-150 |
| PFOS | 70-140 | 29 | 55-150 |
| PFNS | 70-135 | 29 | 65-145 |
| PFDS | 70-135 | 30 | 60-145 |

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| Target Analyte | DOC Mean Recovery (%) | DOC RSD (%) | LCS/LLLCS Recovery (%) |
|---|---|---|---|
| PFDoS | 45-135 | 35 | 50-145 |
| 4:2FTS | 70-135 | 27 | 70-145 |
| 6:2FTS | 70-135 | 32 | 65-155 |
| 8:2FTS | 70-140 | 33 | 60-150 |
| PFOSA | 70-135 | 22 | 70-145 |
| NMeFOSA | 70-135 | 30 | 60-150 |
| NEtFOSA | 70-130 | 26 | 65-145 |
| NMeFOSAA | 65-140 | 32 | 50-140 |
| NEtFOSAA | 70-135 | 28 | 70-145 |
| NMeFOSE | 70-135 | 29 | 70-145 |
| NEtFOSE | 70-130 | 21 | 70-135 |
| HFPO-DA | 70-135 | 23 | 70-140 |
| ADONA | 70-135 | 23 | 65-145 |
| PFMPA | 60-140 | 23 | 55-140 |
| PFMBA | 65-145 | 27 | 60-150 |
| NFDHA | 65-140 | 37 | 50-150 |
| 9Cl-PF3ONS | 70-145 | 30 | 70-155 |
| 11Cl-PF3OUdS | 50-150 | 35 | 55-160 |
| PFEESA | 70-135 | 25 | 70-140 |
| 3:3FTCA | 70-130 | 23 | 65-130 |
| 5:3FTCA | 70-130 | 24 | 70-135 |
| 7:3FTCA | 55-130 | 34 | 50-145 |

**Table 8: DOC/LCS/LLLCS Acceptance Limits for Solid & Biosolid Matrices**

| Target Analyte | DOC Mean Recovery (%) | DOC RSD (%) | LCS/LLLCS Recovery (%) |
|---|---|---|---|
| PFBA | 70-140 | 17 | 70-140 |
| PFPeA | 70-140 | 26 | 60-150 |
| PFHxA | 70-135 | 23 | 65-140 |
| PFHpA | 70-140 | 21 | 65-145 |
| PFOA | 70-140 | 23 | 70-150 |
| PFNA | 65-145 | 24 | 70-155 |
| PFDA | 70-145 | 26 | 70-155 |
| PFUnA | 70-145 | 26 | 70-155 |
| PFDoA | 70-145 | 25 | 70-150 |
| PFTrDA | 55-160 | 26 | 65-150 |
| PFTeDA | 70-145 | 24 | 65-150 |
| PFBS | 60-145 | 25 | 65-145 |
| PFPeS | 65-140 | 29 | 55-160 |
| PFHxS | 65-145 | 28 | 60-150 |
| PFHpS | 70-140 | 27 | 65-155 |
| PFOS | 70-135 | 27 | 65-160 |
| PFNS | 70-140 | 27 | 55-140 |

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| Target Analyte | DOC Mean Recovery (%) | DOC RSD (%) | LCS/LLLCS Recovery (%) |
|---|---|---|---|
| PFDS | 50-150 | 31 | 40-155 |
| PFDoS | 40-140 | 40 | 25-160 |
| 4:2FTS | 70-135 | 27 | 60-150 |
| 6:2FTS | 60-160 | 50 | 55-200 |
| 8:2FTS | 70-140 | 27 | 70-150 |
| PFOSA | 70-140 | 19 | 70-140 |
| NMeFOSA | 65-145 | 26 | 70-155 |
| NEtFOSA | 70-135 | 19 | 70-140 |
| NMeFOSAA | 65-145 | 31 | 65-155 |
| NEtFOSAA | 60-150 | 31 | 65-165 |
| NMeFOSE | 70-140 | 19 | 70-140 |
| NEtFOSE | 70-135 | 17 | 70-135 |
| HFPO-DA | 70-140 | 25 | 70-145 |
| ADONA | 70-155 | 26 | 70-160 |
| PFMPA | 70-140 | 25 | 30-140 |
| PFMBA | 55-145 | 33 | 60-150 |
| NFDHA | 45-145 | 27 | 60-155 |
| 9Cl-PF3ONS | 65-135 | 23 | 70-150 |
| 11Cl-PF3OUdS | 50-135 | 31 | 45-160 |
| PFEESA | 70-140 | 20 | 70-140 |
| 3:3FTCA | 45-155 | 32 | 45-130 |
| 5:3FTCA | 70-135 | 28 | 60-130 |
| 7:3FTCA | 70-145 | 39 | 60-150 |

**Table 9: DOC/LCS/LLLCS Acceptance Limits for Tissue Matrix**

| Target Analyte | DOC Mean Recovery (%) | DOC RSD (%) | LCS/LLLCS Recovery (%) |
|---|---|---|---|
| PFBA | 70-135 | 20 | 60-140 |
| PFPeA | 70-130 | 20 | 60-145 |
| PFHxA | 70-140 | 20 | 60-160 |
| PFHpA | 70-140 | 20 | 60-145 |
| PFOA | 70-130 | 25 | 60-150 |
| PFNA | 70-140 | 20 | 60-145 |
| PFDA | 70-135 | 20 | 60-150 |
| PFUnA | 70-135 | 20 | 60-155 |
| PFDoA | 70-135 | 20 | 60-140 |
| PFTrDA | 55-160 | 20 | 60-150 |
| PFTeDA | 70-140 | 25 | 60-140 |
| PFBS | 70-145 | 20 | 60-150 |
| PFPeS | 70-150 | 20 | 60-145 |
| PFHxS | 70-140 | 25 | 60-155 |
| PFHpS | 70-145 | 20 | 60-140 |
| PFOS | 70-135 | 30 | 60-160 |

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| Target Analyte | DOC Mean Recovery (%) | DOC RSD (%) | LCS/LLLCS Recovery (%) |
|---|---|---|---|
| PFNS | 60-130 | 20 | 45-140 |
| PFDS | 55-135 | 20 | 50-140 |
| PFDoS | 25-145 | 45 | 25-140 |
| 4:2FTS | 65-140 | 30 | 55-150 |
| 6:2FTS | 70-140 | 25 | 60-150 |
| 8:2FTS | 70-150 | 25 | 60-170 |
| PFOSA | 70-140 | 20 | 60-150 |
| NMeFOSA | 70-140 | 30 | 60-160 |
| NEtFOSA | 70-140 | 40 | 60-150 |
| NMeFOSAA | 70-140 | 20 | 60-145 |
| NEtFOSAA | 70-140 | 25 | 60-145 |
| NMeFOSE | 60-150 | 20 | 40-180 |
| NEtFOSE | 70-145 | 40 | 60-205 |
| HFPO-DA | 70-140 | 25 | 60-145 |
| ADONA | 70-145 | 20 | 55-165 |
| PFMPA | 70-145 | 40 | 25-145 |
| PFMBA | 70-140 | 20 | 60-150 |
| NFDHA | 70-155 | 30 | 60-180 |
| 9Cl-PF3ONS | 70-140 | 20 | 60-170 |
| 11Cl-PF3OUdS | 65-140 | 20 | 50-170 |
| PFEESA | 70-145 | 25 | 50-150 |
| 3:3FTCA | 55-130 | 25 | 30-140 |
| 5:3FTCA | 70-145 | 20 | 60-160 |
| 7:3FTCA | 70-155 | 20 | 60-200 |

**Table 10: Acceptance Limits for EIS and NIS Compounds in Aqueous & Landfill Leachate Matrices**

| Labeled Compound | Aqueous Recovery (%) | Landfill Leachate Recovery (%) |
|---|---|---|
| 13C4-PFBA | 5-130 | 5-130 |
| 13C5-PFPeA | 40-130 | 40-130 |
| 13C5-PFHxA | 40-130 | 40-130 |
| 13C4-PFHpA | 40-130 | 40-130 |
| 13C8-PFOA | 40-130 | 40-130 |
| 13C9-PFNA | 40-130 | 40-130 |
| 13C6-PFDA | 40-130 | 40-130 |
| 13C7-PFUnA | 30-130 | 40-130 |
| 13C2-PFDoA | 10-130 | 35-130 |
| 13C2-PFTeDA | 10-130 | 25-130 |
| 13C3-PFBS | 40-135 | 40-130 |
| 13C3-PFHxS | 40-130 | 40-130 |
| 13C8-PFOS | 40-130 | 40-130 |

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| Labeled Compound | Aqueous Recovery (%) | Landfill Leachate Recovery (%) |
|---|---|---|
| 13C2-4:2FTS | 40-200 | 40-220 |
| 13C2-6:2FTS | 40-200 | 40-170 |
| 13C2-8:2FTS | 40-300 | 40-145 |
| 13C8-PFOSA | 40-130 | 40-130 |
| D3-NMeFOSA | 10-130 | 40-130 |
| D5-NEtFOSA | 10-130 | 35-130 |
| D3-NMeFOSAA | 40-170 | 35-130 |
| D5-NEtFOSAA | 25-135 | 30-130 |
| D7-NMeFOSE | 10-130 | 20-130 |
| D9-NEtFOSE | 10-130 | 20-130 |
| 13C3-HFPODA | 40-130 | 40-130 |
| 13C3-PFBA | 50-200 | 50-200 |
| 13C2-PFHxA | 50-200 | 50-200 |
| 13C4-PFOA | 50-200 | 50-200 |
| 13C5-PFNA | 50-200 | 50-200 |
| 13C2-PFDA | 50-200 | 50-200 |
| 18O2-PFHxS | 50-200 | 50-200 |
| 13C4-PFOS | 50-200 | 50-200 |

**Table 11: Acceptance Limits for EIS and NIS Compounds in Solid & Biosolid Matrices**

| Labeled Compound | Solids Recovery (%) | Biosolids Recovery (%) |
|---|---|---|
| 13C4-PFBA | 8-130 | 5-130 |
| 13C5-PFPeA | 35-130 | 35-130 |
| 13C5-PFHxA | 40-130 | 40-130 |
| 13C4-PFHpA | 40-130 | 40-130 |
| 13C8-PFOA | 40-130 | 40-130 |
| 13C9-PFNA | 40-130 | 40-145 |
| 13C6-PFDA | 40-130 | 40-130 |
| 13C7-PFUnA | 40-130 | 40-130 |
| 13C2-PFDoA | 40-130 | 40-130 |
| 13C2-PFTeDA | 20-130 | 10-160 |
| 13C3-PFBS | 40-135 | 40-150 |
| 13C3-PFHxS | 40-130 | 40-140 |
| 13C8-PFOS | 40-130 | 40-130 |
| 13C2-4:2FTS | 40-165 | 40-300 |
| 13C2-6:2FTS | 40-215 | 40-300 |
| 13C2-8:2FTS | 40-275 | 40-300 |

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| Labeled Compound | Solids Recovery (%) | Biosolids Recovery (%) |
|---|---|---|
| 13C8-PFOSA | 40-130 | 20-140 |
| D3-NMeFOSA | 10-130 | 20-130 |
| D5-NEtFOSA | 10-130 | 20-130 |
| D3-NMeFOSAA | 40-135 | 30-150 |
| D5-NEtFOSAA | 40-150 | 20-140 |
| D7-NMeFOSE | 20-130 | 25-130 |
| D9-NEtFOSE | 15-130 | 20-130 |
| 13C3-HFPODA | 40-130 | 40-130 |
| 13C3-PFBA | 50-200 | 50-200 |
| 13C2-PFHxA | 50-200 | 50-200 |
| 13C4-PFOA | 50-200 | 50-200 |
| 13C5-PFNA | 50-200 | 50-200 |
| 13C2-PFDA | 50-200 | 50-200 |
| 18O2-PFHxS | 50-200 | 50-200 |
| 13C4-PFOS | 50-200 | 50-200 |

**Table 12: Acceptance Limits for EIS and NIS Compounds in Tissue Matrices**

| Labeled Compound | Tissue Recovery (%) |
|---|---|
| 13C4-PFBA | 5-130 |
| 13C5-PFPeA | 10-185 |
| 13C5-PFHxA | 25-170 |
| 13C4-PFHpA | 25-150 |
| 13C8-PFOA | 25-150 |
| 13C9-PFNA | 35-185 |
| 13C6-PFDA | 30-150 |
| 13C7-PFUnA | 30-180 |
| 13C2-PFDoA | 35-180 |
| 13C2-PFTeDA | 20-160 |
| 13C3-PFBS | 25-190 |
| 13C3-PFHxS | 35-175 |
| 13C8-PFOS | 40-160 |
| 13C2-4:2FTS | 30-300 |
| 13C2-6:2FTS | 35-300 |
| 13C2-8:2FTS | 40-365 |
| 13C8-PFOSA | 25-180 |
| D3-NMeFOSA | 5-130 |
| D5-NEtFOSA | 5-130 |

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| Labeled Compound | Tissue Recovery (%) |
|---|---|
| D3-NMeFOSAA | 30-250 |
| D5-NEtFOSAA | 30-235 |
| D7-NMeFOSE | 5-160 |
| D9-NEtFOSE | 5-130 |
| 13C3-HFPODA | 20-185 |
| 13C3-PFBA | 50-200 |
| 13C2-PFHxA | 50-200 |
| 13C4-PFOA | 50-200 |
| 13C5-PFNA | 50-200 |
| 13C2-PFDA | 50-200 |
| 18O2-PFHxS | 50-200 |
| 13C4-PFOS | 50-200 |

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### Appendix C: State/Program Specific Requirements

This appendix provides program specific requirements that supersede or supplement the main body of the SOP. When analyzing samples under DoD compliance, these requirements are applicable.

| QC Item | SOP Section | Requirement |
|---|---|---|
| Instrument Blank | 9.2.5 | No analytes detected > ½ LOQ. |
| Method Blank | 11.1.1 | No analytes detected > ½ LOQ. |
| AFFF Sample Duplicate | Appendix E | All AFFF samples shall be prepared and analyzed in duplicate in the same manner as aqueous samples (e.g., solid phase extraction, extracted internal standards, carbon cleanup, etc.). |
| Laboratory Duplicate | Appendices B & F | One per preparatory batch. RPD of all analytes should be ≤ 30% between sample and DUP. RPD criterion does not apply if both results are below the LOQ. |

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**Appendix D: Sample Pre-screening Instructions**

Samples that are known or suspected to contain high levels of analytes may be pre-screened using the following procedure. These are example procedures using smaller sample aliquots spiked with EIS and NIS and no clean up procedures. Other pre-screening procedures may be used.

**Aqueous Samples**

1) Weight out 10 (±0.1) g of sample into a 50-mL centrifuge tube.
2) Add 50 µL of EIS to the sample and vortex to mix.
3) Filter 1 mL of the sample through 0.2-µm membrane filter into a microvial. Sample is ready for instrumental analysis.

**Solid and Tissue Samples**

1) Weigh 1.0 (±0.1) g sample into 50-mL polypropylene centrifuge tubes.
2) Add 20 mL of 0.3% methanolic ammonium hydroxide to the sample. Vortex and mix on a shaker table (or equivalent) for 10 min. Allow to settle and/or centrifuge to produce a clear extract.
3) Filter using a filter vial:
    a. Add 20 µL of EIS to a clean filter vial (chamber).
    b. Add 400 µL of clear extract from step 2 (e.g., by adding extract until it reaches the fill line), carefully vortex to mix.
    c. Use filter/plunger part and filter.
4) Transfer 30 µL of filtrate to a ~300 µL polypropylene microvial and dilute to 300 µL with 0.3% methanolic ammonium hydroxide. Add NIS (1.5 µL) to the resulting solution.
5) The extract is now a 10x dilution.
6) Sample is ready for instrumental screening analysis.
7) Calculate results using the equivalent sample weight computed as follows:

$$Equivalent\ Weight = Sample\ weight\ (g) x \frac{0.4\ mL}{20\ mL}$$

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**Appendix E: Aqueous Sample Subsampling Instructions**

**Note:** Because some target analytes may be stratified within the sample (e.g., AFFF-contaminated media, surfactants), or adhere to the walls of the sample container, subsampling may only be done on a project-specific basis. Subsampling has been shown to increase uncertainty in PFAS analysis, especially on foaming samples.

If a reduced sample size is required, transfer a weighed subsample using the following subsampling procedure to a 60-mL HDPE bottle and dilute to approximately 60 mL using reagent water. This container is now considered the "sample bottle."

1) Gently invert sample 3-4 times being careful to avoid foam formation and subsample immediately (do not let stand).
2) If foam forms and more than 5 mL is required – pour sample, avoiding any foam.
3) If foaming forms and a volume less than 5 mL is required – pipette from ½ cm below the foam.
4) If no foam forms – pour or pipette based on volume required.

**Required Protocol for AFFF and FFF (F3) Concentrates**

Samples composed of AFFF or F3 will be subsampled consistently, with approximately **0.02 g of AFFF/F3 material** aliquoted for each discrete sample preparation/analysis; each AFFF or F3 concentrate sample analyzed under DoD direction **must be prepared in duplicate**. After creating and documenting the subsample aliquot, add approximately 60 mL of reagent water, cap the vessel, and shake vigorously by hand for 20-30 seconds. After adding the reagent water and agitating, allow **at least 3 hours** for the subsample aliquot to fully dissolve in the water. If dissolution is incomplete after 3 hours, agitate again and wait another 3 hours; consider applying continuous agitation (orbital shaker) if full dissolution of the aliquot into water requires extended time. Following the extended dissolution time, prepared AFFF/F3 samples should be prepared and analyzed following the routine protocols for aqueous sample processing. Aqueous reporting limits (MDL/LOD/LOQ) will be used, with values adjusted to account for the actual sample aliquot, assuming 1 g/mL; this constitutes a 25,000X nominal adjustment factor for AFFF/F3 reporting limits, relative to nominal aqueous reporting limits.

Pace **STRONGLY DISCOURAGES** clients from sending AFFF concentrate material for analysis; this protocol is designed for "as-prepared" AFFF materials (i.e. pre-diluted to application concentration) and newer generation 'Fluorine Free Foam' (F3) concentrates. If F3 material (concentrate or as-prepared) or as-prepared AFFF material is received, follow the normal routines described in the first paragraph above. If an AFFF concentrate material (usually of a thick gel-like consistency) is received for analysis, the lab shall prepare a 3% (w/w) aqueous solution from the received sample (in the smallest volume feasible) prior to subsampling and diluting 0.02 g for extraction. Handling of AFFF concentrate should ideally be done in an isolated area outside of the PFAS processing area to prevent gross lab contamination. Following the two dilution steps, the nominal adjustment factor for AFFF concentrate material is 833,333X ($8.33 \times 10^5$) relative to nominal aqueous reporting limits.

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## Appendix F: MS/MSD, MS/DUP SAMPLE SELECTION PROTOCOL

Project-specific requirements may include that matrix spikes (MS), matrix spike duplicates (MSD), and/or laboratory duplicates (DUP) be prepared and analyzed with project samples. The client/field team should identify those samples which are designated for these additional QC procedures and provide additional sample material for them. In the event that samples are received for such a project without additional containers for MS/MSD/DUP, prep analysts will select samples to be used for this purpose following a hierarchy of preference, as defined below.

**Note:** Any kind of blank (Field Blank, Trip Blank, Equipment Blank, Rinsate Blank, etc.) will not be used for MS/MSD/DUP analysis.

1) First preference is to use client-designated samples as MS/MSD samples. This designation should show up on the prep worklist, in the comments. It is possible that SR will miss adding this comment to the sample, but this designation will be present in the COC from the client, on the right side of the COC under “Comments/Remarks/Cooler ID.” When a client designates a sample to be used for MS/MSD analysis, they will typically provide us with more than 2 bottles (often 4, sometimes as many as 6).

2) Lacking a client-designated MS/MSD sample, the next preference is to use any sample received with more than 2 bottles provided. If an analyst selects a set of samples for prep in which none of the samples are client-designated for MS/MSD, the analyst should check for any samples in the set that were received with 3 or more bottles. If there is a sample with 3 or more bottles, pull 3 of them and use one for the parent sample and spike the other two for analysis as MS/MSD samples.

3) Lacking any samples received with 3 or more bottles, the prep analyst must use two different parent samples to create an MS/DUP pair. Find two samples out of the set of samples selected for prep which were received with 2 bottles and pull both bottles for each sample. Pick one sample (pair of bottles) to be used for parent/MS prep and the other sample (pair of bottles) to be used for parent/DUP. The sample selected for parent/MS will have one bottle spiked with targets and one prepped as normal, with no added spiking. The bottle which is spiked should be identified in the LIMS as MS. The sample selected for parent/DUP will have both bottles prepared following normal procedures but one of the two should be identified in the LIMS as DUP.

4) If all samples in a particular prep batch were all received in just one bottle, analysis of an MS/MSD or MS/DUP pair will not be possible. This should be an uncommon occurrence, as prep analysts will attempt to adjust batching to ensure that every prep batch contains an MS/MSD or MS/DUP for projects which require the additional QC.

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**Appendix G: Aqueous Sample Management Decision Guide**

**NOTE:** No TSS pre-test will be performed on aqueous samples received for 1633 analysis.

Per Method 1633, Section 11.1.1.5, “laboratories may utilize other documented strategies for minimizing the disruptions due to SPE clogging and slow extractions.” Follow the guide below to evaluate aqueous sample matrices for solid material and determine the appropriate preparation approach; a matching decision tree is included at the end of this appendix.

If potential interferences other than settled solids are observed, take action to mitigate the impacts on data quality. Examples of other sample characteristics that could lead the lab to take precautionary measures with a field sample (i.e., prepare from reduced volume) include: presence of standing foam in the sample after shaking, thick/viscous matrix, collected from a known highly contaminated site/project, client notes indicating potential high concentrations, and knowledge of potential hazards to safety, equipment performance, or process integrity due to sample composition. Consider any visible indications of particulate matter including settled solids collected on the bottom of the container, cloudiness and/or dark color of the sample, suspended solids within the sample, increased viscosity, etc. If uncertain, seek a second opinion from another analyst, supervisor, or operations director; these matrix characteristics may require reduced-volume extraction. The lab will attempt to use the largest volume possible (i.e., the smallest reduction possible) when performing a reduced-volume extraction to manage challenging matrix characteristics, and no less than 1 mL of sample will be used in this case.

1) Allow samples to sit for at least 15 minutes to allow solids in the matrix to settle to the bottom of the container.

2) Visually inspect each sample for settled solids collected in the bottom of the container and follow the appropriate protocol based on observation:

    a. If no solids are observed in the bottom of the container, proceed to step 3.

    b. If solids are observed in the bottom of the container with an approximate depth <1/2 cm (<5 mm), proceed to step 5.

    c. If solids are observed in the bottom of the container with an approximate depth >1/2 cm (>5 mm), proceed to step 7.

    d. If solids observed in the container make up approximately 5% or more of the total sample volume, proceed to step 9.

No Settled Solids Observed:

3) Do not take any additional action to prepare for extraction and follow routine protocols.

4) If the SPE cartridge begins to clog during sample loading (see Identifying Cartridge Clogging section below), abandon loading of the remaining sample volume and proceed to the cartridge rinsing and drying described in step 10 of Section 9.3.4.

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a. Document the inability to load the entire sample volume due to cartridge clogging. If the resulting EIS recoveries are below the method acceptance ranges, this documentation provides the rationale for re-extraction from reduced volume.

b. The sample bottle rinse described in step 12 of Section 9.3.5 must be omitted; simply add the 5 mL of 1% methanolic ammonium hydroxide directly to the reservoir/cartridge.

c. If the cartridge clog prevents the cartridge rinses or elution solvent from passing through the cartridge, document that an extract could not be collected for that sample. Submit the sample for re-extraction from reduced volume. Notify the group leader and prep team of this necessity and, based on the total volume loaded in the first extraction attempt, provide a suggested reduction factor (i.e., reduce volume 5X, 10X, 20X, etc.).

Settled Solids Depth <1/2 cm Observed:

5) Do not take any additional action to prepare for extraction and follow routine protocols; however, be aware that there is a higher probability that the SPE cartridge will clog, and care must be taken in sample loading to attempt to pass the entire sample through the sorbent.

6) If the SPE cartridge begins to clog during sample loading (see Identifying Cartridge Clogging section below), abandon loading of the remaining sample volume and proceed to the cartridge rinsing and drying described in step 10 of Section 9.3.4.

a. The sample bottle rinse described in step 12 of Section 9.3.5 must be omitted; simply add the 5 mL of 1% methanolic ammonium hydroxide directly to the reservoir/cartridge.

b. Document the inability to load the entire sample volume due to cartridge clogging. If the resulting EIS recoveries are below the method acceptance ranges, this documentation provides the rationale for re-extraction following centrifugation; however,

c. If the cartridge clog prevents the cartridge rinses or elution solvent from passing through the cartridge, document that an extract could not be collected for that sample. Submit the sample for re-extraction with sample centrifugation (See Aqueous Sample Centrifugation Protocol in Appendix H). Notify the group leader and prep team of this necessity.

i. If, in the judgment of an experienced analyst, the nature of the solids present in the sample is of a nature that would preclude successful centrifugation and decantation, the decision should be confirmed with the group supervisor and/or another experienced analyst; once confirmed, the sample is submitted for re-extraction from reduced volume. Notify the group of this necessity and, based on the total volume loaded in the first extraction attempt, provide a suggested reduction factor (i.e., reduce volume 5X, 10X, 20X, etc.).

ii. If the centrifuged sample clogs the cartridge in the second extraction, see step 6 above; if there is sufficient sample remaining for another re-extraction, submit the sample for re-extraction from reduced volume as described in (i) above. If there is not sufficient sample remaining for another re-extraction, narrate any quality exceedances and report data for all runs.

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Settled Solids Depth >1/2 cm Observed:

7) The sample will need to be centrifuged before performing SPE. Instead of following the routine sample extraction procedures, refer to Appendix H for the Aqueous Sample Centrifugation Protocol.

8) Document the decision to centrifuge the sample prior to SPE.

    a. If resulting EIS recoveries are below the method acceptance ranges, this documentation provides evidence that the results are impacted by matrix interference.

        i. Report the data with a narrative statement explaining that the results are matrix-impacted.

        ii. Alternately, submit the sample for re-extraction from reduced volume to attempt to provide data with compliant EIS recoveries.

    b. If the decanted sample clogs the SPE and prevents successful collection of the extract, document that detail and submit the sample for re-extraction from reduced volume. Notify the group of this necessity and, based on the total volume loaded in the first extraction attempt, provide a suggested reduction factor (i.e., reduce volume 5X, 10X, 20X, etc.) for the re-extraction.

Settled Solids Observed to be ≥ 5% of Total Volume:

9) Shake the sample to thoroughly homogenize it, then immediately subsample 1 mL into a pre-labeled 50mL centrifuge tube and add reagent water to approximately 40 mL. At 5% solids, a sample contains 50,000 mg/L, so 1 mL contains 50 mg of solid material.

10) Spike the diluted subsample with EIS as normal and proceed with extraction.

11) If the SPE cartridge begins to clog during sample loading (see Identifying Cartridge Clogging section below), abandon loading of the remaining sample volume and proceed to the cartridge rinsing and drying described in step 10 of Section 9.3.4.

    a. Document the inability to load the entire sample volume due to cartridge clogging.

    b. The sample bottle rinse described in step 12 of Section 9.3.5 must be omitted; simply add the 5 mL of 1% methanolic ammonium hydroxide directly to the reservoir/cartridge.

    c. If the cartridge clog prevents the cartridge rinses or elution solvent from passing through the cartridge, document that an extract could not be collected for that sample.

12) If the cartridge clogs during extraction and causes failing results, the lab will contact the client and notify them that sample extraction failed due to the nature of the matrix, and that they must decide between two options for reprocessing the sample:

    a. Apply biosolid matrix protocols, following Sections 9.3.6 through 9.3.8 of this SOP. Use 0.5 g of sample for extraction; do not submit for % solids analysis and report results as ng/g, on a wet weight basis.

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b. Attempt to separate and analyze the aqueous and solid phases separately. If the client selects this option, follow the protocol detailed in Appendix I.

**Identifying Cartridge Clogging**

During the loading phase of the SPE process, some samples may cause their cartridges to clog, preventing the entire sample from being loaded through, and sometimes preventing an extract from being collected. If you have a sample that slows down considerably during the loading process, you may need to abandon loading the remainder of the sample. The goal is to stop the process before the cartridge seizes up completely, so that a sample extract can still be collected from the cartridge.

When Clogs Start

Some of the first visual indications of a cartridge becoming clogged include: discoloration of the cartridge frit and/or sorbent bed, reduced drip rate of the sample through the cartridge, and coloration or sedimentation on the bottom of the reservoir.

When a cartridge starts to clog, it is important to stop the process before the cartridge seizes up completely. Take the actions listed below; an evaluation must be made to decide whether each cartridge can reasonably be used further without seizing up completely.

- Do not continue to add any more sample volume to the reservoir of the clogging cartridge.
- If there is substantial volume remaining in the reservoir (i.e., > 10 mL) and the cartridge is in apparent imminent danger of seizing completely, close the manifold port to stop sample loading. Carefully remove the cartridge-adaptor-reservoir assembly for the sample in question and pour whatever sample volume remains in the reservoir back into the original sample bottle. This volume will be included in the evaluation of extracted sample volume (initial volume).
- If the reservoir on the clogging cartridge empties before the other samples have finished loading, close the manifold port to prevent the cartridge from drying.
- If sample volume remains in any of the slowed cartridges after the loading of the other samples is finished, close all the manifold ports and focus pressure on the slowed cartridge in an attempt to load the volume remaining in the reservoir. (Do this one at a time for multiple clogs.) If the cartridge appears to be in imminent danger of seizing up completely, do not attempt to load the volume remaining in the reservoir; follow the steps in the second bullet of this section.

Abandoning Sample Loading

If the decision is made to abandon sample loading, take the following actions. Some of these are partial duplicates of the actions listed in the section above.

- If any sample remains in the reservoir, carefully remove the cartridge-adaptor-reservoir assembly for the sample in question and pour whatever sample volume remains in the reservoir back into the

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original sample bottle. This volume will be included in the evaluation of extracted sample volume (initial volume).

- Use the cartridge from the abandoned sample and finish the SPE process to collect what extract is available.
- The sample bottle rinse described in step 12 of Section 9.3.5 must be omitted; simply add the 5 mL of 1% methanolic ammonium hydroxide directly to the reservoir/cartridge.
- Weigh the sample in its original bottle to establish the “empty bottle” weight (aka post-extraction weight).

Fully Clogged Cartridges

Samples will have to be re-extracted when cartridges clog so fully that the extraction process cannot be taken to completion to collect a sample extract. Based on the total volume loaded in the failed extraction attempt, provide a suggested reduction factor for the re-extraction (i.e., reduce volume 5X, 10X, 20X, etc.) The sample should be shaken up before subsampling for the reduced volume re-extraction. However, for samples containing solids that are very fine and easily suspended, the analyst may consider allowing the sample to settle before subsampling an aliquot for reduced volume re-extraction; this may help prevent cartridge clogging in the re-extraction process.

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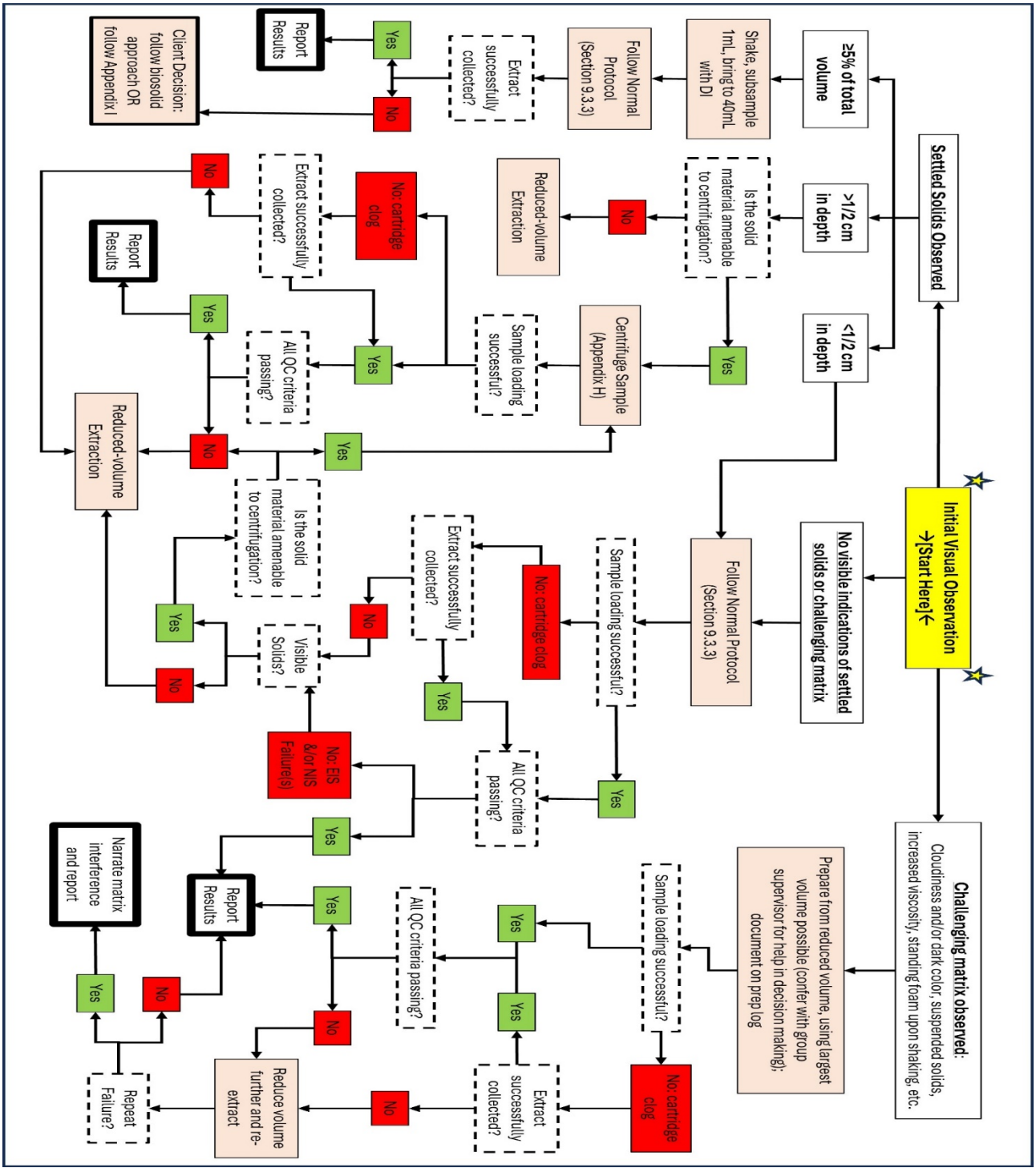


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**Appendix H: Aqueous Sample Centrifugation Protocol**

Method 1633 states “laboratories may utilize other documented strategies for minimizing the disruptions due to SPE clogging and slow extractions,” and “a trained analyst should be able to distinguish samples with very low TSS and focus…on only those samples that might present a risk of clogging.” Therefore, whether an individual sample will require centrifugation for proper preparation will be determined and documented by the preparation analyst, following the guidance in Appendix G. Additionally, the method states “If centrifugation is used to prevent samples with high TSS from clogging the SPE, the EIS compounds must be spiked into the original sample container prior to centrifugation.” This protocol complies with that dictate.

1) Follow Appendix G to evaluate the sample for the presence of solids. Inspect the sample and consider the necessity of centrifuging.

2) If the sample is determined to require centrifugation/decantation, contemporaneously make a note on the prep batch log indicating this fact.

3) Spike samples requiring centrifugation in the same manner and with the same standard volume as samples which will not be centrifuged.

4) Label a 500mL conical centrifuge bottle with the sample ID for each sample that will be centrifuged. Set them in an appropriate rack with the caps removed.

5) Vigorously shake the spiked sample and then quickly pour it into the appropriately labeled centrifuge bottle. Try to ensure that the original sample bottle is devoid of any solid material after the transfer. Be careful to avoid spilling sample during the transfer process. Tightly cap each centrifuge bottle after transfers are complete.

6) Transfer capped centrifuge bottles to the centrifuge rotor, ensuring that the carousel is symmetrically balanced. Close the top and centrifuge at 3000 RPM (~2000 RCF) for 6 minutes.

7) Remove centrifuge bottles and decant the centrifuged liquid from the condensed solids by transferring it back into the original sample bottle. Try to avoid transferring any of the condensed solids from the centrifuge bottle back to the original sample bottle, while maximizing the amount of liquid collected in the sample bottle.

8) Weigh the full, decanted original sample bottle and document in the prep batch log.

9) Extract the decanted sample as normal alongside un-centrifuged samples, through the cartridge rinsing and drying (step 10 of Section 9.3.4).

10) When the SPE cartridges have been dried, rinse the original sample bottle following the protocol in step 12 of Section 9.3.5. Additionally, add 5mL of 1% methanolic ammonium hydroxide (1%-MeOH) to each centrifuge bottle to rinse the inside of them as well as the solids they contain. If the condensed solids become re-suspended while rinsing the bottles, centrifugation may be required. Using a transfer pipet or mechanical pipet, transfer the 1%-MeOH rinse from the centrifuge bottle into the reservoir/SPE cartridge and elute with the original sample bottle rinse into a 15mL conical centrifuge tube.

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11) Add 5 mL of additional 1%-MeOH directly to the SPE reservoir of all batch QC samples (MB/LCS/LLLCS) and elute with the normal bottle rinse. This is to match the volume used for elution of centrifuged field samples in the prep batch.

12) After elution, all sample extracts (client and QC) with additional elution volume shall be concentrated to ~3.5 mL and brought to a final volume of ~4 mL with 1%-MeOH. Concentrate each extract at approximately 55 ºC with N2 flow of approximately 1.2 L/min. Use a reference elution tube to reconstitute to the appropriate volume, like the protocol in step 8 of Section 9.3.6 of this SOP. This extract concentration and reconstitution must be done BEFORE adding acetic acid and NIS to the extracts, as directed in step 14 of Section 9.3.5.

13) Weigh the empty bottle with the cap on and subtract that from the weight of the bottle with sample, determined in step 8 of this appendix, to determine initial sample volume.

14) Add 25 µL of concentrated acetic acid and 20 µL of NIS mix to each sample extract in its collection tube and vortex to mix. Transfer a portion of each extract into an autosampler vial for LC-MS/MS analysis. Cap the collection tubes containing the remaining extracts and store at 0 - 6 °C.

15) Generate a narrative statement noting which samples in the prep batch included centrifugation in the extraction process. Include any additional observations and/or deficiencies that were noted during the centrifugation or extraction process, particularly if any issues were encountered during the sample loading step of the SPE process.

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**Appendix I: Separation & Analysis of Liquid-Solid Biphasic Matrices**

Method 1633 states “laboratories may utilize other documented strategies for minimizing the disruptions due to SPE clogging and slow extractions, including centrifuging the sample before adding the EIS and treating the supernatant aqueous phase and the solid phase as separate samples.” This will be done only according to client direction or project requirement; see Appendix G for more information regarding management of solids in aqueous samples.

1) If the client has requested to have the sample separated into aqueous and solid phases for analysis, the sample must be logged into the LIMS system separately for both matrices. The resulting solid phase will be reported on a wet weight basis and will not be analyzed for percent solids (aka percent moisture).

**NOTE:** The LOQ for the resulting solid analysis will depend on the amount of solid material available after decanting – the lab will use ~5 g of material if available, but any reduction in available solids will result in an increase in the reported LOQ.

2) Label a 500mL conical centrifuge bottle with the sample ID for each sample that will be centrifuged. Set them in an appropriate rack with the caps removed.

3) Vigorously shake the sample and then quickly pour it into the appropriately labeled centrifuge bottle. Try to ensure that the original sample bottle is devoid of any solid material after the transfer. Be careful to avoid spilling sample during the transfer process. Tightly cap each centrifuge bottle after transfers are complete.

4) Transfer capped centrifuge bottles to the centrifuge rotor, ensuring that the carousel is symmetrically balanced. Close the top and centrifuge at 3000 RPM (~2000 RCF) for 6 minutes.

5) Remove centrifuge bottles and decant the centrifuged liquid from the condensed solids by transferring it back into the original sample bottle. Try to avoid transferring any of the condensed solids from the centrifuge bottle back to the original sample bottle, while maximizing the amount of liquid collected in the sample bottle.

6) Weigh the full, decanted original sample bottle and document in the prep batch log.

7) Extract the decanted aqueous sample as normal alongside un-centrifuged samples, starting with EIS addition.

8) Label a 50 mL centrifuge tube with the sample ID for each solid phase sample generated from phase separation. Using a wooden tongue depressor or a pre-cleaned metal scoopula, transfer the solid material from the decanted 500 mL centrifuge bottle to the labeled 50 mL tube, targeting 5 g of total sample mass. Record the sample mass transferred to the 50 mL tube – this will be the extracted sample mass used for calculations and reporting. In many cases, re-extraction will not be possible due to limited solid material.

9) Spike the collected solid material with EIS and extract as normal alongside solid samples which were not generated from phase separation.

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**Appendix J: TCLP/SPLP by 1633**

Clients may submit samples (solid or aqueous) for PFAS following TCLP or SPLP procedures. For solid samples, the TCLP and SPLP procedures are used to simulate the leaching of environmental contaminants over extended periods of time from a solid material into the environment. A subsample of the client's sample is weighed out and combined with a leaching solution and mechanically tumbled for a set period. Each leachate prep method (TCLP: Method 1311 or SPLP: Method 1312) employs a unique leaching solution dictated by the parent methods. After the sample has been tumbled/leached by the Organic prep department, the leachate is filtered by the Organic Prep department and delivered to the PFAS sample holding area. The PFAS department is notified by email when the leachate solutions are ready for PFAS prep. The filtered leachate solutions are prepared by the PFAS prep analysts using the 1633 aqueous prep method, at a 1:5 dilution (100 mL of leachate solution).

1) Samples requested for PFAS by SPLP/TCLP analysis will be batched and leached by the normal SPLP/TCLP procedures used by the Westborough Alpha Organic Prep department. Organic Prep will be the initial responsible party for samples analyzed for PFAS by SPLP/TCLP.

2) When the leaching process is complete, Organic Prep will collect approximately 500mL (at minimum 100mL) of the leachate solutions in clean HDPE containers provided by the Emerging Contaminants department.

3) After collecting the leachate solution, an Organic Prep analyst will filter approximately 500 mL (at minimum 100mL) of each leachate solution using a Flipmate apparatus, using normal protocols for Flipmate filtration.

4) After filtering the leachates, the Organic Prep analyst will deliver the filtrates to the Sample management department for transport to the Emerging Contaminants Department (EC) at the Alpha Mansfield Facility. Leachates will be transferred to the EC department's designated sample storage refrigerator.

5) Samples to be analyzed for PFAS following TCLP/SPLP will appear on a separate PFAS prep worklist, the title of which will contain "SPLP" or "TCLP." From these worklists, PFAS analysts will select the samples to be extracted.

6) Pour ~100 mL of filtrate solution into a pre-labeled HDPE PFAS sample bottle, using the gradations marked on the bottle as a guide. Record the actual amount of filtrate by weighing the sample bottle. LOQs for samples prepared in this way will be ~5X higher than normal Aqueous matrix LOQs.

7) Following the instructions in step 7, use the leachate blank solution (typically has sample ID L0000000-01) to prepare three bottles for use as batch QC. Volume for the leachate blank, LLLCS, and LCS will be recorded as 100 mL.

8) Label and fill a clean 125 mL HDPE bottle with ~125 mL of pre-tested reagent water for use as a typical 1633 MB sample. Volume for the 1633 MB sample will be recorded as 100 mL.

9) After preparing the diluted filtrate, filtrate batch QC, and 1633 MB bottles, follow the normal extraction steps for aqueous matrices. Each sample will be spiked with EIS as normal. The filtrate

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LLLCS and LCS will be spiked with target analytes according to the routine aqueous protocol for LLLCS and LCS target spiking.

10) Leachate batch QC (MB/LLLCS/MS/MSD) are documented in LIMS as leachate blank (MB), and LLLCS (LCS).

11) Following the SPE process, the instrumental analyst will analyze the extracts by the 1633 method, as normal.

12) After processing, reviewing, generating reports for the data, and importing the data into LIMS, the TCLP/SPLP tumble date must be input into the analytical results from the leachate logs.

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**Appendix K: Surface Wipe PFAS Analysis by 1633**

Clients may submit wipe samples for PFAS analysis by 1633; wipes can be used as a proxy measurement of surface contamination in production facilities, labs, etc. The lab provides sampling kits for users which consist of a 50 mL centrifuge tube paired with a packaged ghost wipe for each surface to be sampled (ghost wipes: Environmental Express Part# SC5000). The wipe is used to swab a defined area of the surface or item of interest and is placed in the accompanying centrifuge tube, which is then capped, labeled, and shipped back to the lab for preparation and analysis.

Used wipe samples are prepared directly in the container in which they are received, following the protocols for solid matrices described in Sections 9.3.6 through 9.3.8; analysis follows normal 1633 routines. No correction will be made for percent solids, and results are reported as ng/wipe.

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**Appendix L: Articles of Commerce Analysis via Cryomill Processing**

Clients may submit samples of various consumer product materials and 'articles of commerce' for analysis of PFAS contained in the products. To effectively mobilize any PFAS that may be present within the structure of the material, samples must be milled to a fine powder using a cryogenic mill (or Cryomill).

This appendix provides strategies for processing samples obtained from an article of commerce. Common techniques are covered for mechanical size reduction of articles and their sub-units or portions thereof prior to the determination of PFAS in the article or article components via extraction and quantitative analysis. Polymer powders, nanomaterials, fibers, pastes, fluorinated ionomers etc. may not require size reduction if they are known to be sufficiently homogenous and more than 95% of the material passes a 250 µm sieve. Examples of common articles requiring milling prior to extraction and analysis are compacted cakes, melt extruded pellets and molded articles, elastomers and agglomerates, coated wire, textiles, paper, leather, food, and LDPE and polypropylene.

The user shall elect to apply one or more of the approaches, or compendium of approaches, to create homogenous samples suitable for extraction and analysis. Selection of the appropriate technique(s) depends on the article. Alternative methods of mechanical sample preparation can be used, provided that the required particle size (avg. particle size approx. 100 µm) of the sample is achieved without contaminating or compromising the sample.

Sample Processing Equipment and Materials

The following sample processing equipment and materials are required, subject to the type of material being prepared. Conditions for cryogenic fine milling are provided for the Retsch CryoMill, however, alternative cryomilling equipment like the SPEX ® Freezer/Mill may be used for most products.

1) Scissors, heavy plate shears or RetschTM ZM 200 Grinding Mill (Centrifugal Mill) with 6 or 12 tooth stainless steel (SS) rotor and 1 mm stainless steel bottom sieve.
2) Retsch CryoMill (Ball Mill), with SS grinding cartridge and 25 mm grinding ball (50 mL grinding cartridge, 5 g fill), or equivalent cryogenic mill capable of grinding to approximately 100 µm particles.
3) Cleaning brushes (different sizes) and polishing cloths, or cotton balls/swabs
4) Liquid nitrogen (LN2)
5) High purity methanol and ASTM Type I water for cleaning mill parts
6) Ventilated hood, to minimize exposure to fine particles/dusts/aerosols and chemical vapors
7) Ventilated drying oven capable of > 200°C
8) Precision sieves and accessories, nickel mesh, 50 µm and 150 µm sizes

Manual Cutting

If possible, manual cutting with pre-cleaned shears or scissors is suitable for rough cutting and preparation of samples for further reduction by grinding, etc. Recommended maximum sample size is 10

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x 10 mm but will depend on the specification of the equipment used in the subsequent preparation processes.

Fine Grinding by Cryomill

Fine grinding via cryomill is suitable for further mechanical breakdown of samples, grinding material to pieces ~100 µm in diameter. Be careful not to allow the LN2 to come into direct contact with the sample to prevent spattering and sample loss. Thorough cleaning of the mill components between samples is crucial to avoid cross-contamination; see steps 7-11 below for details.

Cryomilling will be performed using a Retsch CryoMill (ball mill) with automatic LN2 feed, as described below:

| Sample Type[1] | Cycles | Preset | Frequency (Hz) | PCT (minutes) | MT (minutes) | ICT (minutes) |
|---|---|---|---|---|---|---|
| Elastomers (FKM, FFKM, FEPM, and agglomerates) | 1 | 1 | 30 | Auto | 2 | NA |
| Compacted Cake | 5 | NA | 30 | Auto | 2 | 2 |
| Melt Extruded Pellets and Molded Articles | 7 | 2 | 30 | Auto | 4 | 2 |
| Coated Wire | 3 | 3 | 30 | Auto | 2 | 2 |
| Textiles, Paper, Leather | 3 | 4 | 25 | 10 | 2.5 | 0 |
| Food (meat, cheese) | 1 | 5 | 25 | 8 | 2 | NA |
| LDPE and PP | 2 | 6 | 25 | 10 | 2 | 2 |

[1] *In most applications, a feed mass of 5 g is used.*
PCT: Precooling time (automatic set)
MT: Milling time
ICT: In-between cooling time

1) In the case of FFKM compounds and articles, care must be taken to avoid excessive energy input as it may lead to cryo-mechanical degradation of the polymer and the creation of mechanoradicals, which can inflate the amount of target substance detected. Filling levels will impact the energy applied in the grinding process and can inflate test results as well.

2) In the case of cured FFKM elastomeric articles, pulverizing the product in a 2-roll mill as commonly used for compounding of elastomers can be an alternate sample preparation method to avoid or reduce the risk of mechanical degradation. Alternative methods for FFKM compounds and articles that do not require cryo-grinding are being investigated.

3) Cryogenically mill the sample powder and sweep out the milled material to collect all the powder. The collected plastic-based sample material should be precision sieved to obtain a sufficiently homogeneous portion of known particle size range of 50 µm to 150 µm, by first sieving material

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through the 150 µm sieve, then the 50 µm sieve (keep contents captured on 50 µm sieve). Size range is 100 + 50 µm (i.e. ~ 100 µm).

4) The collected FKM-, FFKM- and FEPM-based samples are visually inspected for homogenous size, verification via light-scattering is beneficial. Sieving of the samples is not recommended due to materials' elastomeric nature and the potential for particles to re-agglomerate into larger segments over time.

**NOTE:** Freshly cryomilled samples should either be extracted ASAP (same day) OR placed under frozen conditions (-10° C) ASAP and held under frozen conditions until ready to extract.

5) Make sure to follow the User Manual for installing and removing the grinding jar. This includes the two lock rings on the left side of the mechanism.

    a. Make sure outer LOCK RINGS are loosened.

    b. Screw in the grinding jar (from the right side of the mechanism). Tighten with black plastic tightening aid.

    c. TIGHTEN TWO LOCK RINGS: Outside ring tightened first (hand-tighten only); inner ring tightened second (snug), using the tool.

    d. Perform grinding cycle.

    e. LOOSEN THOSE TWO LOCK RINGS: Inside ring loosened first, outer ring loosened second. To loosen either ring, the tool will be needed because of icing.

    f. Unscrew grinding jar.

    g. When cryomill is not in use, make sure to replace the cooling jacket seal.

6) For extraction of cryomilled materials, follow the solid matrix extraction protocol listed in Sections 9.3.6-9.3.8, using 2 g as the target sample mass instead of 5 g. Sample results will be reported as ng/g, with no moisture correction.

Cleaning Procedure for Mill Components

Thorough cleaning of the mill components between samples is crucial to avoid cross-contamination. The following cleaning procedure is recommended.

7) Remove residual polymer thoroughly with DI water and brush.

8) If necessary, wipe away last polymer residue with clean polish cloth or cotton ball/swab.

9) Rinse all parts with methanol, use an ultrasonic bath as needed.

10) Rinse all parts with DI Water, use an ultrasonic bath as needed.

11) Repeat steps 7-10 as needed.

Analysis and Holding Time

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| Matrix | Routine Container | Minimum Sample Amount | Preservation | Holding Time |
|---|---|---|---|---|
| Fluoropolymers, molded articles, coated wire, pellets, or other Articles of Commerce[1] | Any container or packaging that does not contain PFAS. Target container is a 125 mL PFAS container; however, clients will often send in Ziploc bags or other packaging. | 5 g (target weight for clients to send is 20 g). | Can be shipped at any temperature (being an Article of Commerce). Once received in the lab: <6°C (prior to cryomill)<br>Once cryomilled: Frozen<br>Extract storage: <6°C | Sample receipt (or dated collected)[2] to cryomill:<br>1 year<br>From cryomilling to extraction:<br>14 days<br>Once extracted: 30 days |

*[1] Almost any "solid" material is applicable to this approach, as long as it can be manually coarse cut to approximately 5-10 mm in size (half a pea). If the matrix is soft (e.g., gummy bear), a larger feed size can be used.*

*[2] Often clients do not include "date collected." If none provided, "date collected" becomes "date received."*

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## Appendix M: Procedure for Total Oxidizable Precursors (TOP)

The following modifications to the referenced SOP are as follows:

Section 7: Water Bath – Capable of monitoring recording to .1 C maintaining 85 C.

Section 8.1: Sodium Hydroxide (NaOH, CAS#: 1310-73-2) – High purity, demonstrated to be free of analytes and interferences.

Potassium Persulfate ($K_2S_2O_8$, CAS#: 7727-21-1) - High purity, demonstrated to be free of analytes and interferences.

Hydrochloric Acid (HCl, CAS#: 7647-01-0) - High purity, demonstrated to be free of analytes and interferences.

Additional table to be added to Section 8

**Table 1**

| Isotope Labeled Standard | Conc. Top Surr Stock (ng/mL) | Vol. of Top Surr Stock (µl) | Final Vol. of Top Surr PDS (mL) | Final Conc. of Top Surr PDS (ng/mL) |
|---|---|---|---|---|
| $^{13}C_2$-PFOA | 50,000 | 40 | 4.0 | 500 |
| $^{13}C_2D_4$-4:2FTS | 50,000 | 80 | 4.0 | 1000 |

For Aqueous samples, prior to Section 10 of SOP 45852, add to each 125 ml sample with Potassium Persulfate until 60 mM (about 2 grams). Add Sodium Hydroxide until the sample is 125 mM (about .625 grams).

Sample should have a pH >12.

Fortify each sample with 20 µl of TOP pre-assay surrogate containing 1 negative control surrogates and 1 positive control surrogates from table 1.

Place sample in a water bath at 85 C for 6 hours.

Remove sample from water bath and adjust pH 6-8 with Hydrochloric Acid.

Following pre-treatment, follow the aqueous extraction protocol from section 10 of SOP 45852 unaltered.

Section 11, An additional calculation is added for the final reporting of the TOP assay results.

TOP Assay = Result of Post TOP assay extraction – Result of analysis from Pre-Top Assay extraction.

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# Determination of Selected Perfluorinated Alkyl Substances by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry Isotope Dilution (LC/MS/MS)

**References:** EPA Method 537.1, Version 2, March 2020, EPA Document #: EPA/600/R-20/006

EPA Method 533, November 2019, EPA Document #: 815-B-19-020

ISO 25101, First Edition, March 2009, Reference #: ISO 25101:2009(E)

Department of Defense, Quality Systems Manual for Environmental Laboratories, Version 5.4, 2021

## 1. Scope and Application

**Matrices:** Drinking water, Non-potable Water, Tissues, Biosolids and Soil Matrices
(Drinking water is applicable for specific state regulatory requirements for this method)
**Definitions:** Refer to Alpha Analytical Quality Manual.

**1.1.** This is a liquid chromatography/tandem mass spectrometry (LC/MS/MS) method for the determination of selected perfluorinated alkyl substances (PFAS) in Non-Drinking Water and soil Matrices. Accuracy and precision data have been generated in reagent water, finished ground and surface waters, and soils for the compounds listed in Table 1.

**1.2.** The data report packages present the documentation of any method modification related to the samples tested. Depending upon the nature of the modification and the extent of intended use, the laboratory may be required to demonstrate that the modifications will produce equivalent results for the matrix. Approval of all method modifications is by one or more of the following laboratory personnel before performing the modification: Area Supervisor, Department Supervisor, Laboratory Director, or Quality Assurance Officer.

**1.3.** This method is restricted to use by or under the supervision of analysts experienced in the operation of the LC/MS/MS and in the interpretation of LC/MS/MS data. Each analyst must demonstrate the ability to generate acceptable results with this method by performing an initial demonstration of capability.

## 2. Summary of the Method

**2.1.** A 250-mL water sample is fortified with extracted internal standards (EIS) and passed through a solid phase extraction (WAX) cartridge containing a mixed mode, Weak Anion Exchange, reversed phase, water-wettable polymer to extract the method analytes and isotopically labeled compounds. The compounds are eluted from the solid phase in two fractions with methanol followed by a small amount of 2% ammonium hydroxide in methanol solution. The extract is concentrated with nitrogen in a heated water bath and then adjusted to a 1-mL volume with 80:20% (vol/vol) methanol:water.

**2.2.** A 0.5 to 4 gram soil, solid, tissue, or biosolid sample is fortified with extracted internal standards (EIS), diluted in methanol, and agitated rigorously. An aliquot of the methanol is passed across an SPE-based clean-up cartridge and the eluate is collected. The extract is concentrated with

nitrogen in a heated water bath and then adjusted to a 1-mL volume with 80:20% (vol/vol) methanol:water.

**2.3.** A sample extract is injected into an LC equipped with a C18 column that is interfaced with an MS/MS. The analytes are separated and identified by comparing the acquired mass spectra and retention times to reference spectra and retention times for calibration standards acquired under identical LC/MS/MS conditions. The concentration of each analyte is determined by using the isotope dilution technique. Extracted Internal Standards (EIS) analytes are used to monitor the extraction efficiency of the method analytes.

### 2.4. Method Modifications from Reference

**2.4.1.** None.

**Table 1**

| Parameter | Acronym | CAS |
|---|---|---|
| **PERFLUOROALKYL ETHER CARBOXYLIC ACIDS (PFECAs)** | | |
| Tetrafluoro-2-(heptafluoropropoxy)propanoic acid | HFPO-DA | 13252-13-6 |
| 4,8-dioxa-3H-perfluorononanoic acid | ADONA | 919005-14-4 |
| **PERFLUOROALKYLCARBOXILIC ACIDS (PFCAs)** | | |
| Perfluorobutanoic acid | PFBA | 375-22-4 |
| Perfluoropentanoic acid | PFPeA | 2706-90-3 |
| Perfluorohexanoic acid | PFHxA | 307-24-4 |
| Perfluoroheptanoic acid | PFHpA | 375-85-9 |
| Perfluorooctanoic acid | PFOA | 335-67-1 |
| Perfluorononanoic acid | PFNA | 375-95-1 |
| Perfluorodecanoic acid | PFDA | 335-76-2 |
| Perfluoroundecanoic acid | PFUnA | 2058-94-8 |
| Perfluorododecanoic acid | PFDoA | 307-55-1 |
| Perfluorotridecanoic acid | PFTrDA | 72629-94-8 |
| Perfluorotetradecanoic acid | PFTA | 376-06-7 |
| Perfluorohexadecanoic acid | PFHxDA | 67905-19-5 |
| Perfluorooctadecanoic acid | PFODA | 16517-11-6 |
| **PERFLUOROALKYL SULFONIC ACIDS (PFASs)** | | |
| Perfluoropropanesulfonic acid | PFPrS | 423-41-6 |
| Perfluorobutanesulfonic acid | PFBS | 375-73-5 |
| Perfluoropentanesulfonic acid | PFPeS | 2706-91-4 |
| Perfluorohexanesulfonic acid | PFHxS | 355-46-4 |
| Perfluoroheptanesulfonic acid | PFHpS | 375-92-8 |
| Perfluorooctanesulfonic acid | PFOS | 1763-23-1 |
| Perfluorononanesulfonic acid | PFNS | 68259-12-1 |
| Perfluorodecanesulfonic acid | PFDS | 335-77-3 |
| Perfluorododecanesulfonic acid | PFDoS | 79780-39-5 |

**Table 1 Cont.**

| Parameter | Acronym | CAS |
|---|---|---|
| **CHLORO-PERFLUOROALKYLSULFONATE** | | |
| 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid | 11Cl-PF3OUdS | 763051-92-9 |
| 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid | 9Cl-PF3ONS | 756426-58-1 |
| **PERFLUOROOCTANESULFONAMIDES (FOSAs)** | | |
| Perfluorooctanesulfonamide | PFOSA | 754-91-6 |
| N-methylperfluoro-1-octanesulfonamide | NMeFOSA | 31506-32-8 |
| N-ethylperfluoro-1-octanesulfonamide | NEtFOSA | 4151-50-2 |
| **TELOMER SULFONIC ACIDS** | | |
| 1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2) | 4:2FTS | 757124-72-4 |
| 1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2) | 6:2FTS | 27619-97-2 |
| 1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2) | 8:2FTS | 39108-34-4 |
| 1H,1H,2H,2H-perfluorododecanesulfonic acid (10:2) | 10:2FTS | 120226-60-0 |
| **PERFLUOROOCTANESULFONAMIDOACETIC ACIDS** | | |
| N-methyl perfluorooctanesulfonamidoacetic acid | NMeFOSAA | 2355-31-9 |
| N-ethyl perfluorooctanesulfonamidoacetic acid | NEtFOSAA | 2991-50-6 |
| **NATIVE PERFLUOROOCTANESULFONAMIDOETHANOLS (FOSEs)** | | |
| 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol | NMeFOSE | 24448-09-7 |
| 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol | NEtFOSE | 1691-99-2 |
| **PERFLUOROETHER AND POLYETHER CARBOXYLIC ACIDS** | | |
| Perfluoro-3-methoxypropanoic acid | PFMPA | 377-73-1 |
| Perfluoro-4-methoxybutanoic acid | PFMBA | 863090-89-5 |
| Perfluoro(2-ethoxyethane)sulfonic acid | PFEESA | 113507-82-7 |
| Nonafluoro-3,6-dioxaheptanoic acid | NFDHA | 151772-58-6 |

# 3. Reporting Limits

**3.1.** The reporting limit for PFAS's is 2 ng/L for aqueous samples (20 ng/L for HFPO-DA) and 0.25 - 1 ng/g (2.5 ng/g for HFPO-DA) for soil samples.

# 4. Interferences

**4.1.** PFAS standards, extracts and samples should not come into contact with any glass containers or pipettes as these analytes can potentially adsorb to glass surfaces. PFAS analyte and EIS standards commercially purchased in glass ampoules are acceptable; however, all subsequent transfers or dilutions performed by the analyst must be prepared and stored in polypropylene containers.

**4.2.** Method interferences may be caused by contaminants in solvents, reagents (including reagent water), sample bottles and caps, and other sample processing hardware that can lead to discrete artifacts and/or elevated baselines in the chromatograms. The method analytes in this method can also be found in many common laboratory supplies and equipment, such as PTFE (polytetrafluoroethylene) products, LC solvent lines, methanol, aluminum foil, SPE sample transfer lines, etc. All items such as these must be demonstrated to be free from interferences (less than 1/3 the RL for each method analyte) under the conditions of the analysis by analyzing laboratory reagent blanks whenever a new vendor or reagent is brought online as described in Section 9.1,

and by continuous evaluation of method blanks and/or instrument blanks. **Subtracting blank values from sample results is not permitted.**

**4.3.** Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the water. Humic and/or fulvic material can be co-extracted during SPE and high levels can cause enhancement and/or suppression in the electrospray ionization source or low recoveries on the SPE sorbent. Total organic carbon (TOC) is a good indicator of humic content of the sample.

**4.4.** SPE cartridges can be a source of interferences. The analysis of field and laboratory reagent blanks can provide important information regarding the presence or absence of such interferences. Brands and lots of SPE devices should be tested to ensure that contamination does not preclude analyte identification and quantitation.

# 5. Health and Safety

**5.1.** The toxicity or carcinogenicity of each reagent and standard used in this method is not fully established; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. A reference file of material safety data sheets is available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available in the Chemical Hygiene Plan.

**5.2.** All personnel handling environmental samples known to contain or to have been in contact with municipal waste must follow safety practices for handling known disease causative agents.

**5.3.** PFOA has been described as “likely to be carcinogenic to humans.” Pure standard materials and stock standard solutions of these method analytes should be handled with suitable protection to skin and eyes, and care should be taken not to breathe the vapors or ingest the materials.

# 6. Sample Collection, Preservation, Shipping and Handling

## 6.1. Sample Collection for Aqueous Samples

**6.1.1.** Samples must be collected in two (2) 250-mL high density polyethylene (HDPE) container with an unlined plastic screw cap.

**6.1.2.** The sample handler must wash their hands before sampling and wear nitrile gloves while filling and sealing the sample bottles. PFAS contamination during sampling can occur from a number of common sources, such as food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will aid in minimizing this type of accidental contamination of the samples.

**6.1.3.** Open the tap and allow the system to flush until the water temperature has stabilized (approximately 3 to 5 min). Collect samples from the flowing system.

**6.1.4.** Fill sample bottles. Samples do not need to be collected headspace free.

**6.1.5.** After collecting the sample and cap the bottle. Keep the sample sealed from time of collection until extraction.

**6.1.6. Field Reagent Blank (FRB)**

6.1.6.1. An FRB must be handled along with each sample set. The sample set is composed of samples collected from the same sample site and at the same time. At the laboratory, fill the field blank sample bottle with reagent water and preservatives, seal, and ship to the sampling site along with the sample bottles. For each FRB shipped, an empty sample bottle (no preservatives) must also be shipped. At the sampling site, the sampler must open the shipped FRB and pour the reagent water into the empty shipped sample bottle, seal and label this bottle as the FRB. The FRB is shipped back to the laboratory along with the samples and analyzed to ensure that PFAS's were not introduced into the sample during sample collection/handling.

6.1.6.2. The reagent water used for the FRBs must be initially analyzed for method analytes as a MB and must meet the MB criteria in Section 9.1.1 prior to use. This requirement will ensure samples are not being discarded due to contaminated reagent water rather than contamination during sampling.

### 6.2. Sample Collection for Soil and Sediment samples

**6.2.1.** Grab samples are collected in polypropylene containers. Sample containers and contact surfaces containing PTFE shall be avoided.

### 6.3. Sample Preservation

**6.3.1.** Not applicable.

### 6.4. Sample Shipping

**6.4.1.** Samples must be chilled during shipment and must not exceed 10 °C during the first 48 hours after collection. Sample temperature must be confirmed to be at or below 10 °C when the samples are received at the laboratory. Samples stored in the lab must be held at or below 6 °C until extraction but should not be frozen.

**6.4.2.** **NOTE:** Samples that are significantly above 10° C, at the time of collection, may need to be iced or refrigerated for a period of time, in order to chill them prior to shipping. This will allow them to be shipped with sufficient ice to meet the above requirements.

### 6.5. Sample Handling

#### 6.5.1. Holding Times

6.5.1.1. Aqueous samples should be extracted as soon as possible but must be extracted within 28 days and stored at 0° - 6° C in the dark. Solid and tissue matrices should be extracted within 90 days and stored at 0° - 6° C in the dark. Extracts are stored at <10° C and analyzed within 90 days after extraction.

6.5.1.2. The holding time for extraction for all matrices reporting to the State of Maine is 14 days stored at 0-6°C or -20°C; analytical holding time is 28 days for extracts stored at 0-4°C.

## 7. Equipment and Supplies

**7.1.** SAMPLE CONTAINERS – 250-mL high density polyethylene (HDPE) bottles fitted with unlined screw caps. Sample bottles must be discarded after use.

**7.2.** SAMPLE JARS – 8-ounce wide mouth high density polyethylene (HDPE) bottles fitted with unlined screw caps. Sample bottles must be discarded after use.

**7.3.** POLYPROPYLENE BOTTLES – 4-mL narrow-mouth polypropylene bottles.

**7.4.** CENTRIFUGE TUBES – 50-mL conical polypropylene tubes with polypropylene screw caps for storing standard solutions and for collection of the extracts.

**7.5.** AUTOSAMPLER VIALS – Polypropylene 0.7-mL autosampler vials with polypropylene caps.

**7.6.** NOTE: Polypropylene vials and caps are necessary to prevent contamination of the sample from PTFE coated septa. However, polypropylene caps do not reseal, so evaporation occurs after injection. Thus, multiple injections from the same vial are not possible.

**7.7.** POLYPROPYLENE GRADUATED CYLINDERS – Suggested sizes include 25, 50, 100 and 1000-mL cylinders.

**7.8.** Auto Pipets – Suggested sizes include 5, 10, 25, 50, 100, 250, 500, 1000, 5000 and 10,000-µls.

**7.9.** PLASTIC PIPETS – Polypropylene or polyethylene disposable pipets.

**7.10.** ANALYTICAL BALANCE – Capable of weighing to the nearest 0.0001 g.

**7.11.** ANALYTICAL BALANCE – Capable of weighing to the nearest 0.1 g.

**7.12.** SOLID PHASE EXTRACTION (SPE) APPARATUS FOR USING CARTRIDGES

**7.13.** SPE CARTRIDGES – 0.5 g SPE cartridges containing a reverse phase copolymer characterized by a weak anion exchanger (WAX) sorbent phase.

**7.14.** VACUUM EXTRACTION MANIFOLD – A manual vacuum manifold with large volume sampler for cartridge extractions, or an automatic/robotic sample preparation system designed for use with SPE cartridges, may be used if all QC requirements discussed in Section 9 are met. Extraction and/or elution steps may not be changed or omitted to accommodate the use of an automated system. Care must be taken with automated SPE systems to ensure the PTFE commonly used in these systems does not contribute to unacceptable analyte concentrations in the MB (Sect. 9.1.1).

**7.15.** SAMPLE DELIVERY SYSTEM – Use of a polypropylene transfer tube system, which transfers the sample directly from the sample container to the SPE cartridge, is recommended, but not mandatory. Standard extraction manifolds come equipped with PTFE transfer tube systems. These can be replaced with 1/8” O.D. x 1/16” I.D. polypropylene or polyethylene tubing cut to an appropriate length to ensure no sample contamination from the sample transfer lines. Other types of non-PTFE tubing may be used provided it meets the MB (Sect. 9.1.1) and LCS (Sect. 9.2) QC requirements.

**7.16.** Extract Clean-up Cartridge – 250 mg 6mL SPE Cartridge containing graphitized polymer carbon.

**7.17.** EXTRACT CONCENTRATION SYSTEM – Extracts are concentrated by evaporation with nitrogen using a water bath set no higher than 65 °C.

**7.18.** LABORATORY OR ASPIRATOR VACUUM SYSTEM – Sufficient capacity to maintain a vacuum of approximately 10 to 15 inches of mercury for extraction cartridges.

**7.19.** LIQUID CHROMATOGRAPHY (LC)/TANDEM MASS SPECTROMETER (MS/MS) WITH DATA SYSTEM

**7.20.** LC SYSTEM – Instrument capable of reproducibly injecting up to 10-µL aliquots and performing binary linear gradients at a constant flow rate near the flow rate used for development of this method (0.4 mL/min). The LC must be capable of pumping the water/methanol mobile phase

without the use of a degasser which pulls vacuum on the mobile phase bottle (other types of degassers are acceptable). Degassers which pull vacuum on the mobile phase bottle will volatilize the ammonium acetate mobile phase causing the analyte peaks to shift to earlier retention times over the course of the analysis batch. The usage of a column heater is optional.

**7.21.** LC/TANDEM MASS SPECTROMETER – The LC/MS/MS must be capable of negative ion electrospray ionization (ESI) near the suggested LC flow rate of 0.4 mL/min. The system must be capable of performing MS/MS to produce unique product ions for the method analytes within specified retention time segments. A minimum of 10 scans across the chromatographic peak is required to ensure adequate precision.

**7.22.** DATA SYSTEM – An interfaced data system is required to acquire, store, reduce, and output mass spectral data. The computer software should have the capability of processing stored LC/MS/MS data by recognizing an LC peak within any given retention time window. The software must allow integration of the ion abundance of any specific ion within specified time or scan number limits. The software must be able to calculate relative response factors, construct linear regressions or quadratic calibration curves, and calculate analyte concentrations.

**7.23.** ANALYTICAL COLUMN – An LC BEH C18 column (2.1 x 50 mm) packed with 1.7 µm dp C18 solid phase particles was used. Any column that provides adequate resolution, peak shape, capacity, accuracy, and precision (Sect. 9) may be used.

# 8. Reagents and Standards

**8.1.** GASES, REAGENTS, AND SOLVENTS – Reagent grade or better chemicals must be used.

**8.1.1.** REAGENT WATER – Purified water which does not contain any measurable quantities of any method analytes or interfering compounds greater than 1/3 the RL for each method analyte of interest. Prior to daily use, at least 3 L of reagent water should be flushed from the purification system to rinse out any build-up of analytes in the system's tubing.

**8.1.2.** METHANOL ($CH_3OH$, CAS#: 67-56-1) – High purity, demonstrated to be free of analytes and interferences.

**8.1.3.** AMMONIUM ACETATE ($NH_4C_2H_3O_2$, CAS#: 631-61-8) – High purity, demonstrated to be free of analytes and interferences.

**8.1.4.** ACETIC ACID ($H_3CCOOH$, CAS#: 64-19-7) - High purity, demonstrated to be free of analytes and interferences.

**8.1.5.** 1M AMMONIUM ACETATE/REAGENT WATER – High purity, demonstrated to be free of analytes and interferences.

**8.1.6.** 2mM AMMONIUM ACETATE/METHANOL:WATER (5:95) – To prepare, mix 2 mL of 1M AMMONIUM ACETATE,1 mL ACETIC ACID and 50 mL METHANOL into I Liter of REAGENT WATER.

**8.1.7.** Methanol/Water (80:20) – To prepare a 1 Liter bottle, mix 200 mL of REAGENT WATER with 800 mL of METHANOL.

**8.1.8.** AMMONIUM HYDROXIDE ($NH_3$, CAS#: 1336-21-6) – High purity, demonstrated to be free of analytes and interferences.

**8.1.9.** Sodium Acetate ($NaOOCCH_3$, CAS#: 127-09-3) – High purity, demonstrated to be free of analytes and interferences.

**8.1.10.** 25 mM Sodium Acetate Buffer – To prepare 250 mLs, dissolve .625 grams of sodium acetate into 100 mLs of reagent water. Add 4 mLs Acetic Acid and adjust the final volume to 250 mLs with reagent water.

**8.1.11.** NITROGEN – Used for the following purposes: Nitrogen aids in aerosol generation of the ESI liquid spray and is used as collision gas in some MS/MS instruments. The nitrogen used should meet or exceed instrument manufacturer's specifications. In addition, Nitrogen is used to concentrate sample extracts (Ultra High Purity or equivalent).

**8.1.12.** ARGON – Used as collision gas in MS/MS instruments. Argon should meet or exceed instrument manufacturer's specifications. Nitrogen gas may be used as the collision gas provided sufficient sensitivity (product ion formation) is achieved.

**8.2.** STANDARD SOLUTIONS – When a compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. PFAS analyte and IS standards commercially purchased in glass ampoules are acceptable; however, all subsequent transfers or dilutions performed by the analyst must be prepared and stored in polypropylene containers. Standards for sample fortification generally should be prepared in the smallest volume that can be accurately measured to minimize the addition of excess organic solvent to aqueous samples.

**NOTE:** Stock standards and diluted stock standards are stored at ≤4 °C.

**8.2.1.** ISOTOPE DILUTION Extracted Internal Standard (ID EIS) STOCK SOLUTIONS - ID EIS stock standard solutions are stable for at least 6 months when stored at 4 °C. The stock solution is purchased at a concentration of 1000 ng/mL.

**8.2.2.** ISOTOPE DILUTION Extracted Internal Standard PRIMARY DILUTION STANDARD (ID EIS PDS) – Prepare the ID EIS PDS at a concentration of 500 ng/mL. The ID PDS is prepared in methanol. The ID PDS is stable for 1 year when stored at ≤4 °C (table 2a).

**Table 2a**

| Isotope Labeled Standard | Conc. of EIS Stock (ng/mL) | Vol. of EIS Stock (mL) | Final Vol. of EIS PDS (mL) | Final Conc. of EIS PDS (ng/mL) |
|---|---|---|---|---|
| M4PFBA | 1000 | 1.0 | 2.0 | 500 |
| M5PFPeA | 1000 | 1.0 | 2.0 | 500 |
| M5PFHxA | 1000 | 1.0 | 2.0 | 500 |
| M4PFHpA | 1000 | 1.0 | 2.0 | 500 |
| M8PFOA | 1000 | 1.0 | 2.0 | 500 |
| M9PFNA | 1000 | 1.0 | 2.0 | 500 |
| M6PFDA | 1000 | 1.0 | 2.0 | 500 |
| M7PFUdA | 1000 | 1.0 | 2.0 | 500 |
| MPFDoA | 1000 | 1.0 | 2.0 | 500 |
| M2PFTeDA | 1000 | 1.0 | 2.0 | 500 |
| M2PFHxDA | 50,000 | .02 | 2.0 | 500 |
| M8FOSA | 1000 | 1.0 | 2.0 | 500 |
| d3-N-MeFOSAA | 1000 | 1.0 | 2.0 | 500 |
| d5-N-EtFOSAA | 1000 | 1.0 | 2.0 | 500 |
| M3PFBS | 929 | 1.0 | 2.0 | 464.5 |
| M3PFHxS | 946 | 1.0 | 2.0 | 473 |
| M8PFOS | 957 | 1.0 | 2.0 | 478.5 |
| M2-4:2FTS | 935 | 1.0 | 2.0 | 467.5 |
| M2-6:2FTS | 949 | 1.0 | 2.0 | 474.5 |
| M2-8:2FTS | 958 | 1.0 | 2.0 | 479 |
| M2,D4-10:2FTS | 50,000 | .04 | 2.0 | 1000 |
| M3HFPO-DA | 50,000 | .4 | 2.0 | 10,000 |

**Table 2b**

| Isotope Labeled Standard | Conc. of EIS Stock (ng/mL) | Vol. of EIS Stock (mL) | Final Vol. of EIS PDS (mL) | Final Conc. of EIS PDS (ng/mL) |
|---|---|---|---|---|
| d3-N-MeFOSA | 50,000 | .2 | 2.0 | 5000 |
| d5-N-EtFOSA | 50,000 | .2 | 2.0 | 5000 |
| d7-N-MeFOSE | 50,000 | .2 | 2.0 | 5000 |
| d9-N-EtFOSE | 50,000 | .2 | 2.0 | 5000 |

**8.2.3.** ANALYTE STOCK STANDARD SOLUTION – Analyte stock standards are stable for 1 year when stored at 4 °C. When using these stock standards to prepare a PDS, care must be taken to ensure that these standards are at room temperature and adequately vortexed.

**8.2.4.** ANALYTE PRIMARY SPIKING STANDARD – Prepare the spiking standard at a concentration of 500 ng/mL in methanol. The spiking standard is stable for at least two months when stored in polypropylene centrifuge tubes at room temperature.

**8.2.5.** Analyte Secondary Spiking Stock (SS): Prepare the spiking solution of additional add on components for project specific requirements only.

**Table 3: Purchased PFAC-30PAR**

| Analyte | Conc. of Stock (ng/mL) | Vol. of Stock (mL) | Final Vol. of PDS (mL) | Final Conc. of PDS (ng/mL) |
|---|---|---|---|---|
| PFBA | 1000 | 1 | 2 | 500 |
| PFPeA | 1000 | 1 | 2 | 500 |
| PFHxA | 1000 | 1 | 2 | 500 |
| PFHpA | 1000 | 1 | 2 | 500 |
| PFOA | 1000 | 1 | 2 | 500 |
| PFNA | 1000 | 1 | 2 | 500 |
| PFDA | 1000 | 1 | 2 | 500 |
| PFUnA | 1000 | 1 | 2 | 500 |
| PFDoA | 1000 | 1 | 2 | 500 |
| PFTrDA | 1000 | 1 | 2 | 500 |
| PFTA | 1000 | 1 | 2 | 500 |
| FOSA | 1000 | 1 | 2 | 500 |
| Br-NMeFOSAA | 240 | 1 | 2 | 120 |
| L-NMeFOSAA | 760 | 1 | 2 | 380 |
| Br-NEtFOSAA | 225 | 1 | 2 | 112.5 |
| L-NEtFOSAA | 775 | 1 | 2 | 387.5 |
| L-PFBS | 887 | 1 | 2 | 443.5 |
| L-PFPeS | 941 | 1 | 2 | 470.5 |
| L-PFHxSK | 741 | 1 | 2 | 370.5 |
| Br-PFHxSK | 173 | 1 | 2 | 86.5 |
| L-PFHpS | 953 | 1 | 2 | 476.5 |
| L-PFOSK | 732 | 1 | 2 | 366 |
| Br-PFOSK | 196 | 1 | 2 | 98 |
| L-PFNS | 962 | 1 | 2 | 481 |
| L-PFDS | 965 | 1 | 2 | 482.5 |
| 4:2FTS | 937 | 1 | 2 | 468.5 |
| 6:2FTS | 951 | 1 | 2 | 475.5 |
| 8:2FTS | 960 | 1 | 2 | 480 |
| 9ClPF3ONS | 933 | 1 | 2 | 466.5 |
| 11ClPF3OUdS | 943 | 1 | 2 | 471.5 |
| ADONA | 945 | 1 | 2 | 472.5 |
| HFPO-DA | 1000 | 1 | 2 | 500 |

**Table 4: Secondary Stock (SS)**

| Analyte | Conc. of Stock (ng/mL) | Vol. of Stock (mL) | Final Vol. of SS (mL) | Final Conc. of SS(ng/mL) |
|---|---|---|---|---|
| PFHxDA | 50,000 | 0.4 | 10 | 2000 |
| PFODA | 50,000 | 0.4 | 10 | 2000 |
| HFPO-DA | 50,000 | 3.9 | 10 | 19,500 |
| 10:2-FTS | 48,300 | 0.4 | 10 | 1932 |
| PFDoS | 48,400 | 0.4 | 10 | 1936 |
| PFPrS | 45,800 | 0.4 | 10 | 1832 |
| PFMPA | 50,000 | 0.4 | 10 | 2000 |
| PFMBA | 50,000 | 0.4 | 10 | 2000 |
| PFEESA | 44,500 | 0.4 | 10 | 1780 |
| NFDHA | 50,000 | 0.4 | 10 | 2000 |
| NMeFOSA | 50,000 | 0.4 | 10 | 2000 |
| NMeFOSE | 50,000 | 0.4 | 10 | 2000 |
| NEtFOSA | 50,000 | 0.4 | 10 | 2000 |
| NEtFOSE | 50,000 | 0.4 | 10 | 2000 |

**Table 5: Final PDS solution**

| Stock | Conc of Stock | Vol of Stock (mL) | Final Vol of PDS (mL) | Final conc (ng/mL) |
|---|---|---|---|---|
| **PFAC30PAR** | **Varies (see Table 3)** | **2** | **4** | **500 (varies)** |
| **Secondary Stock** | **Varies (see Table 4)** | **1** | **4** | **500 (varies)** |

**8.2.6.** LOW, MEDIUM, AND HIGH LEVEL LCS – The LCS's will be prepared at the following concentrations and rotated per batch; 2 ng/L, 40 ng/L, 500 ng/l for drinking water. The analyte PDS contains all the method analytes of interest at various concentrations in methanol. The analyte PDS has been shown to be stable for six months when stored at ≤ 4 °C.

**8.2.7.** Isotope Dilution Labeled Recovery Stock Solutions (ID REC) – ID REC Stock solutions are stable for at least 1 year when stored at 4 °C. The stock solution is purchased at a concentration of 2000 ng/mL.

**8.2.8.** Isotope Dilution Labeled Recovery Primary Dilution Standard (ID REC PDS) - Prepare the ID REC PDS at a concentration of 500 ng/mL. The ID REC PDS is prepared in methanol. The ID REC PDS is stable for at least 1 year when stored in polypropylene centrifuge tubes at ≤4 °C.

**Table 5**

| Analyte | Conc. of REC Stock (ng/mL) | Vol. of REC Stock (mL) | Final Vol. of REC PDS (mL) | Final Conc. of REC PDS (ng/mL) |
|---|---|---|---|---|
| M2PFOA | 2000 | 1 | 4 | 500 |
| M2PFDA | 2000 | 1 | 4 | 500 |
| M3PFBA | 2000 | 1 | 4 | 500 |
| M4PFOS | 2000 | 1 | 4 | 500 |

**8.2.9.** CALIBRATION STANDARDS (CAL)

Current Concentrations (ng/mL): 0.25 (optional), 0.5, 1.0, 5.0, 10.0, 25, 50.0, 100, 250.

Prepare the CAL standards over the concentration range of interest from dilutions of the analyte PDS in methanol containing 20% reagent water. 20 µl of the EIS PDS and REC PDS are added to the CAL standards to give a constant concentration of 10 ng/mL. The lowest concentration CAL standard must be at or below the RL (2 ng/L), which may depend on system sensitivity. The CAL standards may also be used as CCVs (Sect. 9.8).

**Table 6**

| Calibration Standard Concentration | Final Aqueous Cal STD Concentration | Final Soil Cal STD Concentration | 30 Compound Stock Added (uL) | Individual Analyte Stocks Added (uL) | 500 ng/mL Dilution Added (uL) | Final Volume in MeOH/H2O (80:20) |
|---|---|---|---|---|---|---|
| .5 ng/mL | 2 ng/L | .25 ng/g | 6.25 | | 25 | 25 mLs |
| 1 ng/mL | 4 ng/L | .5 ng/g | 5 | | 20 | 10 mLs |
| 5 ng/mL | 20 ng/L | 1 ng/g | 25 | | 100 | 10 mLs |
| 10 ng/mL | 40 ng/L | 5 ng/g | 125 | 5 | | 25 mLs |
| 50 ng/mL | 200 ng/L | 25 ng/g | 250 | 10 | | 10 mLs |
| 125 ng/mL | 500 ng/L | 62.5 ng/g | 625 | 25 | | 10 mLs |
| 150 ng/mL | 600 ng/L | 75 ng/g | 750 | 30 | | 10 mLs |
| 250 ng/mL | 1000 ng/L | 125 ng/g | 625 | | | 5 mLs |
| 500 ng/mL | 2000 ng/L | 250 ng/g | 1250 | | | 5 mLs |

# 9. Quality Control

The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

## 9.1. Blanks

**9.1.1. METHOD BLANK (MB)** - A Method Blank (MB) is required with each extraction batch to confirm that potential background contaminants are not interfering with the identification or quantitation of method analytes. Prep and analyze a MB for every 20 samples. If the MB produces a peak within the retention time window of any analyte that would prevent the determination of that analyte, determine the source of contamination, and eliminate the interference before processing samples. Background contamination must be reduced to an acceptable level before proceeding. Background from method analytes or other contaminants that interfere with the measurement of method analytes must be below the RL. If the method analytes are detected in the MB at concentrations equal to or greater than this level, then all data for the problem analyte(s) must be considered invalid for all samples in the extraction batch. Because background contamination is a significant problem for several method analytes, it is highly recommended that the analyst maintains a historical record of MB data.

9.1.1.1. Corrective Action: Samples should not be analyzed until an acceptable method blank analysis is obtained. The results are qualified with a “B” flag for any associated sample concentrations that are less than 10x the blank concentration for the analyte. Sample results are qualified with a “B” flag for analytes observed in the blank > RL. Exceptions may be made if the samples associated with the out-of-control method blank

are non-detect for the compound of interest, or if sample concentrations are greater than 10x the blank levels. In such cases when the sample results are accepted, the client is notified in a project narrative associated with the sample results.

**9.1.2. FIELD REAGENT BLANK (FRB) -** The purpose of the FRB is to ensure that PFAS's measured in the Field Samples were not inadvertently introduced into the sample during sample collection/handling. Analysis of the FRB is performed on a project specific basis. The FRB is processed, extracted, and analyzed in exactly the same manner as a Field Sample.

### 9.2. Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicates (LCSD)

**9.2.1.** An LCS is required with each extraction batch. The fortified concentration of the LCS may be rotated between low, medium, and high concentrations from batch to batch. Default limits of 50-150% (60 – 140% for New Jersey programs) of the true value may be used for analytes until sufficient replicates have been analyzed to generate proper control limits. Calculate the percent recovery (%*R*) for each analyte using the equation:

$$\%R = \frac{A \times 100}{B}$$

Where:

*A* = measured concentration in the fortified sample
*B* =fortification concentration.

**9.2.2.** Where applicable, in the absence of additional sample volume required to perform matrix specific QC, LCSD's are to be extracted and analyzed. The concentration and analyte recovery criteria for the LCSD must be the same as the batch LCS. The RSD's must fall within ≤30% of the true value for medium and high-level replicates, and ≤50% for low level replicates. Calculate the relative percent difference (RPD) for duplicate MSs (MS and MSD) using the equation:

$$RPD = \frac{|LCS - LCSD|}{(LCS + LCSD) / 2} \times 100$$

**9.2.3.** If the LCS and or LCSD results do not meet these criteria for method analytes, then all data for the problem analyte(s) must be considered invalid for all samples in the extraction batch.

**9.2.4.** Corrective Action: All compounds should be recovered within the specified limits. If the LCS recovery is still out of control, re-extract and/or re-analyze the LCS and all associated samples. Samples cannot be reported until an acceptable LCS is obtained. Exceptions may be made in some cases for documented difficult/poor performing compounds such as PFODA, FOSA, and NFDHA. An explanation of any out-of-control LCS recovery must be included in the project narrative to the client.

## 9.3. Labeled Recovery Standards (REC)

**9.3.1.** The analyst must monitor the peak areas of the REC(s) in all injections during each analysis day.

## 9.4. Extracted Internal Standards (EIS)

**9.4.1.** The EIS standard is fortified into all samples, CCVs, MBs, LCSs, MSs, MSDs, FD, and FRB prior to extraction. It is also added to the CAL standards. The EIS is a means of assessing method performance from extraction to final chromatographic measurement. Calculate the recovery (%R) for the EIS using the following equation:

$$\%R = (A / B) \times 100$$

Where:

*A* = calculated EIS concentration for the QC or Field Sample

*B* = fortified concentration of the EIS.

**9.4.2.** EIS recoveries are evaluated according to their matrix specific control limits in the LIMS. Any samples with EIS recoveries < 5% (< 10 % for New York) must be re-extracted. Any data associated with EIS recoveries <2% cannot be reported and the project manager needs to be notified. A low or high percent recovery for a sample, blank, or CCV does not require discarding the analytical data, but it may indicate a potential problem with future analytical data. When EIS recovery from a sample, blank, or CCV are outside control limits, check 1) calculations to locate possible errors, 2) standard solutions for degradation, 3) contamination, and 4) instrument performance. For CCVs and QC elements spiked with all target analytes, if the recovery of the corresponding target analytes meet the acceptance criteria but the EIS is outside criteria, the data can be used. If the associated target analytes do not meet the acceptance criteria, the data must be reanalyzed.

## 9.5. Matrix Spike (MS)

**9.5.1.** Analysis of an MS is required in each extraction batch and is used to determine that the sample matrix does not adversely affect method accuracy. Assessment of method precision is accomplished by analysis of a Field Duplicate (FD) (Sect. 9.6); however, infrequent occurrence of method analytes would hinder this assessment. If the occurrence of method analytes in the samples is infrequent, or if historical trends are unavailable, a second MS, or MSD, must be prepared, extracted, and analyzed from a duplicate of the Field Sample. Extraction batches that contain MSDs will not require the extraction of a field sample duplicate. If a variety of different sample matrices are analyzed regularly, for example, drinking water from groundwater and surface water sources, method performance should be established for each. Over time, MS data should be documented by the laboratory for all routine sample sources.

**9.5.2.** Within each extraction batch, a minimum of one Field Sample is fortified as an MS for every 20 Field Samples analyzed. The MS is prepared by spiking a sample with an appropriate amount of the Analyte Stock Standard (Sect. 8.2.3). Use historical data and rotate through the low, mid and high concentrations when selecting a fortifying concentration. Calculate the percent recovery (%*R*) for each analyte using the equation:

$$\%R = \frac{(A - B)}{C} \times 100$$

Where:

*A* = measured concentration in the fortified sample
*B* = measured concentration in the unfortified sample
*C* = fortification concentration.

**9.5.3.** Analyte recoveries may exhibit matrix bias. For samples fortified at or above their native concentration, recoveries should range between 50-150%. If the accuracy of any analyte falls outside the designated range, and the laboratory performance for that analyte is shown to be in control in the LCS, the recovery is judged to be matrix biased. The result for that analyte in the unfortified sample is labeled suspect/matrix to inform the data user that the results are suspect due to matrix effects.

## 9.6. Laboratory Duplicate

**9.6.1.** FIELD DUPLICATE OR LABORATORY FORTIFIED SAMPLE MATRIX DUPLICATE (FD or MSD) – Within each extraction batch (not to exceed 20 Field Samples), a minimum of one FD or MSD must be analyzed. Duplicates check the precision associated with sample collection, preservation, storage, and laboratory procedures. If method analytes are not routinely observed in Field Samples, an MSD should be analyzed rather than an FD.

9.6.1.1. Calculate the relative percent difference (*RPD*) for duplicate measurements (*FD1*

and *FD2*) using the equation:

$$RPD = \frac{|FD1 - FD2|}{(FD1 + FD2) / 2} \times 100$$

**9.6.2.** RPDs for FDs should be ≤30%. Greater variability may be observed when FDs have analyte concentrations that are within a factor of 2 of the RL. At these concentrations, FDs should have RPDs that are ≤50%. If the RPD of any analyte falls outside the designated range, and the laboratory performance for that analyte is shown to be in control in the CCV, the recovery is judged to be matrix biased. The result for that analyte in the unfortified sample is labeled suspect/matrix to inform the data user that the results are suspect due to matrix effects.

**9.6.3.** If an MSD is analyzed instead of a FD, calculate the relative percent difference (RPD) for duplicate MSs (MS and MSD) using the equation:

$$RPD = \frac{|MS - MSD|}{(MS + MSD) / 2} \times 100$$

**9.6.4.** RPDs for duplicate MSs should be ≤30% for samples fortified at or above their native concentration. Greater variability may be observed when MSs are fortified at analyte concentrations that are within a factor of 2 of the RL. MSs fortified at these concentrations should have RPDs that are ≤50% for samples fortified at or above their native concentration. If the RPD of any analyte falls outside the designated range, and the laboratory performance for that analyte is shown to be in control in the LCSD where applicable, the result is judged to be matrix biased.

## 9.7. Initial Calibration Verification (ICV)

**9.7.1.** After each ICAL, analyze a QCS sample from a source different from the source of the CAL standards. If a second vendor is not available, then a different lot of the standard should be used. The QCS should be prepared and analyzed just like a CCV. Acceptance criteria for the QCS are identical to the CCVs; the calculated amount for each analyte must be ± 30% of the expected value. If measured analyte concentrations are not of acceptable accuracy, check the entire analytical procedure to locate and correct the problem.

## 9.8. Continuing Calibration Verification (CCV)

**9.9.** CCV Standards are analyzed at the beginning of each analysis batch, after every 10 Field Samples, and at the end of the analysis batch. See Section 10.11 for concentration requirements and acceptance criteria.

## 9.10. Method-specific Quality Control Samples

**9.10.1.** None

## 9.11. Method Sequence

- CCV-LOW
- MB
- LCS
- LCSD (where applicable)
- MS
- Duplicate or MSD
- Field Samples (1-10)
- CCV-MID
- Field Samples (11-20)
- CCV-LOW

# 10. Procedure

## 10.1. Equipment Set-up

**10.1.1.** This procedure may be performed manually or in an automated mode using a robotic or automatic sample preparation device. If an automated system is used to prepare samples, follow the manufacturer's operating instructions, but all extraction and elution steps must be the same as in the manual procedure. Extraction and/or elution steps may not be changed or omitted to accommodate the use of an automated system. If an automated system is used, the MBs should be rotated among the ports to ensure that all the valves and tubing meet the MB requirements (Sect. 9.1).

**10.1.2.** Some of the PFAS's adsorb to surfaces, including polypropylene. Therefore, the aqueous sample bottles must be rinsed with the elution solvent (Sect 10.3.4) whether extractions are performed manually or by automation. The bottle rinse is passed through the cartridge to elute the method analytes and is then collected (Sect. 10.3.4).

**10.1.3. NOTE:** The SPE cartridges and sample bottles described in this section are designed as single use items and should be discarded after use. They may not be refurbished for reuse in subsequent analyses.

## 10.2. Sample Preparation and Extraction of Aqueous Samples

**10.2.1.** Samples are preserved, collected, and stored as presented in Section 6. The entire sample that is received must be sent through the SPE cartridge. In addition, the bottle must be solvent rinsed and this rinse must be sent through the SPE cartridge as well. The method blank (MB) and laboratory control sample (LCS) must be extracted in the same manner (i.e., must include the bottle solvent rinse). It should be noted that a water rinse alone is not sufficient. This does not apply to samples with high concentrations of PFAS that are prepared using serial dilution and not SPE.

**10.2.2.** Determine sample volume. Weigh all samples to the nearest 1g. If visible sediment is present, centrifuge and decant into a new 250mL HDPE bottle and record the weight of the new container.

NOTE: Some of the PFAS's adsorb to surfaces, thus the sample volume may NOT be transferred to a graduated cylinder for volume measurement.

**10.2.3.** The MB, LCS and FRB may be prepared by measuring 250 mL of reagent water with a polypropylene graduated cylinder or filling a 250-mL sample bottle to near the top.

**10.2.4.** Adjust the QC and sample pH to 3 by adding acetic acid in water dropwise.

**10.2.5.** Add 20 µL of the EIS PDS (Sect. 8.2.2) to each sample and QC, cap and invert to mix.

**10.2.6.** If the sample is an LCS, LCSD, MS, or MSD, add the necessary amount of analyte PDS (Sect. 8.2.4 and Sect 8.2.5). Cap and invert each sample to mix.

## 10.3. Cartridge SPE Procedure

**10.3.1.** CARTRIDGE CLEAN-UP AND CONDITIONING – DO NOT allow cartridge packing material to go dry during any of the conditioning steps. Rinse each cartridge with 3 X 5 mL of 2% ammonium hydroxide in methanol, followed by 5mLs of methanol. Next, rinse each cartridge with 5 mLs of the 25 mM acetate buffer, followed by 15 mL of reagent water, without allowing the water to drop below the top edge of the packing. If the cartridge goes dry during the conditioning phase, the conditioning must be started over. Add 4-5 mL of reagent water to

each cartridge, attach the sample transfer tubes (Sect. 7.11.3), turn on the vacuum, and begin adding sample to the cartridge.

**10.3.2.** SAMPLE EXTRACTON – Adjust the vacuum so that the approximate flow rate is approximately 4 mL/min. Do not allow the cartridge to go dry before all the sample has passed through.

**10.3.3.** SAMPLE BOTTLE AND CARTRIDGE RINSE – After the entire sample has passed through the cartridge, rinse the sample bottles with 4 mL reagent water followed by 4 mL 25 mM acetate buffer at pH 4 and draw the aliquot through the sample transfer tubes and the cartridges. Draw air or nitrogen through the cartridge for 5-10 min at high vacuum (10-15 in. Hg). NOTE: If empty plastic reservoirs are used in place of the sample transfer tubes to pass the samples through the cartridges, these reservoirs must be treated like the transfer tubes. After the entire sample has passed through the cartridge, the reservoirs must be rinsed to waste with reagent water.

**10.3.4.** SAMPLE BOTTLE AND CARTRIDGE ELUTION, Fraction 1 – Turn off and release the vacuum. Lift the extraction manifold top and insert a rack with collection tubes into the extraction tank to collect the extracts as they are eluted from the cartridges. Rinse the sample bottles with 12 mLs of methanol and draw the aliquot through the sample transfer tubes and cartridges. Use a low vacuum such that the solvent exits the cartridge in a dropwise fashion.

**10.3.5.** NOTE: Due to the possible volatility and suspect degradation of sulfonamides and sulfonamide ethanols when exposed to heat, a portion of the methanol fraction may be retained and analyzed independently with no evaporation for these analytes.

**10.3.6.** SAMPLE BOTTLE AND CARTRIDGE ELUTION, Fraction 2 In a separate collection vial, rinse the sample bottles with 12 mL of 2% ammonium hydroxide in methanol and elute the analytes from the cartridges by pulling the 4 mL of methanol through the sample transfer tubes and the cartridges. Use a low vacuum such that the solvent exits the cartridge in a dropwise fashion.

**10.3.7.** NOTE: If empty plastic reservoirs are used in place of the sample transfer tubes to pass the samples through the cartridges, these reservoirs must be treated like the transfer tubes. After the reservoirs have been rinsed in Section 10.3.3, the elution solvent used to rinse the sample bottles must be swirled down the sides of the reservoirs while eluting the cartridge to ensure that any method analytes on the surface of the reservoirs are transferred to the extract.

**10.3.8.** CLEAN-UP CARTRIDGE ELUTION, Elute the clean-up cartridge with 8 additional mLs of methanol and draw the aliquot through the cartridge. Use a low vacuum such that the solvent exits the cartridge in a dropwise fashion.

**10.3.9.** Fractions 1 and 2 are to be combined during the concentration stage (section10.8).

## 10.4. Sample Prep and Extraction Protocol for Soils, Solids and Sediments.

**10.4.1.** Homogenize and weigh 4 grams of sample (measured to the nearest hundredth of a gram) into a 50 mL polypropylene centrifuge tube. For laboratory control blanks and spikes, 4 grams of clean sand is used.

**10.4.2.** Add 40 µL of the EIS PDS (Sect. 8.2.2) to each sample and QC.

**10.4.3.** If the sample is an LCS, LCSD, MS, or MSD, add the necessary amount of analyte PDS (Sect. 8.2.6). Cap and invert each sample to mix.

**10.4.4.** To all samples, add 10 mLs of methanol, cap, vortex for 25 seconds at 2500 RPM.

**10.4.5.** Following mixing, sonicate each sample for 30 minutes and let samples sit overnight (at least 2 hours is required for RUSH samples).

**10.4.6.** Centrifuge each sample at 3500RPM for 10 minutes.

**10.4.7.** Remove 5mL of supernatant, and reserve for clean-up.

## 10.5. Sample Prep and Extraction Protocol for Tissues, Oils and Biosolids.

**10.5.1.** Homogenize and weigh 2-8 grams of sample (measured to the nearest hundredth of a gram) into a 50 mL polypropylene centrifuge tube. For laboratory control blanks and spikes, 4 grams of clean sand is used.

**10.5.2.** Add 40 µL of the EIS PDS (Sect. 8.2.2) to each sample and QC.

**10.5.3.** If the sample is an LCS, LCSD, MS, or MSD, add the necessary amount of analyte PDS (Sect. 8.2.6). Cap and invert each sample to mix.

**10.5.4.** Add 100 ul of Ammonium Hydroxide.

**10.5.5.** To all samples, add 10 mLs of methanol, cap, vortex for 25-30 seconds at 2500 RPM.

**10.5.6.** Following mixing, sonicate each sample for 30 minutes and let samples sit for 2 hours.

**10.5.7.** Centrifuge each sample at 3500RPM for 10 minutes.

**10.5.8.** Remove 5 mLs of the supernatant, and reserve for clean-up.

## 10.6. Extract Clean-up: Soils, Solids and Sediment Matrices

**10.6.1.** CARTRIDGE CLEAN-UP AND CONDITIONING –. Rinse each cartridge with 15 mL of methanol and discard. If the cartridge goes dry during the conditioning phase, the conditioning must be started over. Attach the sample transfer tubes (Sect. 7.11.3), turn on the vacuum, and begin adding sample to the cartridge. For Soils extracts, transfer 5 mLs of the MeOH eluate to the cartridge. Samples should be allowed to pass through the cartridge by gravity feed at a dropwise rate to ensure adequate contact time with the cartridge sorbent. Vacuum is only applied if the flow of solvent through the cartridge stops.

**10.6.2.** Adjust the vacuum so that the approximate flow rate is 1-2 mL/min. Do not allow the cartridge to go dry before all the sample has passed through.

**10.6.3.** SAMPLE BOTTLE AND CARTRIDGE RINSE – After the entire sample has passed through the cartridge, rinse the sample collection vial with two 4-mL aliquots of methanol and draw each aliquot through the cartridges. Draw air or nitrogen through the cartridge for 5 min at high vacuum (10-15 in. Hg).

**10.6.4.** If extracts are not to be immediately evaporated, cover collection tubes and store at ambient temperature till concentration.

NOTE: Due to the possible volatility and suspect degradation of sulfonamides and sulfonamide ethanols when exposed to heat, a portion of the eluate may be retained and analyzed independently with no evaporation for these analytes.

## 10.7. Extract Clean-up: Tissues, Oils and Biosolids

**10.7.1.** CARTRIDGE CLEAN-UP AND CONDITIONING –. Stack a 500 mg WAX cartridge onto a 250 mg GCB cartridge. Rinse each cartridge set with 10 mL of 2% $NH_4OH$ and discard. Immediately rinse each cartridge stack with 15 mLs MeOH and discard, If the cartridge goes

dry during the conditioning phase, the conditioning must be started over. Attach the sample transfer tubes (Sect. 7.11.3), turn on the vacuum.

**10.7.2.** Adjust the vacuum so that the approximate flow rate is 1-2 mL/min. Do not allow the cartridge to go dry before all the sample has passed through.

**10.7.3.** SAMPLE elution AND CARTRIDGE RINSE – Load 5 mLs of the MeOH sample extract to the cartridge. After the entire sample has passed through the cartridge, rinse the cartridges with 5-mLs of methanol and draw through the cartridges. Immediately add and elute 2 5mL aliquots of 2% $NH_4OH$ to the cartridges, collecting the eluate with the MeOH eluate.

**10.7.4.** If extracts are not to be immediately evaporated, cover collection tubes and store at ambient temperature till concentration.

**10.7.5.** NOTE: Due to the possible volatility and suspect degradation of sulfonamides and sulfonamide ethanols when exposed to heat, a portion of the eluate may be retained and analyzed independently with no evaporation for these analytes.

## 10.8. Extract Concentration

**10.8.1.** Concentrate the extract to dryness under a gentle stream of nitrogen in a heated water bath (60-65 °C) to remove all the water/methanol mix. Add the appropriate amount of 80:20% (vol/vol) methanol:water solution and 20 µl of the ID REC PDS (Sect. 8.2.8) to the collection vial to bring the volume to 1 mL and vortex. Transfer two aliquots with a plastic pipet (Sect. 7.8) into 2 polypropylene autosampler vials.

**10.8.2.** NOTE: It is recommended that the entire 1-mL aliquot not be transferred to the autosampler vial because the polypropylene autosampler caps do not reseal after injection. Therefore, do not store the extracts in the autosampler vials as evaporation losses can occur occasionally in these autosampler vials. Extracts can be split between 2 X 700 µl vials (Sect. 7.5).

## 10.9. Sample Volume Determination

**10.9.1.** If the level of the sample was marked on the sample bottle, use a graduated cylinder to measure the volume of water required to fill the original sample bottle to the mark made prior to extraction. Determine to the nearest 10 mL.

**10.9.2.** If using weight to determine volume, weigh the empty bottle to the nearest 10 g and determine the sample weight by subtraction of the empty bottle weight from the original sample weight (Sect. 10.2.2). Assume a sample density of 1.0 g/mL. In either case, the sample volume will be used in the final calculations of the analyte concentration (Sect. 11.2).

**10.10. Initial Calibration -** Demonstration and documentation of acceptable initial calibration is required before any samples are analyzed. After the initial calibration is successful, a CCV is required at the beginning and end of each period in which analyses are performed, and after every tenth Field Sample.

**10.10.1.** ESI-MS/MS TUNE

**10.10.1.1.** Calibrate the mass scale of the MS with the calibration compounds and procedures prescribed by the manufacturer.

**10.10.1.2.** Optimize the [M-H]- for each method analyte by infusing approximately 0.5-1.0 µg/mL of each analyte (prepared in the initial mobile phase conditions) directly into the MS at the chosen LC mobile phase flow rate (approximately 0.4 mL/min). This tune can be done on a mix of method analytes. The MS parameters (voltages, temperatures, gas flows, etc.) are

varied until optimal analyte responses are determined. The method analytes may have different optima requiring some compromise between the optima.

**10.10.1.3.** Optimize the product ion for each analyte by infusing approximately 0.5-1.0 µg/mL of each analyte (prepared in the initial mobile phase conditions) directly into the MS at the chosen LC mobile phase flow rate (approximately 0.4 mL/min). This tune can be done on a mix of method analytes. The MS/MS parameters (collision gas pressure, collision energy, etc.) are varied until optimal analyte responses are determined. Typically, carboxylic acids have very similar MS/MS conditions and sulfonic acids have similar MS/MS conditions.

**10.10.2.** Establish LC operating parameters that optimize resolution and peak shape. Modifying the standard or extract composition to more aqueous content to prevent poor shape is not permitted.

**10.10.2.1.** Cautions: LC system components, as well as the mobile phase constituents, contain many of the method analytes in this method. Thus, these PFAS's will build up on the head of the LC column during mobile phase equilibration. To minimize the background PFAS peaks and to keep background levels constant, the time the LC column sits at initial conditions must be kept constant and as short as possible (while ensuring reproducible retention times). In addition, prior to daily use, flush the column with 100% methanol for at least 20 min before initiating a sequence. It may be necessary on some systems to flush other LC components such as wash syringes, sample needles or any other system components before daily use.

**10.10.3.** Inject (2µl for Sciex systems, 3µl for Waters systems, 20µl for MeOH fractions) a mid-level CAL standard under LC/MS conditions to obtain the retention times of each method analyte. If analyzing for PFTA, ensure that the LC conditions are adequate to prevent co-elution of PFTA and the mobile phase interferants. These interferants have the same precursor and products ions as PFTA, and under faster LC conditions may co-elute with PFTA. Divide the chromatogram into retention time windows each of which contains one or more chromatographic peaks. During MS/MS analysis, fragment a small number of selected precursor ions ([M-H]-) for the analytes in each window and choose the most abundant product ion. For maximum sensitivity, small mass windows of ±0.5 daltons around the product ion mass were used for quantitation.

**10.10.4.** Inject a mid-level CAL standard under optimized LC/MS/MS conditions to ensure that each method analyte is observed in its MS/MS window and that there are at least 10 scans across the peak for optimum precision.

10.10.4.1. NOTE: PFHxS, PFOS, NMeFOSAA, and NEtFOSAA have multiple chromatographic peaks using the LC conditions in Table 7 due to chromatographic resolution of the linear and branched isomers of these compounds. Most PFAS's are produced by two different processes. One process gives rise to linear PFAS's only while the other process produces both linear and branched isomers. Thus, both branched and linear PFAS's can potentially be found in the environment. For the aforementioned compounds that give rise to more than one peak, all the chromatographic peaks observed in the standard must be integrated and the areas totaled. Chromatographic peaks in a sample must be integrated in the same way as the CAL standard.

**10.10.5.** Prepare a set of CAL standards as described in Section 8.2.9. The lowest concentration CAL standard must be at or below the RL (2 ng/L), which may depend on system sensitivity.

**10.10.6.** The LC/MS/MS system is calibrated using the isotope dilution technique. Target analytes are quantitated against their isotopically labeled analog (Extracted Internal Standard) where commercially available. If a labeled analog is not commercially available, the extracted internal standard with the closest retention time and /or closest chemical similarity is to be used. Use the LC/MS/MS data system software to generate a linear regression or quadratic calibration curve for each of the analytes. This curve must always be forced through zero and may be concentration weighted, if necessary. Forcing zero allows for a better estimate of the background levels of method analytes. A minimum of 5 levels are required for a linear calibration model and a minimum of 6 levels are required for a quadratic calibration model.

**10.10.7. CALIBRATION ACCEPTANCE CRITERIA** – A linear or quadratic fit is acceptable if the coefficient of determination ($r^2$) is greater than 0.990. All curves must force through zero (some of the SCIEX software versions do not allow forcing through zero for quadratic curves, therefore an additional standard at approximately half the RL must be analyzed). Any target analyte calibrated using average response must have a relative standard deviation (RSD) of ≤20%. When quantitated using the initial calibration curve, each calibration point, except the lowest point, for each analyte must calculate to be within 70-130% of its true value. Any CAL point within 2x the RL must calculate to be within 50-150% of its true value. If these criteria cannot be met, the analyst will have difficulty meeting ongoing QC criteria. It is recommended that corrective action is taken to reanalyze the CAL standards, restrict the range of calibration, or select an alternate method of calibration (forcing the curve through zero is still required). EIS compounds must have an RSD of ≤20%; the fluorotelomer EIS compounds must have an RSD ≤30%.

10.10.7.1. **CAUTION:** When acquiring MS/MS data, LC operating conditions must be carefully reproduced for each analysis to provide reproducible retention times. If this is not done, the correct ions will not be monitored at the appropriate times. As a precautionary measure, the chromatographic peaks in each window must not elute too close to the edge of the segment time window.

**10.10.8. CONTINUING CALIBRATION CHECK (CCV)** – Minimum daily calibration verification is as follows. Verify the initial calibration at the beginning and end of each group of analyses, and after every tenth sample during analyses. In this context, a “sample” is considered to be a Field Sample. MBs, CCVs, LCSs, MSs, FDs FRBs and MSDs are not counted as samples. The beginning CCV of each analysis batch must be at or below the RL in order to verify instrument sensitivity prior to any analyses. If standards have been prepared such that all low CAL points are not in the same CAL solution, it may be necessary to analyze two CAL standards to meet this requirement. Alternatively, the analyte concentrations in the analyte PDS may be customized to meet these criteria.

**10.10.8.1.** Inject an aliquot of the appropriate concentration CAL standard and analyze with the same conditions used during the initial calibration.

**10.10.8.2.** Calculate the concentration of each analyte and EIS in the CCV. The calculated amount for each analyte for medium level CCVs must be within 70 – 130% of the true value with an allowance of 10% of the reported analytes to be less than 70% (minimum recovery is 10%) for compounds without their own labelled EIS. For CCVs, if the recovery of the corresponding target analytes meets the acceptance criteria but the EIS is outside criteria, the data can be used. The calculated amount for the lowest calibration point for each analyte must be within 50-150%. If these conditions do not exist, then all data for the problem analyte must be considered invalid, and remedial action should be taken which may require recalibration. Any Field or QC Samples that have been analyzed since the last acceptable calibration verification should be reanalyzed after adequate calibration has been restored, with the following exception. If the CCV fails

because the calculated concentration is greater than 130% (150% for the low-level CCV) for a particular method analyte, and Field Sample extracts show no detection for that method analyte, non-detects may be reported without re-analysis.

**10.10.8.3.** REMEDIAL ACTION – Failure to meet CCV QC performance criteria may require remedial action. Major maintenance, such as cleaning the electrospray probe, atmospheric pressure ionization source, cleaning the mass analyzer, replacing the LC column, etc., requires recalibration (Sect 10.10) and verification of sensitivity by analyzing a CCV at or below the RL (Sect 10.11).

### 10.10.9. EXTRACT ANALYSIS

**10.10.9.1.** Establish operating conditions equivalent to those summarized in Tables 7-9 of Section 16.

**10.10.9.2.** Establish an appropriate retention time window for each analyte. This should be based on measurements of actual retention time variation for each method analyte in CAL standard solutions analyzed on the LC over the course of time. A value of plus or minus three times the standard deviation of the retention time obtained for each method analyte while establishing the initial calibration can be used to calculate a suggested window size. However, the experience of the analyst should weigh heavily on the determination of the appropriate retention window size.

**10.10.9.3.** Calibrate the system by either the analysis of a calibration curve (Sect. 10.10) or by confirming the initial calibration is still valid by analyzing a CCV as described in Section 10.11.

**10.10.9.4.** Begin analyzing Field Samples, including QC samples, at their appropriate frequency by injecting the same size aliquots under the same conditions used to analyze the CAL standards.

**10.10.9.5.** At the conclusion of data acquisition, use the same software that was used in the calibration procedure to identify peaks of interest in predetermined retention time windows. Use the data system software to examine the ion abundances of the peaks in the chromatogram. Identify an analyte by comparison of its retention time with that of the corresponding method analyte peak in a reference standard.

**10.10.9.6.** The analyst must not extrapolate beyond the established calibration range. If an analyte peak area exceeds the range of the initial calibration curve, the sample should be re-extracted with a reduced sample volume in order to bring the out of range target analytes into the calibration range. If a smaller sample size would not be representative of the entire sample, the following options are recommended. Re-extract an additional aliquot of sufficient size to insure that it is representative of the entire sample. Spike it with a higher concentration of internal standard. Prior to LC/MS analysis, dilute the sample so that it has a concentration of internal standard equivalent to that present in the calibration standard. Then, analyze the diluted extract.

## 11. Data Evaluation, Calculations and Reporting.

**11.1.** Complete chromatographic resolution is not necessary for accurate and precise measurements of analyte concentrations using MS/MS. In validating this method, concentrations were calculated by measuring the product ions listed in Table 9.

**11.2.** Calculate analyte concentrations using the multipoint calibration established in Section 10.9. Do not use daily calibration verification data to quantitate analytes in samples. Adjust final analyte concentrations to reflect the actual sample volume determined in Section 10.8

Cex = (Area of target analyte * Concentration of Labeled analog) / (area of labeled analog * CF)

$C_s$ = (Cex / sample volume in mL) * 1000

Cex = The concentration of the analyte in the extract
CF = calibration factor from calibration.

**11.3.** Prior to reporting the data, the chromatogram should be reviewed for any incorrect peak identification or poor integration.

**11.4.** PFHxS, PFOS, PFOA, NMeFOSAA, and NEtFOSAA have multiple chromatographic peaks using the LC conditions in Table 7 due to the linear and branch isomers of these compounds (Sect. 10.10.4.). The areas of all the linear and branched isomer peaks observed in the CAL standards for each of these analytes must be summed and the concentrations reported as a total for each of these analytes.

**11.5.** Calculations must utilize all available digits of precision, but final reported concentrations should be rounded to an appropriate number of significant figures (one digit of uncertainty), typically two, and not more than three significant figures.

**11.6.** Peak responses must be at least 3 times the background noise level (S/N 3:1). If the S/N ratio is not due to high background noise, the sample may be diluted (either by extraction or analytically) to reduce the noise.

**11.7.** Target analytes, Extracted Internal Standards, and Response Internal Standard RTs must fall within +/-0.4minutes of the predicted retention times of the midpoint of the initial calibration curve or daily calibration verification standard. Additionally, a target analyte with a corresponding isotopically labelled analog must elute within +/- 0.1minutes of the associated EIS.

**11.8.** The ion ratio between the quantification ion and confirmation ion response must fall within +/-50% of the ratio observed in the mid-point initial calibration standard. When this ratio is not met, the data must be flagged.

# 12. Contingencies for Handling Out-of-Control Data or Unacceptable Data

**12.1.** Section 9.0 outlines sample batch QC acceptance criteria. If non-compliant organic compound results are to be reported, the Organic Section Head and/or the Laboratory Director, and the Operations Manager must approve the reporting of these results. The laboratory Project Manager shall be notified and may choose to relay the non-compliance to the client, for approval, or other corrective action, such as re-sampling and re-analysis. The analyst, Data Reviewer, or Department Supervisor performing the secondary review initiates the project narrative, and the narrative must clearly document the non-compliance and provide a reason for acceptance of these results.

**12.2.** All results for the organic compounds of interest are reportable without qualification if extraction and analytical holding times are met, preservation requirements (including cooler temperatures) are met, all QC criteria are met, and matrix interference is not suspected during extraction or analysis of the samples. If any of the below QC parameters are not met, all associated samples must be evaluated for re-extraction and/or re-analysis.

# 13. Method Performance

### 13.1. Detection Limit Study (DL) / Limit of Detection Study (LOD) / Limit of Quantitation (LOQ)

**13.1.1.** The laboratory follows the procedure to determine the DL, LOD, and/or LOQ as outlined in Alpha SOP ID 1732. These studies performed by the laboratory are maintained on file for review.

### 13.2. Demonstration of Capability Studies

**13.2.1.** Refer to Alpha SOP ID 1739 for further information regarding IDC/DOC Generation.

**13.2.2.** The analyst must make a continuing, annual, demonstration of the ability to generate acceptable accuracy and precision with this method.

## 14. Pollution Prevention and Waste Management

**14.1.** Refer to Alpha's Chemical Hygiene Plan and Hazardous Waste Management and Disposal SOP for further pollution prevention and waste management information.

**14.2.** This method utilizes SPE to extract analytes from water. It requires the use of very small volumes of organic solvent and very small quantities of pure analytes, thereby minimizing the potential hazards to both the analyst and the environment as compared to the use of large volumes of organic solvents in conventional liquid-liquid extractions.

**14.3.** The analytical procedures described in this method generate relatively small amounts of waste since only small amounts of reagents and solvents are used. The matrices of concern are finished drinking water or source water. However, laboratory waste management practices must be conducted consistent with all applicable rules and regulations, and that laboratories protect the air, water, and land by minimizing and controlling all releases from fume hoods and bench operations. Also, compliance is required with any sewage discharge permits and regulations, particularly the hazardous waste identification rules and land disposal restrictions.

## 15. Referenced Documents

Chemical Hygiene Plan – ID 2124
Detection Limit (DL), Limit of Detection (LOD) & Limit of Quantitation (LOQ) SOP – ID 1732
Demonstration of Capability (DOC) Generation SOP – ID 1739
Hazardous Waste Management and Disposal SOP – ID 1728

## 16. REVISION HISTORY

**Revisions Made from Prior Version**

| Section | Description of Change |
|---|---|
| 6.5.1.1 | Updated Hold Time for Aqueous, Soils and Tissues. |
| 6.5.1.2 | Added specific hold time criteria for Maine |
| 8.2.9 | Revised the calibration standard levels |
| 9.1.1.1 | Added Corrective Action for Method Blanks |
| 9.1.2 | Changed FRB to project-specific basis |
| 9.2.1 | Added LCS criteria specific to NJ |
| 9.2.4 | Added Corrective Action for LCS |
| 9.4.2 | Revisions to EIS criteria |
| 10.10.7 | Revisions to Calibration Acceptance Criteria |

# 16. Attachments

**Table 7a: LC Method Conditions**

| Time (min) | 2 mM Ammonium Acetate (5:95 MeOH/$H_2O$) | 100% Methanol |
|---|---|---|
| Initial | 100.0 | 0.0 |
| 1.0 | 100.0 | 0.0 |
| 2.2 | 85.0 | 15.0 |
| 11 | 20.0 | 80.0 |
| 11.4 | 0.0 | 100.0 |
| 12.4 | 100.0 | 00.0 |
| 15.5 | 100.0 | 0.0 |
| Waters Aquity UPLC ® BEH$C_{18}$ 2.1 x 50 mm packed with 1.7 µm BEH $C_{18}$ stationary phase<br>Flow rate of 0.4 mL/min<br>3 µL injection | | |

**Table 7b: LC Method Conditions (MeOH Fraction)**

| Time (min) | 2 mM Ammonium Acetate (5:95 MeOH/$H_2O$) | 100% Methanol |
|---|---|---|
| Initial | 100.0 | 0.0 |
| 1.0 | 50.0 | 50.0 |
| 4.5 | 1.0 | 99.0 |
| 4.95 | 1.0 | 99.0 |
| 5.0 | 100.0 | 0.0 |
| 5.5 | 100.0 | 0.0 |
| Waters Aquity UPLC ® BEH$C_{18}$ 2.1 x 50 mm packed with 1.7 µm BEH $C_{18}$ stationary phase<br>Flow rate of 0.6 mL/min<br>20 µL injection | | |

**Table 8: ESI-MS Method Conditions**

| ESI Conditions | |
|---|---|
| Polarity | Negative ion |
| Capillary needle voltage | .5 kV |
| Cone Gas Flow | 25 L/hr |
| Nitrogen Desolvation gas | 1000 L/hr |
| Desolvation gas temp. | 500 ºC |

## Table 9a: Method Analyte Source, Retention Times (RTs), and EIS References

| # | Analyte | Transition | Confirmation Mass | RT | IS | Type |
|---|---|---|---|---|---|---|
| 1 | M3PFBA | 216>171 | | 2.65 | | REC |
| 2 | PFBA | 213 > 169 | N/A | 2.65 | 3: M4PFBA | |
| 3 | M4PFBA | 217 > 172 | | 2.65 | 1: M3PBA | EIS |
| 4 | PFPeA | 263 > 219 | N/A | 5.67 | 5: M5PFPEA | |
| 5 | M5PFPEA | 268 > 223 | | 5.66 | 1: M3PFBA | EIS |
| 6 | PFBS | 299 > 80 | 99 | 6.35 | 7: M3PFBS | |
| 7 | M3PFBS | 302 > 80 | | 6.35 | 29:M4PFOS | EIS |
| 8 | FTS 4:2 | 327 > 307 | 81 | 7.47 | 9: M2-4:2FTS | |
| 9 | M2-4:2FTS | 329 > 81 | | 7.47 | 29:M4PFOS | EIS |
| 10 | PFHxA | 313 > 269 | 119 | 7.57 | 11: M5PFHxA | |
| 11 | M5PFHxA | 318 > 273 | | 7.57 | 19:M2PFOA | EIS |
| 12 | PFPeS | 349 > 80 | 99 | 7.88 | 18: M3PFHxS | |
| 13 | PFHpA | 363 > 319 | 169 | 8.80 | 14: M4PFHpA | |
| 14 | M4PFHpA | 367 > 322 | | 8.80 | 19:M2PFOA | EIS |
| 15 | L-PFHxS | 399 > 80 | 99 | 8.94 | 18: M3PFHxS | |
| 16 | br-PFHxS | 399 > 80 | 99 | 8.72 | 18: M3PFHxS | |
| 17 | PFHxS Total | 399 > 80 | | 8.94 | 18: M3PFHxS | |
| 18 | M3PFHxS | 402 > 80 | | 8.94 | 29:M4PFOS | EIS |
| 19 | M2PFOA | 415 > 370 | | 9.7 | | REC |
| 20 | L-PFOA | 413 > 369 | 169 | 9.7 | 23: M8PFOA | |
| 21 | br-PFOA | 413 > 369 | 169 | 9.48 | 23: M8PFOA | |
| 22 | PFOA Total | 413 > 369 | | 9.7 | 23: M8PFOA | |
| 23 | M8PFOA | 421 > 376 | | 9.7 | 19: M2PFOA | EIS |
| 24 | FTS 6:2 | 427 > 407 | 81 | 9.66 | 25: M2-6:2FTS | |
| 25 | M2-6:2FTS | 429 > 409 | | 9.66 | 29:M4PFOS | EIS |
| 26 | PFHpS | 449 > 80 | 99 | 9.78 | 33: M8PFOS | |
| 27 | PFNA | 463 > 419 | 219 | 10.41 | 33: M9PFNA | |
| 28 | M9PFNA | 472 > 427 | | 10.41 | 19: M2PFOA | EIS |
| 29 | M4PFOS | 503 > 80 | | 10.45 | | REC |
| 30 | L-PFOS | 499 > 80 | 99 | 10.45 | 33: M8PFOS | |
| 31 | br-PFOS | 499 > 80 | 99 | 10.27 | 33: M8PFOS | |
| 32 | PFOS Total | 499 > 80 | | 10.45 | 33: M8PFOS | |
| 33 | M8PFOS | 507 > 80 | | 10.45 | 29: M4PFOS | EIS |
| 34 | FTS 8:2 | 527 > 507 | 81 | 10.99 | 35: M2-8:2FTS | |
| 35 | M2-8:2FTS | 529 > 509 | | 10.99 | 29:M4PFOS | EIS |
| 36 | M2PFDA | 515 > 470 | | 11.00 | | REC |
| 37 | PFDA | 513 > 469 | 219 | 11.00 | 38: M6PFDA | |
| 38 | M6PFDA | 519 > 474 | | 11.00 | 36: M2PFDA | EIS |
| 39 | PFNS | 549 > 80 | 99 | 11.02 | 33:M8PFOS | |
| 40 | br-NMeFOSAA | 570 > 419 | 483 | 11.41 | 41: D3-NMeFOSAA | |

| # | Analyte | Transition | Confirmation Mass | RT | IS | Type |
|---|---|---|---|---|---|---|
| 41 | L-NMeFOSAA | 570 > 419 | 483 | 11.41 | 41: D3-NMeFOSAA | |
| 42 | NMeFOSAA total | 570 > 419 | | 11.41 | 41: D3-NMeFOSAA | |
| 43 | d3-NMeFOSAA | 573 > 419 | | 11.41 | 36: M2PFOA | EIS |
| 44 | PFOSA | 498 > 78 | 478 | 11.48 | 29: M8FOSA | |
| 45 | M8FOSA | 506 > 78 | | 11.48 | 19: M2PFOA | EIS |

| # | Analyte | Transition | Confirmation Mass | RT | IS | Type |
|---|---|---|---|---|---|---|
| 46 | PFUnDA | 563 > 519 | 269 | 11.51 | 41: M7-PFUDA | |
| 47 | M7-PFUDA | 570 > 525 | | 11.51 | 36: M2PFDA | EIS |
| 48 | PFDS | 599 > 80 | 99 | 11.51 | 33:M8PFOS | |
| 49 | br-NEtFOSAA | 584 > 419 | 526 | 11.68 | 48: d5-NEtFOSAA | |
| 50 | L-NEtFOSAA | 584 > 419 | 526 | 11.68 | 48: d5-NEtFOSAA | |
| 51 | NEtFOSAA total | 584 > 419 | | 11.68 | 48: d5-NEtFOSAA | |
| 52 | d5-NEtFOSAA | 589 > 419 | | 11.68 | 36: M2PFOA | EIS |
| 53 | PFDoA | 613 > 569 | 319 | 11.96 | 50: MPFDOA | |
| 54 | MPFDOA | 615 > 570 | | 11.96 | 36: M2PFDA | EIS |
| 55 | PFTrdA | 663 > 619 | 169 | 12.34 | 53: M2PFTEDA and 50:MPFDOA avg | |
| 56 | PFTeA | 713 > 669 | 169 | 12.6 | 53: M2PFTEDA | |
| 57 | M2PFTEDA | 715 > 670 | | 12.6 | 36: M2PFDA | EIS |
| 58 | M3HFPO-DA | 287>169 | | 7.97 | 19: M2PFOA | EIS |
| 59 | HFPO-DA | 285>169 | 185 | 7.97 | 54: M3HFPO-DA | |
| 60 | ADONA | 377>251 | 85 | 8.00 | 23: M8PFOA | |
| 61 | PFHxDA | 813>769 | | 13.20 | 59: M2PFHxDA | |
| 62 | PFODA | 913>869 | | 13.50 | 59: M2PFHxDA | |
| 63 | M2PFHxDA | 815>770 | | 13.20 | 36:M2PFDA | EIS |
| 64 | NEtFOSA | 526>169 | 119 | 11.00 | 61: d5-NEtFOSA | |
| 65 | NMeFOSA | 512>169 | 219 | 10.50 | 63: d3-NMeFOSA | |
| 66 | d3-NMeFOSA | 515>169 | | 10.50 | 19: M2PFOA | EIS |
| 67 | d5-NEtFOSA | 531>169 | | 11.00 | 19: M2PFOA | EIS |
| 68 | NMeFOSE | 616>59 | N/A | 11.25 | 66: d7-NMeFOSE | |
| 69 | NEtFOSE | 630>59 | N/A | 10.75 | 67: d9-NEtFOSE | |
| 70 | d7-NMeFOSE | 623>59 | | 11.25 | 19: M2PFOA | EIS |
| 71 | d9-NEtFOSE | 639>59 | | 10.75 | 19: M2PFOA | EIS |
| 72 | FTS 10:2 | 627>607 | | 11.50 | 25: M2-8:2FTS | |
| 73 | PFDoS | 699>80 | 99 | 12.50 | 33: M8PFOS | |
| 74 | 9ClPF3ONS | 531>351 | 353 | 10.23 | 33: M8PFOS | |
| 75 | 11ClPF3OUdS | 631>451 | 453 | 11.27 | 33: M8PFOS | |
| 76 | PFPrS | 249>80 | | 3.40 | 7: M3PFBS | |
| 77 | PFMPA | 229>85 | N/A | 3.39 | 1: M3PFBA | |
| 78 | PFMBA | 279 .85 | N/A | 5.75 | 1: M5PFPEA | |
| 79 | PFEESA | 315>135 | 83 | 6.45 | 18: M3PFHxS | |
| 80 | NFDHA | 295>201 | 85 | 6.79 | 11: M5PFHxA | |

**Table 9b: Methanol Analyte Source, Retention Times (RTs), and EIS References**

| # | Analyte | Transition | RT | IS | Type |
|---|---|---|---|---|---|
| 1 | M2PFNA | 472 > 427 | 2.55 | | IS |
| 2 | M2PFUdA | 213 > 169 | 2.87 | | IS |
| 3 | M8FOSA | 217 > 172 | 2.86 | 1: M2PFNA | EIS |
| 4<br>5 | FOSA | 263 > 219 | 2.86 | 3: M8FOSA | |
| 6 | D3-NMeFOSA | 515>169 | 3.22 | 1: M2PFNA | EIS |
| 7 | NMeFOSA | 512>169 | 3.22 | 6: d3-NMeFOSA | |
| 8 | D5-NEtFOSAA | 531>169 | 3.41 | 1: M2PFNA | EIS |
| 9 | NEtFOSAA | 526>169 | 3.41 | 8: d5-NEtFOSA | |
| 10 | D7-NMeFOSE | 563>126 | 3.23 | 1: M2PFNA | EIS |
| 11 | NMeFOSE | 556>122 | 3.23 | 10: d7-NMeFOSE | |
| 12 | D9-NEtFOSE | 579>142 | 3.40 | 11: M2PFNA | EIS |
| 13 | NEtFOSE | 570>136 | 3.40 | 67: d9-NEtFOSE | |

# APPENDIX E

Request to Import/Reuse Fill Material Form

**NEW YORK STATE**
**DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

***Request to Import/Reuse Fill or Soil***

*This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.*

## SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

## SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that passes a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

## SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

---

*Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.*

*If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.*

## SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

---

*Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.*

*If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.*

## SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised April 2023

# Erosion and Sediment Control Plan (ESCP)

# EROSION AND SEDIMENT CONTROL PLAN

Portion of the Former Vacuum Oil Refinery Site
Rochester, New York
BCP Site No. C828190

January 15, 2026

Prepared for:

**10 Flint Street LLC & City of Rochester**

Prepared by:

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# Attachments


1 Erosion Control Details
2 Inspection and Maintenance Report Form

# 1.0 INTRODUCTION

Roux Associates, Inc. and Roux Environmental Engineering and Geology D.P.C. (collectively referred to as "Roux"), on behalf of 10 Flint Street LLC and the City of Rochester (referred to herein as the Remedial Party) has prepared this Erosion and Sediment Control Plan (ESCP) for remedial actions conducted under New York State Brownfield Cleanup Program (BCP or Program) Site No. C828190 ("the Work") for a Portion of the Former Vacuum Oil Refinery Site (the "Site").

## 1.1 Background

The Site consists of a portion of the former Vacuum Oil Refinery located on an approximate 15.4-acre section of ten City of Rochester (City) owned parcels including: 13, 31, 49 (formally part of 13), 69, and 75 Cottage Street, portions of 1 Cottage Street; 100 Riverview Place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) in the City of Rochester, New York.

Current Site features include an asphalt-paved bike/pedestrian path that runs through the eastern side of the Site from the north end of the property to the south end of the property and beyond in both directions. The path runs along the former Erie Railroad corridor. An approximate 1.2-acre grass-covered area is located on the eastern boundary of the Site, along the Genesee River. The remaining areas of the Site are undeveloped (except for the items mentioned above) and consist of vacant and undeveloped wooded and vegetative areas.

The Site was historically operated as a petroleum refining, blending, and bulk oil storage facility from approximately 1866 to approximately 1930 that encompassed approximately 40-acres with a footprint spanning both north and south of Flint Street. The Vacuum Oil Company Refinery operated the petroleum refinery, blending operations, and bulk storage at portions of the Site (including several other contiguous and neighboring properties) from approximately 1866 to around the 1890s. From the early 1890s until its closure in 1935, the Site operated as a blending facility. While most of the above-grade structures have been demolished and removed, some remnants of former structures remain. Since the time of refinery closure, the Site has remained vacant.

The Site is generally located adjacent to a steep topographic gradient to the west, with surface water runoff generally draining to on-Site wetlands and drainage ditches. These low-lying areas are generally isolated; however, portions are connected to each other and to the Genesee River via an unnamed Tributary. Portions of the Site are also situated within the Genesee River Federal Emergency Management Agency (FEMA) 100-year Floodplain.

Four federal jurisdictional wetlands areas have been identified on the Site. These wetlands are identified within the *Final Wetland Assessment and Delineation, Ecological Screening & Invasive Species Report* (Shumaker 2017) and updated in the *US Army Corps of Engineers (USACE) – Buffalo District NYSDEC – Region 8 Joint Permit Application*, prepared by Bergmann for the City of Rochester Vacuum Oil BOA & IRM Project (Bergmann 2022). As shown on Figure 2 of the RAWP, three of these four wetlands (located on 10 Flint Street, 102 Violetta Street and 100 Riverview place) are located within excavation areas or areas requiring the placement of a soil cover (or other Department approved cover materials) as part of the Site-wide cover system for the NYSDEC approved Site remedy. USACE issued a Nationwide Permit (# LRB-2010-01497) to the City on November 3, 2023, requiring the City to purchase wetland credits as compensatory mitigation for the permanent and unavoidable loss of these three federal jurisdictional wetlands (totaling 0.44 acres). A portion of the fourth wetland area is located within a portion of the 31

Cottage Street parcel where existing soil in the top two feet meets Restricted-Residential SCOs and would be considered the Site-wide cover system in this area. The City obtained the wetland mitigation credits through the Ducks Unlimited In-Lieu Fee Mitigation Program, as documented in the April 16, 2024 Credit Sale Letter verifying acceptance of full payment for the appropriate credits (see Appendix A of the RAWP).

## 1.2 Purpose and Scope

The purpose of this ESCP Plan is to control and minimize soil erosion and uncontrolled sediment migration until final completion of the Work and the work areas are restored or installation of the Site-wide cover system. Soil erosion and sedimentation control measures will be employed by the Remediation Contractor to control stormwater runoff from entering or exiting the excavations as well as other work areas (e.g., stockpile and staging areas) and to minimize any impact to surface water quality. The Remediation Contractor will install these measures in stages as the Work progresses, but prior to the commencement of intrusive activities including soil/fill material handling activities. These measures include but not limited to the installation of stabilized construction entrances, silt fencing, etc. All construction and maintenance of soil erosion and sedimentation control practices employed will be performed by the Remediation Contractor as directed by Roux Remedial Engineer.

# 2.0 POTENTIAL EROSION AND SEDIMENT CONTROL CONCERNS

Potential areas and items of concern during Work activities include the following:

- Cleared Site areas with exposed soils.
- Excavated areas.
- Backfilled and graded areas.
- Soil and material stockpiles.
- Staging areas.
- Wetland areas.
- Construction Site entrance.
- Dust control measures.

# 3.0 EROSION AND SEDIMENT CONTROL PLAN

Standard soil conservation practices need to be incorporated into Work activities at the Site to control dust, mitigate soil erosion damage, and prevent off-site soil/fill material and sediment migration and mitigation of water pollution from erosion. These practices combine vegetative and structural measures, many of which will be permanent in nature and become part of the completed project (i.e., grading). Other measures will be temporary and serve only during the construction stage. Selected soil/fill material erosion and sediment control measures will meet the following criteria:

- Incorporate temporary and permanent erosion control measures.
- Remove sediment from sediment-laden storm water before it leaves the Site.

## 3.1 Temporary Measures

Temporary erosion and sedimentation control measures and facilities will be used during Work activities. These temporary measures will be installed and maintained until they are either no longer needed or until such time as permanent measures are installed and become effective. Erosion and sediment controls shall be installed in accordance with the standards and specifications presented in Attachment 1. At a minimum, the following temporary measures will be used:

- Stabilized Construction Entrance and Decontamination Area.
- Perimeter Sediment Controls.
- Stormwater Bypass.

### 3.1.1 Stabilized Construction Entrance and Decontamination Area

In order to minimize the impacts to surroundings areas, stabilized construction entrances will be installed at all points of vehicle ingress and egress to the Site. As needed, temporary access roads will also be constructed to limit the dust generation and to prevent the tracking and moving of soils from and around the Site.

The stabilized entrances will be installed at all points of vehicle ingress and egress to the Site to capture mud and debris from vehicles before entering public roads and minimize dust. Temporary access roads and stabilized entrances will be constructed of a minimum of 6-inches of 1 to 4-inch crushed stone or reclaimed / recycled crushed concrete equivalent. Temporary access roads and stabilized entrances will have a minimum width of twelve feet, but not less than the full width at points where ingress or egress occurs. All imported material will be approved by the NYSDEC project manager prior to import. A request to import will be submitted to the NYSDEC project manager. All temporary crushed stone fill will be underlain with 12 oz non-woven geotextile, or approved equal, to facilitate the removal of stone fill upon completion of the work. New layers of stone will be placed on the temporary roads and the stabilized entrances as needed as work progresses.

A temporary decontamination pad/truck wash will be constructed to decontaminate all trucks and other vehicles/equipment which made contact with Site soil prior to leaving the Site. The decontamination pad will be constructed with a minimum of 12-inches of stone underlain by poly sheeting, sloped into the center to allow for liquid decontamination materials to flow to a 4-inch perforated pipe. Liquids in the perforated pipe will be pumped into an adjacent frac tank for temporary on-Site storage, pending off-Site disposal. The

decontamination pad will be sized to accommodate the largest construction vehicle used and located prior to the stabilized construction egress. The decontamination pad will be integrated with the stabilized construction entrance so that trucks do not get re-contaminated following decontamination and prior to departure from the Site. Dry decontamination will be employed to the extent practical, within decontamination pad of the Site. A Request to Import/Reuse Fill or Soil form with all supporting documentation will be submitted for NYSDEC approval for materials to be used to construct the decontamination pad/truck wash, construction entrances and temporary access roads. Construction details are shown on Figure 10 of the RAWP.

As discussed, liquids and suspended solids generated during decontamination activities will be stored in an on-Site frac tank. If the frack tank contains liquid decontamination material (i.e. is not empty), the tanks will be inspected daily for damage/leaks and to gauge the volume of stored liquids. The frac tanks will be emptied at a frequency that does not interfere with decontamination operations.

All liquid decontamination material will be collected and properly disposed of off-Site at a permitted facility or treated using an on-Site treatment system prior to discharge to the municipal sewer system under an approved Monroe County Department of Environmental Services (DES) discharge permit. The truck decontamination area/construction entrance will be adequately sloped toward the interior of the Site to prevent off-Site tracking of soils. Any Site material tracked to public rights-of-way will be removed immediately. The public right-of-way will be inspected at the beginning of the work, throughout the workday, and at the end of the workday. The Site material will be containerized, characterized, and disposed off-site at a permitted landfill facility.

### 3.1.2 Perimeter Sediment Controls

Remedial activities may result in surface water flow to drainage ditches and adjacent properties. To minimize impacts resulting from remediation activities, erosion and sediment control measures (e.g., silt sock, straw bales, silt fence) will be put in place to ensure no stormwater is discharged from the Site in conformance with requirements presented in the New York State Standards and Specifications for Erosion and Sediment Control. See Attachment 1.

Erosion and sediment control measures will be installed before the start of earth disturbing activities. Erosion and sediment control measures will surround the limit of disturbance in each work area to control erosion associated with stormwater runoff and protect the adjacent areas from potential impacts. Erosion and sediment control measures will also be installed on the perimeter of all excavations and soil stockpiles. The orientation of the controls will be adjusted as necessary as the work proceeds to accommodate changing site conditions. In addition, a 10-foot buffer will be maintained between stockpile areas and the areas of excavation.

Inspection and maintenance requirements for erosion and sediment control measures are discussed in **Section 3.5.2**.

### 3.1.3 Stormwater Bypass

A temporary stormwater bypass, if required, will be installed to convey surface water and stormwater runoff around the excavation areas. The stormwater bypass will be installed before the start of excavation work in each excavation area and will be maintained over the course of work in each area. The temporary stormwater bypass will be constructed with soil berms/earth dike, and/or diversion swales to physically

guide water away from the excavation area. Silt fence and/or straw bales/waddles will be used, as needed in addition to perimeter sediment controls, to trap and control migration of sediments. Construction details are presented in Attachment 1.

## 3.2 Stabilization

Erosion and sediment controls and Site perimeter fencing will remain in place until remedial activities (e.g. excavation, Site-wide cover system) have been completed and vegetative cover established (or other Department approved cover materials have been installed) in the work area.

Impervious areas of the Site include the paved sections of the bike path. As shown on Figure 7, two of the excavation areas are located within areas of the bike path which will result in a minor reduction in the impervious area of the Site. However, this minor reduction in the impervious area of the Site will not result in a major modification of the quantity of runoff from the Site and its effect, if any, would be to decrease the amount of runoff from the Site. Therefore, this ESCP is not required to include a plan for post-construction water quantity or water quality controls. However, post construction controls will likely be required for the future redevelopment, which will be addressed under a separate plan and within the 60-day Change of Use notification.

## 3.3 Dust Control

Dust (particulate matter) control measures will be employed throughout remediation activities. The following measures will be implemented to control particulates in driving areas including:

- Limiting on-Site speed to 15 miles per hour and posting signage of the limit at all Site entrances and along routes within the Site.
- Loading of any dry material that may release dust from trucks will be accompanied by manual water spraying of the material.
- All trucks exiting the Site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Outgoing trucks will be inspected verifying that covers on all such trucks have been properly covered/sealed and will not be allowed to exit the Site if covers are not properly sealed.

The Remediation Contractor will appropriately cover all inactive soil/fill material/sediment stockpiles to control dust migration. Active stockpiles can remain uncovered while the Remediation Contractor is onsite and during active work hours. All stockpiles and staged soil/fill material area will be properly covered during the non-work hours. The Remediation Contractor an/or the Remedial Engineer will be responsible for ensuring all stockpiles and staged material areas is covered at the end of the workday. All stockpiles and staged material areas will be covered with at a minimum of 12 mil poly sheeting and the cover will be properly anchored to ensure it remains in place. Stockpiles and staged material areas will be inspected routinely and all damaged covers will be replaced.

## 3.4 Stockpile Management

Excavation activities may produce stockpiles of soil and subgrade soil/fill materials. Careful placement and construction of stockpiles will be required to control erosion. Stockpiles will be placed no closer than 50 feet from storm water inlets and parcel boundaries. Control measures such as straw bales will be used near catch basins, surface waters, and other discharge points. Additionally, stockpiles will be graded and compacted as necessary for positive surface water runoff and dust control. Stockpiles will be secured with proper covers and anchors at all times unless material is being added, to prevent runoff and dust generation.

As discussed, soil stockpiles generated during the performance of the Work and stockpiles of clean backfill material brought to the Site, will be covered to control dust and precipitation erosion. The soil stockpiles will be continuously encircled with erosion controls (i.e., a berm and/or silt fence). Stockpiles will be kept covered with polyethylene sheeting with a minimum thickness of 12 mil and will be anchored. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

## 3.5 Monitoring, Inspection and Maintenance

All erosion (i.e., dust and precipitation) and sedimentation controls described in this ESCP will be inspected by the Remedial Engineer/P.E. of Record for the Site or a qualified individual who is under the direct supervision of the Remedial Engineer/P.E. of Record for the Site. The inspection frequency will be at a minimum of once a week and within 24 hours of a storm/precipitation event and will be repaired and/or modified as necessary to effectively control erosion (dust and precipitation) or turbidity problems. Inspections will include all areas under construction, stockpile areas, erosion control devices (e.g., silt sock, straw bales, silt fence) and all locations where vehicles enter and leave the site. Routine inspections of the entire Site will also be made on a weekly basis during construction.

If inspections indicate problems, corrective measures will be implemented immediately and will be resolved no later than 24 hours of the inspection. A report summarizing the scope of the inspection, name of the inspector, date, observations made, and a description of the corrective actions taken will be completed. Attachment 2 includes the Inspection and Maintenance Report Form.

### 3.5.1 Implementation

Erosion controls and features shall, at all times, be properly constructed, operated, and maintained in accordance with regulatory requirements and good engineering and construction practices. Erosion control measures and activities will be conducted in accordance with currently accepted Best Management Practices (BMPs).

Erosion control monitoring, inspection, and maintenance are an integral part of Site storm water and erosion control. The key elements of the monitoring effort include the following:

- Site inspections and maintenance
- BMPs monitoring
- Recordkeeping
- Review and modifications
- Certification of compliance

### 3.5.2 Site Inspections and Maintenance Practices

The temporary erosion control features will be maintained until no longer needed or permanent erosion control methods are installed. Site inspections are required every seven days or within 24 hours of a rainfall of 0.5 inches or greater. All disturbed areas, areas for material storage, locations where vehicles enter or exit the site, and all erosion and sediment controls identified as part of this ESCP must be inspected. Controls must be in good operating condition until the affected area they protect has been completely stabilized and the

construction activity is complete. If a repair is necessary, it must be completed within 24-hours of receipt of a report or notice, if practical. Inspection for specific erosion and sediment controls will include the following:

- Silt fence/silt socks will be inspected to determine the following:
    1) Depth
    2) Condition of fabric
    3) That the fabric is attached to the posts
    4) That the fence posts are firmly in the ground
- The silt fences/silt socks will be inspected weekly and within 24 hours of a 0.5 inch or greater storm event.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and other potential erosion control problems.
- Roux shall designate individual(s) that will be responsible for erosion control, maintenance, and repair activities. The designated individual will also be responsible for inspecting the site and filling out the inspection and maintenance report.
- Personnel selected for inspection and maintenance responsibilities will receive training as directed by the Engineer. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used on-site in good working order.

The individual inspecting the Site must record any damages or deficiencies on the Inspection and Maintenance Report Form in Attachment 2. This form can be used to request maintenance and repair and to document inspection and maintenance activities. Damages or deficiencies must be corrected as soon as possible after the inspection. Any changes that may be required to correct deficiencies in this ESCP should also be made as soon as possible, but in no case later than seven days after the inspection.

### 3.5.3 Recordkeeping

A copy of the ESCP and inspection and maintenance records will be included in the weekly reports to NYSDEC and must be kept at the Site from the time construction activities begins until the Site is stabilized. These documents will be made available upon request to regulatory agency representatives or members of the public.

## 3.6 Modifications to the ESCP

During the course of construction, unanticipated changes may occur that affect this ESCP such as schedule changes, phasing changes, staging area modifications, off-site drainage impacts, and repeated failures of designed controls. Modifications and updates to the erosion and sedimentation control requirements will be described and recorded. The ESCP will be amended when any of the following conditions occur:

- when there is a significant change in design, remediation, operation, or maintenance that may have a substantive effect on the potential for the discharge of pollutants to the waters of the United States and that has not otherwise been addressed in this ESCP;
- when this ESCP proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified in this plan;
- when this ESCP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges; or
- to identify any new contractor or subcontractor that will implement any measure of this ESCP.

# ATTACHMENTS

1. Erosion Control and Details
2. Inspection and Maintenance Report Form

# Erosion Control Details

**FINAL**

# New York State Standards and Specifications for Erosion and Sediment Control

**November 2016**

NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation

# STANDARD AND SPECIFICATIONS FOR SILT FENCE

## Definition & Scope

A **temporary** barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil by temporarily ponding the sediment laden runoff allowing settling to occur. The maximum period of use is limited by the ultraviolet stability of the fabric (approximately one year).

## Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope length and fence length will not exceed the limits shown in the Design Criteria for the specific type of silt fence used ; and
2. Maximum ponding depth of 1.5 feet behind the fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier; and
5. Soil conditions allow for proper keying of fabric, or other anchorage, to prevent blowouts.

## Design Criteria

1. Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff.
2. All silt fences shall be placed as close to the disturbed area as possible, but at least 10 feet from the toe of a slope steeper than 3H:1V, to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.
3. The type of silt fence specified for each location on the plan shall not exceed the maximum slope length and maximum fence length requirements shown in the following table:

| | | Slope Length/Fence Length (ft.) | | |
|---|---|---|---|---|
| Slope | Steepness | Standard | Reinforced | Super |
| <2% | < 50:1 | 300/1500 | N/A | N/A |
| 2-10% | 50:1 to 10:1 | 125/1000 | 250/2000 | 300/2500 |
| 10-20% | 10:1 to 5:1 | 100/750 | 150/1000 | 200/1000 |
| 20-33% | 5:1 to 3:1 | 60/500 | 80/750 | 100/1000 |
| 33-50% | 3:1 to 2:1 | 40/250 | 70/350 | 100/500 |
| >50% | > 2:1 | 20/125 | 30/175 | 50/250 |

**Standard Silt Fence (SF)** is fabric rolls stapled to wooden stakes driven 16 inches in the ground.
**Reinforced Silt Fence (RSF)** is fabric placed against welded wire fabric with anchored steel posts driven 16 inches in the ground.
**Super Silt Fence (SSF)** is fabric placed against chain link fence as support backing with posts driven 3 feet in the ground.

4. Silt fence shall be removed as soon as the disturbed area has achieved final stabilization.

The silt fence shall be installed in accordance with the appropriate details. Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. Butt joints are not acceptable. A detail of the silt fence shall be shown on the plan. See Figure 5.30 on page 5.56 for Reinforced Silt Fence as an example of details to be provided.

## Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

| Fabric Properties | Minimum Acceptable Value | Test Method |
|---|---|---|
| Grab Tensile Strength (lbs) | 110 | ASTM D 4632 |
| Elongation at Failure (%) | 20 | ASTM D 4632 |
| Mullen Burst Strength (PSI) | 300 | ASTM D 3786 |
| Puncture Strength (lbs) | 60 | ASTM D 4833 |
| Minimum Trapezoidal Tear Strength (lbs) | 50 | ASTM D 4533 |
| Flow Through Rate (gal/ min/sf) | 25 | ASTM D 4491 |
| Equivalent Opening Size | 40-80 | US Std Sieve ASTM D 4751 |
| Minimum UV Residual (%) | 70 | ASTM D 4355 |

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.5 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot. Posts for super silt fence shall be standard chain link fence posts.

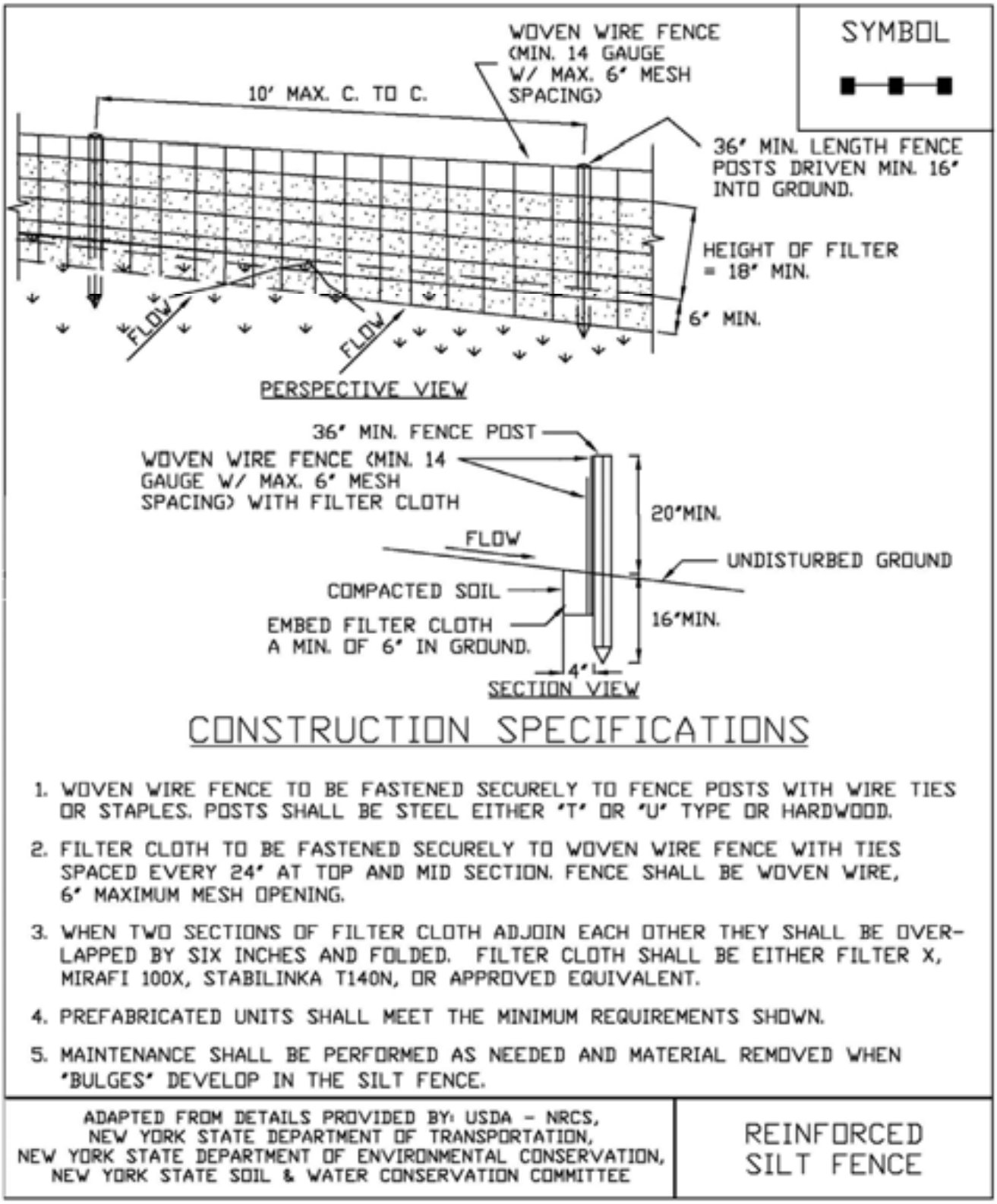
3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated silt fence is acceptable as long as all material specifications are met.

Super Silt Fence

Reinforced Silt Fence

# Figure 5.30
# Reinforced Silt Fence



# STANDARD AND SPECIFICATIONS FOR COMPOST FILTER SOCK

## Definition & Scope

A **temporary** sediment control practice composed of a degradable geotextile mesh tube filled with compost filter media to filter sediment and other pollutants associated with construction activity to prevent their migration offsite.

## Condition Where Practice Applies

Compost filter socks can be used in many construction site applications where erosion will occur in the form of sheet erosion and there is no concentration of water flowing to the sock. In areas with steep slopes and/or rocky terrain, soil conditions must be such that good continuous contact between the sock and the soil is maintained throughout its length. For use on impervious surfaces such as road pavement or parking areas, proper anchorage must be provided to prevent shifting of the sock or separation of the contact between the sock and the pavement. Compost filter socks are utilized both at the site perimeter as well as within the construction areas. These socks may be filled after placement by blowing compost into the tube pneumatically, or filled at a staging location and moved into its designed location.

## Design Criteria

1. Compost filter socks will be placed on the contour with both terminal ends of the sock extended 8 feet upslope at a 45 degree angle to prevent bypass flow.

2. Diameters designed for use shall be 12" – 32" except that 8" diameter socks may be used for residential lots to control areas less than 0.25 acres.

3. The flat dimension of the sock shall be at least 1.5 times the nominal diameter.

4. The **Maximum Slope Length** (in feet) above a compost filter sock shall not exceed the following limits:

| Dia. (in.) | Slope % | | | | | | |
|---|---|---|---|---|---|---|---|
| | **2** | **5** | **10** | **20** | **25** | **33** | **50** |
| 8 | 225* | 200 | 100 | 50 | 20 | — | — |
| 12 | 250 | 225 | 125 | 65 | 50 | 40 | 25 |
| 18 | 275 | 250 | 150 | 70 | 55 | 45 | 30 |
| 24 | 350 | 275 | 200 | 130 | 100 | 60 | 35 |
| 32 | 450 | 325 | 275 | 150 | 120 | 75 | 50 |
| * Length in feet | | | | | | | |

5. The compost infill shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content. When using compost filter socks adjacent to surface water, the compost should have a low nutrient value.**

6. The compost filter sock fabric material shall meet the

7. Compost filter socks shall be anchored in earth with 2" x 2" wooden stakes driven 12" into the soil on 10 foot centers on the centerline of the sock. On uneven terrain, effective ground contact can be enhanced by the placement of a fillet of filter media on the disturbed area side of the compost sock.

8. All specific construction details and material specifications shall appear on the erosion and sediment control constructions drawings when compost filter socks are included in the plan.

## Maintenance

1. Traffic shall not be permitted to cross filter socks.

2. Accumulated sediment shall be removed when it reaches half the above ground height of the sock and disposed of in accordance with the plan.

3. Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired in the manner required by the manufacturer or replaced within 24 hours of inspection notification.

4. Biodegradable filter socks shall be replaced after 6 months; photodegradable filter socks after 1 year. Polypropylene socks shall be replaced according to the manufacturer's recommendations.

5. Upon stabilization of the area contributory to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed in accordance with the stabilization plan. For removal the mesh can be cut and the compost spread as an additional mulch to act as a soil supplement.

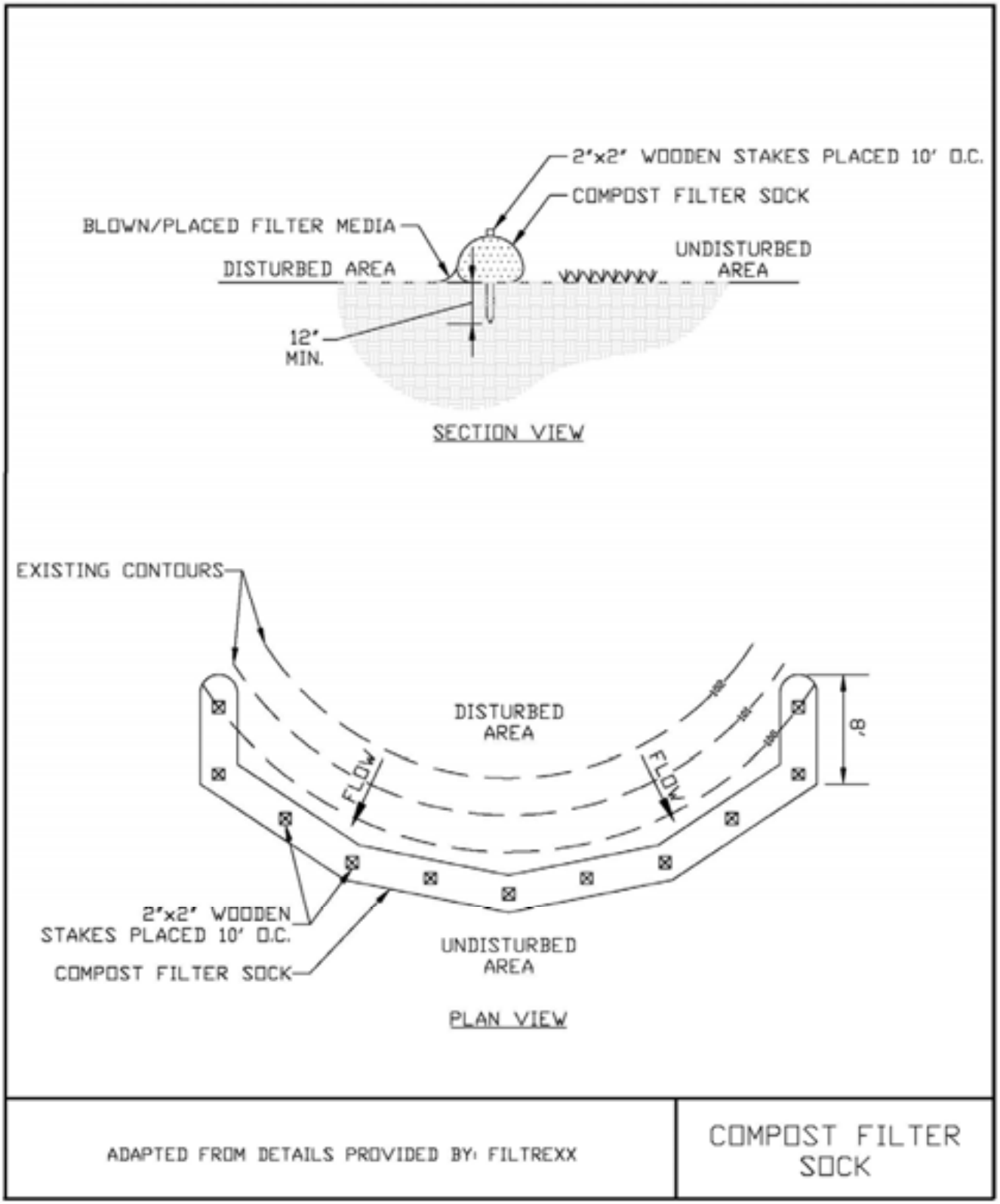
# Table 5.1 - Compost Sock Fabric Minimum Specifications Table

| Material Type | 3 mil HDPE | 5 mil HDPE | 5 mil HDPE | Multi-Filament Polypropylene (MFPP) | Heavy Duty Multi-Filament Polypropylene (HDMFPP) |
|---|---|---|---|---|---|
| **Material Characteristics** | Photodegradable | Photodegradable | Biodegradable | Photodegradable | Photodegradable |
| **Sock Diameters** | 12"<br>18" | 12"<br>18"<br>24"<br>32" | 12"<br>18"<br>24"<br>32" | 12"<br>18"<br>24"<br>32" | 12"<br>18"<br>24"<br>32" |
| **Mesh Opening** | 3/8" | 3/8" | 3/8" | 3/8" | 1/8" |
| **Tensile Strength** | | 26 psi | 26 psi | 44 psi | 202 psi |
| **Ultraviolet Stability % Original Strength (ASTM G-155)** | 23% at 1000 hr. | 23% at 1000 hr. | | 100% at 1000 hr. | 100% at 1000 hr. |
| **Minimum Functional Longevity** | 6 months | 9 months | 6 months | 1 year | 2 years |

# Table 5.2 - Compost Standards Table

| | |
|---|---|
| Organic matter content | 25% - 100% (dry weight) |
| Organic portion | Fibrous and elongated |
| pH | 6.0 – 8.0 |
| Moisture content | 30% - 60% |
| Particle size | 100% passing a 1" screen and<br>10 - 50% passing a 3/8" screen |
| Soluble salt concentration | 5.0 dS/m (mmhos/cm) maximum |

# Figure 5.2
# Compost Filter Sock



# STANDARD AND SPECIFICATIONS FOR EARTH DIKE

## Definition & Scope

A **temporary** berm or ridge of compacted soil, located in such a manner as to channel water to a desired location. Its purpose is to direct runoff to a sediment trapping device, thereby reducing the potential for erosion and off site sedimentation. Earth dikes can also be used for diverting clean water away from disturbed areas.

## Conditions Where Practice Applies

Earth dikes are often constructed across disturbed areas and around construction sites such as graded parking lots and subdivisions. The dikes shall remain in place until the disturbed areas are permanently stabilized.

## Design Criteria

See Figure 3.5 on page 3.15 for details.

**General**

| | Dike A | Dike B |
|---|---|---|
| Drainage Area | <5 Ac | 5-10 Ac |
| Dike Height | 18 in. | 36 in. |
| Dike Width | 24 in. | 36 in. |
| Flow Width | 4 ft. | 6 ft. |
| Flow Depth in Channel | 8 in. | 15 in. |
| Side Slopes | 2:1 or flatter | 2:1 or flatter |
| Grade | 0.5% Min.<br>10% Max. | 0.5% Min.<br>10% Max. |

For drainage areas larger than 10 acres, refer to the Standard and Specifications for Diversion on page 3.9.

**Stabilization**

Stabilization of the dike shall be completed within 2 days of installation in accordance with the standard and specifications for seed and straw mulch or straw mulch only if not in seeding season. The flow channel shall be stabilized as per the following criteria:

| Type of Treatment | Channel Grade[1] | Flow Channel | |
|---|---|---|---|
| | | A (<5 Ac.) | B (5-10 Ac.) |
| 1 | 0.5-3.0% | Seed & Straw Mulch | Seed & Straw Mulch |
| 2 | 3.1-5.0% | Seed & Straw Mulch | Seed and cover with RECP, sod, or lined with plastic or 2” stone |
| 3 | 5.1-8.0% | Seed and cover with RECP, Sod, or line with plastic or 2 in. stone | Line with 4-8 in. rip-rap or, geotextile |
| 4 | 8.1-10% | Line with 4-8 in. rip-rap or geotextile | Site Specific Design |

1 In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.

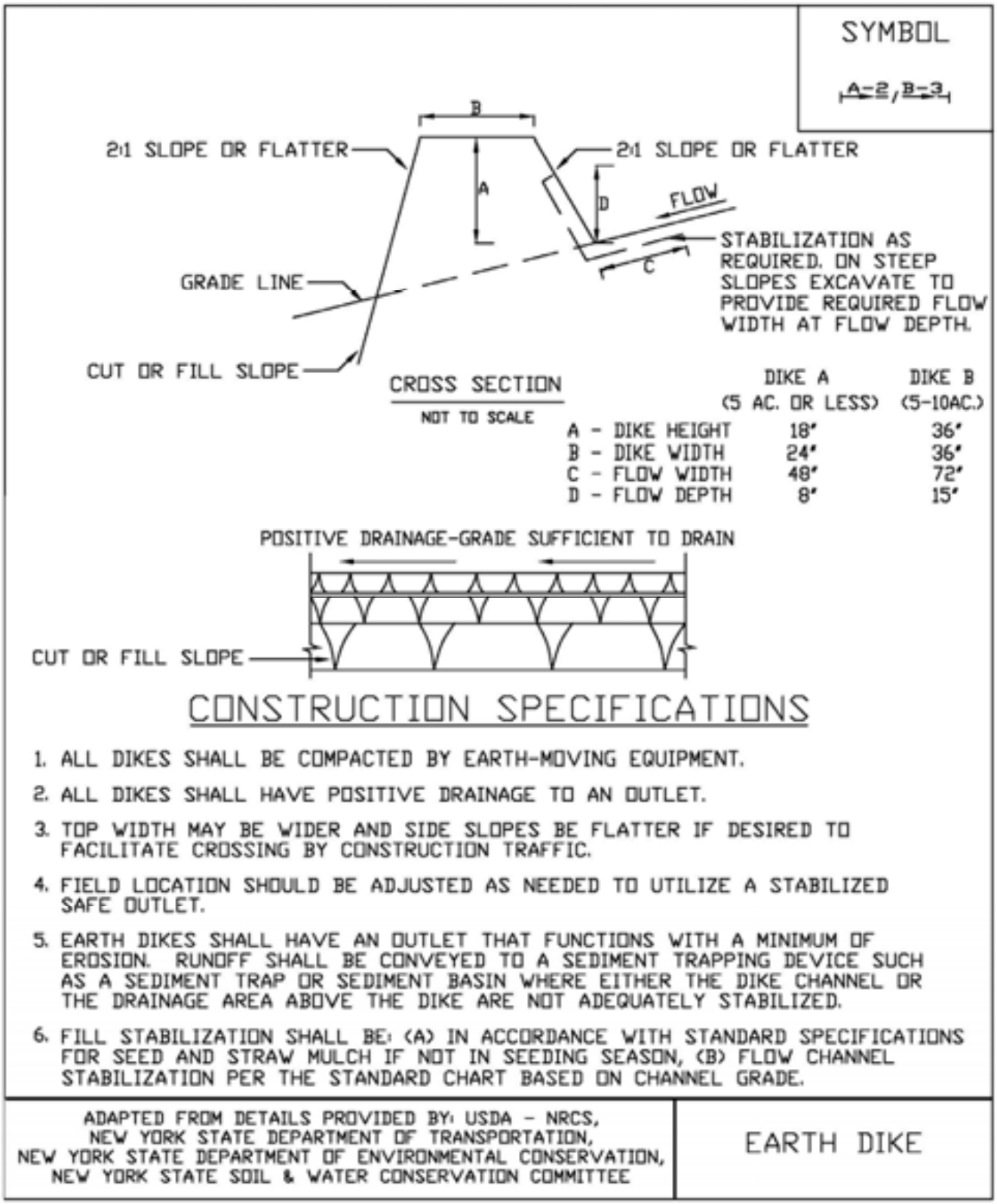
**Outlet**

Earth dikes shall have an outlet that functions with a minimum of erosion.

Runoff shall be conveyed to a sediment trapping device until the drainage area above the dike is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

# Figure 3.5
# Earth Dike Detail



# Inspection and Maintenance Report Form

# Inspection and Maintenance Report Form

**To be completed every 7 days and within 24 hours of a rainfall event of 0.5 inches or more**

Regular Inspector:_____Rainfall Event Inspector:_____Rainfall (inches):_____

| Contractor Activities | OK | NO | N/A | Notes |
|---|---|---|---|---|
| Are construction onsite traffic routes, parking, and storage of equipment and supplies restricted to areas specifically designated for those uses? | | | | |
| Are locations of temporary soil stock piles of construction materials in approved areas? | | | | |
| Is there any evidence of spills and resulting cleanup procedures? | | | | |
| **General Erosion & Sediment Controls** | | | | |
| Are sediment and erosion BMPs installed in the proper location and according to the specifications set out in the SWM & ECP? | | | | |
| Are all operational storm drain inlets protected from sediment inflow? | | | | |
| Do any seeded or landscaped areas require maintenance, irrigation, fertilization, seeding or mulching? | | | | |
| Is there any evidence that sediment is leaving the site? | | | | |
| Is there any evidence of erosion or cut fill slopes? | | | | |
| **Perimeter Road Use** | | | | |
| Does much sediment get tracked on to the perimeter road? | | | | |
| Is the gravel clean or is it filled with sediment? | | | | |
| Does all traffic use the perimeter road to leave the site? | | | | |
| Is maintenance or repair required for the perimeter road? | | | | |

_____ _____

Inspected by (Signature) Date

# Community Air Monitoring Plan (CAMP)

# COMMUNITY AIR MONITORING PLAN

Portion of the Former Vacuum Oil Refinery Site
Rochester, New York
BCP Site No. C828190

January 15, 2026

Prepared for:

**10 Flint Street LLC & City of Rochester**

Prepared by:

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Islandia, New York 11749

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# Appendices

A. Action Limit Report

# 1.0 INTRODUCTION

Roux Associates, Inc. (Roux) on behalf of 10 Flint Street LLC and the City of Rochester, has prepared the following Community Air Monitoring Plan (CAMP) to ensure the soil sampling and remediation (e.g., excavation, soil/fill material handling) activities (collectively, hereafter referred to as "intrusive activities") to be performed at the site known as Portion of the Former Vacuum Oil Refinery Site, Site number C828190, City of Rochester, NY (hereafter referred to as the "Site") do not adversely affect the Site residents and the surrounding community, and to preclude or minimize airborne migration of Site contaminants. The proposed remediation activities include a pre-design investigation, excavation, soil/fill material handling and transport off-site to a permitted landfill facility, and soil waste characterization sampling.

Compliance with this CAMP is required during all intrusive activities and soil/fill material handling activities that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). Intrusive activities include any activities in which soil/fill material of the Site is disturbed such as but not limited to excavation, soil/fill material handling, soil borings, and soil sampling. This CAMP has been prepared to ensure that intrusive activities do not adversely affect residents, bystanders or workers at the Site and in the community surrounding the Site and to mitigate airborne migration of particulate matter and VOCs.

This CAMP is consistent with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan, which is included as Appendix 1A of the New York State Department of Environmental Conservation (NYSDEC) "DER-10 Technical Guidance of Site Investigation and Remediation" (DER-10), dated May 3, 2010.

# 2.0 AIR MONITORING PROCEDURES DURING INTRUSIVE ACTIVITIES

Semi-volatile organic compounds (SVOCs), metals and VOCs are constituents of concern at the Site. The appropriate method to monitor air for these constituents during intrusive activities is through real-time VOC and air particulate (dust) monitoring. Remediation activities include both ground intrusive and non-intrusive activities requiring continuous monitoring for VOC and dust concentrations (particulate). Specific air monitoring procedures required during intrusive activities are described below.

Ground Intrusive Activities

Continuous VOC and particulate (dust) monitoring will be required for all ground intrusive activities conducted at the Site including but not limited to excavation. Note that ground intrusive work areas are not expected to be within 20 feet of potentially exposed populations or occupied structures and therefore special requirements CAMP procedures will not be required at this time. If in the event that work areas are withing 20 feet then the Special CAMP will be implemented.

Non-Intrusive Activities

Continuous VOC and particulate (dust) monitoring will be required for all non-intrusive activities conducted at the Site, including but not limited to temporary soil stockpiling, soil transport, and placement and compaction of backfill materials.

## 2.1 Wind Direction

Wind direction will be evaluated, at a minimum, at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to determine the positioning of the monitoring station equipment in appropriate upwind and downwind locations. A Site figure will be marked daily to record the wind direction and monitoring equipment locations and will be submitted as part of the Daily Report submitted to the NYSDEC and NYSDOH project managers.

## 2.2 Volatile Organic Compound Monitoring

During all ground intrusive and soil handling activities, VOCs will be monitored periodically at the upwind perimeter and continuously at the downwind perimeter of the designated work areas. A portable handheld Photoionization Detector (PID) will be used to periodically monitor conditions at upwind locations. Monitoring station equipment capable of measuring total VOC concentrations (PID) and capable of integrating (running averaging) over periods of 15 minutes or less will be set up at the downwind location, at a height of approximately 4-5 feet above land surface (i.e., the breathing zone). The audible alarm on the PID will be set at 5 parts per million (ppm). Monitoring equipment will be a MiniRAE 2000 portable VOC monitor or similar.

VOC concentrations will be measured at monitoring stations located along the upwind and downwind perimeters of all ground intrusive work areas. Locations of both upwind and downwind monitoring stations will be determined based upon the wind direction and are subject to change in response to changes in wind direction and speed.

The following summarizes VOC action levels and the appropriate responses:

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 ppm above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities must be halted. While continuing to monitor, the source of vapors must be identified, and corrective actions must be taken to abate vapor emissions. After these steps are performed, work activities can resume, provided the total organic vapor level 200 feet downwind of the work area or half the distance to the nearest potential receptor or residential/commercial structure – whichever is less but in no case less than 20 feet – is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down, the source of vapors identified, and corrective measures taken to abate emissions, as described below in **Section 2.2.1**.

The NYSDEC and NYSDOH project managers will be notified of all fugitive emission events and complaints immediately with written documentation provided within 24 hours. All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review upon request. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in **Appendix A**, will be completed and will include the corrective actions taken to mitigate the exceedance.

### 2.2.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during ground intrusive activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- Limiting the excavation size;
- Backfilling portions of the excavation;
- Covering soil stockpiles (if any) with 6-mil polyethylene sheeting;
- Hauling waste materials off-Site in properly covered container;
- Odor masking (e.g., foam suppressants); and/or
- Pausing operations until the wind conditions change such that VOCs and/or odors due to the work are not migrating toward downwind receptors.

All air monitoring readings will be recorded in the field logbook and will be made available for the NYSDEC and NYSDOH personnel to review upon request.

## 2.3 Particulate Monitoring

Air monitoring for particulates (i.e., dust) will be performed continuously during intrusive and non-intrusive activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring station equipment capable of measuring particulate matter smaller than 10 microns ($PM_{10}$) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately 4-5 feet above land surface (i.e., the breathing zone). Monitoring station equipment will be MEI Data Ram monitors, or equivalent. The audible

alarm on the particulate monitoring device will be set at the action level of 100 µg/$m^3$ above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive and non-intrusive activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind $PM_{10}$ particulate level is 100 µg/$m^3$ above background (upwind perimeter) for the 15-minute period, or if airborne dust (visible) is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind $PM_{10}$ particulate levels do not exceed 150 µg/$m^3$ above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind $PM_{10}$ particulate levels are greater than 150 µg/$m^3$ above the upwind level, work must be stopped, and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in **Section 2.3.1** below) and other controls are successful in reducing the downwind $PM_{10}$ particulate concentrations to within 150 µg/$m^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and available for NYSDEC and NYSDOH personnel to review upon request. If an exceedance of the Action Limits occurs, an Action Limit Report (**Appendix A**), will be completed.

### 2.3.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 µg/$m^3$ at any time during intrusive activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- Spraying water on the equipment;
- Placing/hauling materials in properly tarped containers or vehicles;
- Limiting vehicle/equipment activity and speeds on Site; and/or
- Hydro-seeding of disturbed areas (as needed).

Work may continue with dust suppression techniques provided that downwind $PM_{10}$ levels are not more than 150 µg/$m^3$ greater than the upwind levels.

There may also be situations where the dust generated by intrusive activities migrates to downwind locations and is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed at the Site, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 µg/$m^3$, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

The NYSDEC and NYSDOH project managers will be notified of all dust events and complaints immediately with written documentation of the events/complaints provided within 24 hours. All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review upon request.

# 3.0 REFERENCES

NYSDOH, 2010. New York State Department of Health Generic Community Air Monitoring Protocol, May 3, 2010 (also included as Appendix 1A to the Draft Technical Guidance for Site Investigation and Remediation, NYSDEC, May 2010).

# APPENDICES

## A. Action Limit Report

# APPENDIX A

Action Limit Report

# ACTION LIMIT REPORT

Project Location: _____

Date: _____ Time: _____

Name: _____

Contaminant: PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

SITE ACTIVITIES

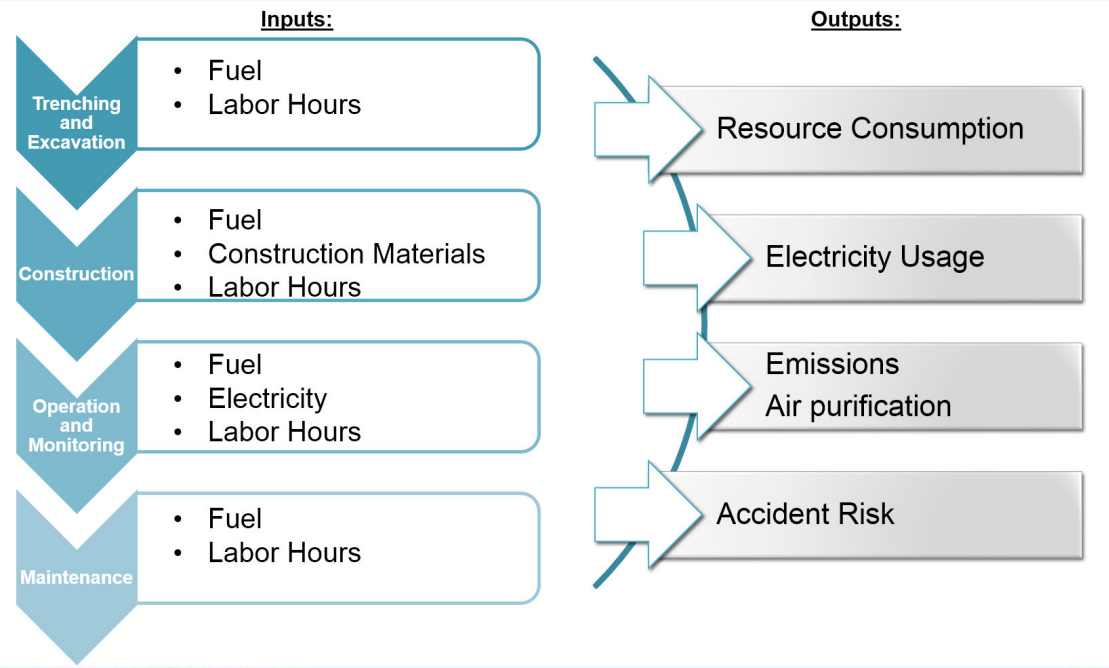
CORRECTIVE ACTIONS TAKEN

# APPENDIX H

SiteWise™ Model

# SiteWise™ Model

- *Developed by the Department of the Navy, Army Corps of Engineers, and Battelle to calculate the environmental footprint of remedial alternatives.*
- *Process input and output data for each remedial alternative is entered into SiteWise™ Model spreadsheets to produce a comparison of environmental impacts.*



# SiteWise™ Model Output– Rochester City Parcels

**City Parcels (Targeted Excavation):**

- **> 125,000 tons of soil removed / backfilled**
- **>5,700 dump trucks transporting soil to/from the site**

Greenhouse Gas Emissions

- City Parcels (Targeted Excavation): 1,364 metric tons = 318 cars on the road per year

Total NOx Emissions

- City Parcels (Targeted Excavation): 5.61 metric tons = 3,387 cars on the road per year

Non-Hazardous Waste Landfill Space

- City Parcels (Targeted Excavation): 57,530 tons = cover 4.5 acres with over 5 ft. of soil

Total Energy Used

- City Parcels (Targeted Excavation): 22,113 MMBTU = 617 houses supplied with energy per year

Total Dust Emissions

- City Parcels (Targeted Excavation): 10.57 metric tons = 5011 cars on the road per year

# Site Health and Safety Plan (HASP)

# SITE-SPECIFIC HEALTH AND SAFETY PLAN

Portion of the Former Vacuum Oil Refinery Site
Rochester, New York
BCP Site No. C828190

November 13, 2025

Prepared for:

**10 Flint Street LLC & City of Rochester**

Prepared by:

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# SITE-SPECIFIC EMERGENCY INFORMATION

## Emergency Phone Numbers

Most emergency services can be obtained by calling **911**. Where 911 service is not available, use the telephone numbers provided in the table below. The following is a master emergency phone list for use by the project management personnel. A more condensed version of the emergency numbers listed below will be posted throughout project work areas. Emergencies encountered on the site will be responded to by a combination of off-site emergency services and on-site personnel.

| **Emergency Contact Information** | | | |
|---|---|---|---|
| **Site Personnel** | | | |
| **Title** | **Contact** | | **Telephone** |
| Operations Manager (OM) | Michael Lesakowski | | 716-818-3954<br>716-725-6946 (Cell) |
| Project Principal (PP) | Ian Reed | | 781-569-4030<br>617-875-9394 |
| Project Manager (PM) | Eric Runstrom | | 781-569-4031<br>413-548-6350 (Cell) |
| Qualified Person / Site Health and Site Safety Officer (SHSO) | Nicholas Suraci | | 716-713-3937 |
| Office Health and Safety Manager (OHSM) | Paul Werthman | | 716-725-6977<br>716-997-9584 (Cell) |
| Corporate Health and Safety Director (CHSD) | Brian Hobbs, CIH, CSP | | 631-630-2419<br>631-807-0193 (Cell) |
| WorkCare, Inc. | Occupational Health Care Management Provider | | 888-449-7787 |
| **Outside Assistance – Non Emergency Numbers – DIAL 911 IN CASE OF EMERGENCY** | | | |
| **Agency** | **Contact** | **Telephone** | **Address/Location** |
| Ambulance/emergency medical services (EMS) | Rural Metro | 585-777-7777 | 811 West Ave, Rochester, NY 14611 |
| Police | Rochester Police Department | 585-428-6720 | 185 Exchange Blvd, Rochester, NY 14614 |
| Fire | Rochester Fire Department | 585-428-6739 | 1261 South Ave, Rochester, NY 14620 |
| Site Address | See Section 2 for all site address information | | |

## Directions to Hospital

The nearest hospital to the Site is the Strong Memorial Hospital located at 601 Elmwood Avenue in Rochester, New York. The telephone number for the hospital is (585) 275-2100. Directions from the Site to the hospital are located below.

Head **Northwest** on Flint **St.**;

Turn **left** at **Plymouth Ave. S/S Plymouth Ave./RT-383**;

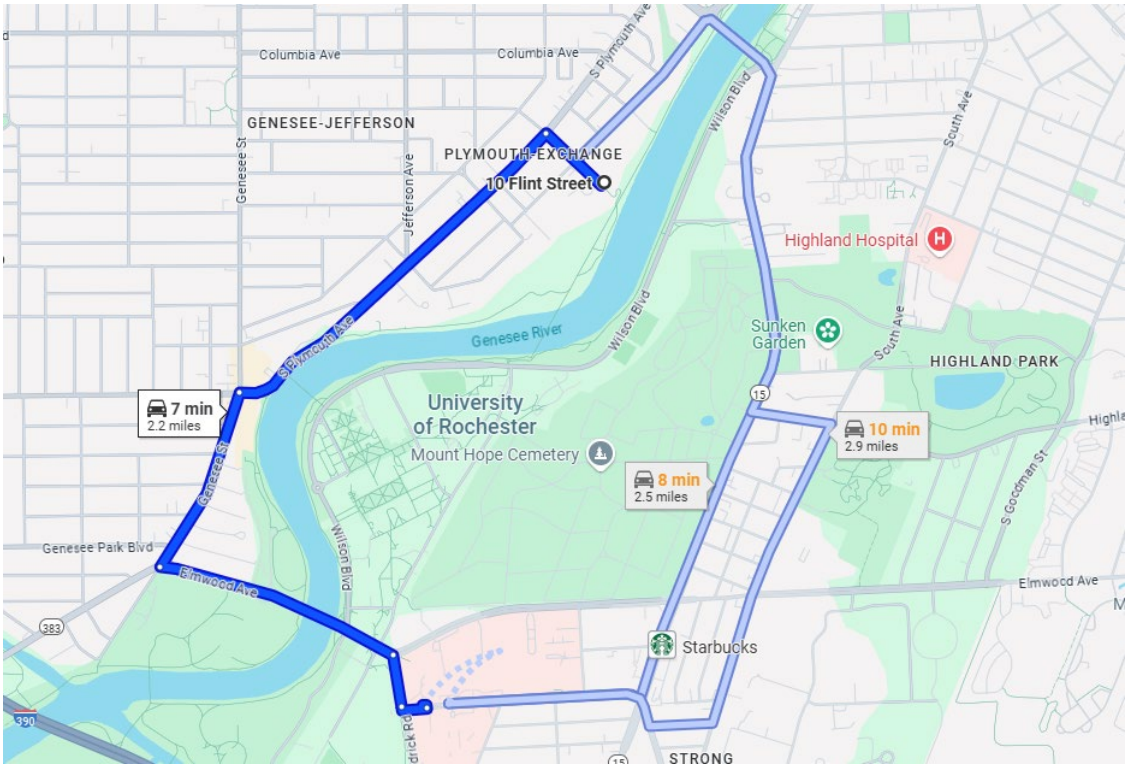
Turn **left** at **Genesee St./RT-383**;

Turn **left** at **Elmwood Ave.**;

Arrive at Strong Memorial Hospital.

The approximate driving time from the Site to the hospital is 7 minutes (2.4 miles).

A map depicting the above-described route is provided below.



## Directions to Urgent Care Facility

The nearest urgent care facility to the Site is Work Fit Medical located at 1160 Chili Ave, Suite 200 in Rochester, New York. The telephone number for the facility is (585) 426-4990. Directions from the Site to the facility are located below.

Head **northwest** on **Flint St** toward **Exchange St**;

Turn **left** onto **S Plymouth Ave**;

Continue **straight** onto **Brooks Ave**;

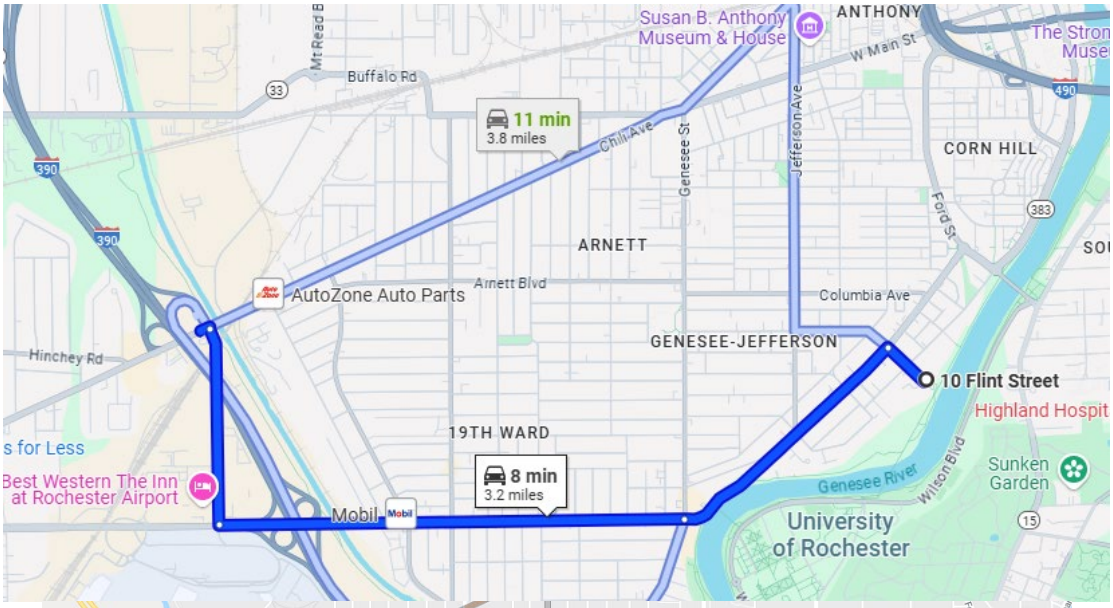
Turn **right** onto **Buell Rd**;

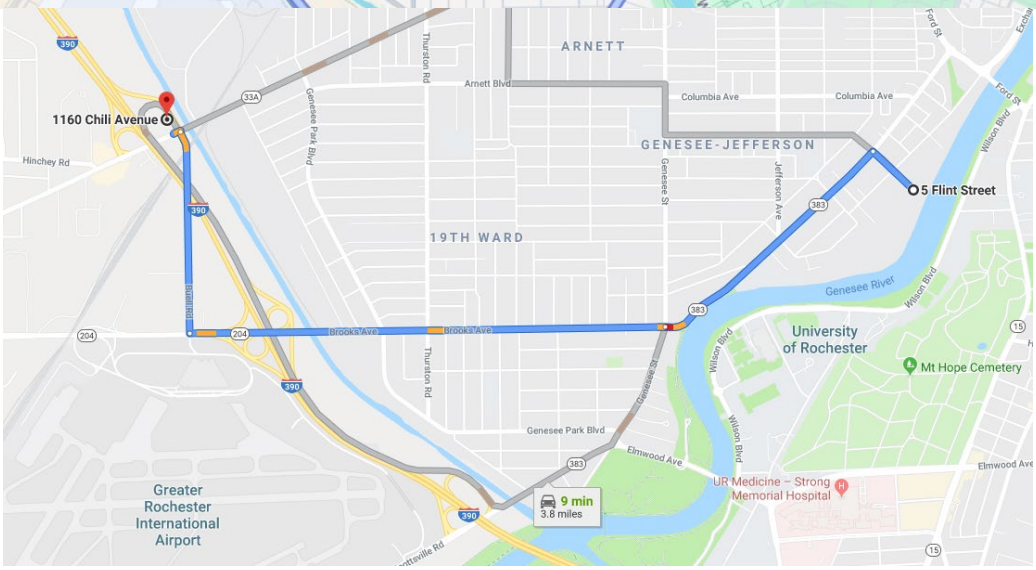
Turn **left** onto **NY-33A W**;

Work Fit Medical will be on the right.

The approximate driving time from the Site to the facility is 8 minutes (3.2 miles).

A map depicting the above-described route is provided below:



# ACRONYM LIST

| Acronym | Definition |
|---|---|
| AMEC | AMEC Earth & Environmental, Inc. |
| AED | Automatic External Defibrillation |
| ANSI | American National Standards Institute |
| BBP | Blood-Borne Pathogens |
| CFR | Code of Federal Regulations |
| CHSD | Corporate health and Safety Director |
| CO | Carbon Monoxide |
| COC | Contaminant of Concern |
| CPR | Cardio Pulmonary Resuscitation |
| CRC | Contamination Reduction Corridor |
| CRZ | Contamination Reduction Zone |
| dBA | Decibels |
| DOT | Department of Transportation |
| EMS | Emergency Medical Services |
| ERC | Emergency Response Coordinator |
| EZ | Exclusion Zone |
| GCM | Grossly Contaminated Media |
| HASP | Health and Safety Plan |
| HAZMAT | Hazardous Materials |
| HAZWOPER | Hazardous Waste Operations and Emergency Response |
| IP | Injured/Ill Person |
| JSA | Job Safety Analysis |
| LEL | Lower Explosive Limit |
| LI | Loss Investigation |
| LPS | Loss Prevention System |
| NRR | Noise Reduction Rating |
| NYSDEC | New York State Dept. of Environmental Conservation |
| NYSDOH | New York State Dept. of Health |
| OHSM | Office Health and Safety Manager |
| OSHA | Occupational Safety and Health Administration |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PEL | Permissible Exposure Limits |

| Acronym | Definition |
|---|---|
| PGSCO | Protection of Groundwater Site Cleanup Objective |
| PID | Photoionization Detector |
| PM | Project Manager |
| PP | Project Principal |
| PPE | Personal Protective Equipment |
| QP | Qualified Person |
| R&Rs | Roles and Responsibilities |
| RI | Remedial Investigation |
| RIR | Remedial Investigation Report |
| RRSCO | Restricted Residential Site Cleanup Objective |
| SCO | Site Cleanup Objective |
| SDS | Safety Data Sheet |
| SGV | Standards and Guidance Values |
| SHSO | Site Health and Safety Officer |
| SLM | Sound Level Meter |
| SMP | Soils Management Plan |
| SOPs | Standard Operating Procedures |
| SPSA | Safety Performance Self Assessment |
| SVOC | Semi-volatile Organic Compound |
| SZ | Support Zone |
| TOGS | Technical and Operation Guidance Series |
| TWA | Time Weighted Average |
| VOC | Volatile Organic Compound |

# 1.0 INTRODUCTION

This Site-specific Health and Safety Plan (HASP) has been prepared by Roux Associates, Inc. (Roux) for use during the pre-design investigation and remedial implementation for a Portion of the Former Vacuum Oil Refinery (Site) in the City of Rochester, NY, specifically the properties owned by the City of Rochester, New York ("City") located at 13, 31, 49 (formally part of 13), 69, 75, and portions of 1 Cottage Street; 100 Riverview Place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) (the "Site"`; **Figure 1**). This HASP was prepared in general accordance with the requirements of the Occupational Safety and Health Administration (OSHA) standards promulgated at 29 CFR 1910.120 and 29 CFR 1926.65, both commonly referred to as the Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard. In accordance with the HAZWOPER Standard, this Site-specific HASP was prepared to address the safety and health hazards associated with the remedial investigation and remedial implementation activities being performed at the Site by Roux and to provide requirements and procedures for the protection of Roux employees, subcontractor personnel, government oversight personnel, Site personnel, and the general public. It also addresses client- and Site-specific requirements for health and safety. Additionally, subcontractors may be required to submit their own HASP as it relates to their specific work activities and will be kept onsite during such work.

Implementation of this HASP is the joint responsibility of the Project Manager (PM), the Site Health and Safety Officer (SHSO), and all field staff, with assistance from the Project Principal (PP), Office Health and Safety Manager (OHSM), and Corporate Health and Safety Director (CHSD). The PM for this project is Eric Runstrom. The Qualified Person (QP) and Site Health and Safety Officer (SHSO) is Nicholas Suraci.

This HASP will be introduced to, reviewed, and signed off on by all Roux personnel through a formal training session prior to commencing work. A copy of the HASP will be kept at the Site at all times. The Roux SHSO or PM will be responsible for posting any changes, amendments, memos, etc. to the HASP. Any revisions to this HASP will be signed by appropriate personnel, which can include Roux's PP, CHSD, and QP. Any changes will be announced to all workers at the daily tailgate safety meeting.

## 1.1 Roles and Responsibilities

Overall Roles and Responsibilities (R&Rs) of Roux personnel are provided in Roux's Policies and Procedures Manual. Only those R&Rs specific to HASP requirements are listed below.

**Project Manager (PM)**

The PM has responsibility and authority to direct all work operations. The PM coordinates safety and health functions with the Site Health and Safety Officer (SHSO), has the authority to oversee and monitor the performance of the SHSO, and bears ultimate responsibility for the proper implementation of this HASP. The specific duties of the PM are:

- Preparing and coordinating the Site work plan;
- Providing Qualified Person(s) with work assignments and overseeing their performance; Coordinating safety and health efforts with the SSHO;
- Ensuring effective emergency response through coordination with the Emergency Response Coordinator (ERC); and
- Serving as primary Site liaison with public agencies and officials and Site contractors.

**Site Health and Safety Officer (SHSO)**

The SHSO has the full responsibility and authority to develop and implement this HASP and to verify compliance. The SHSO reports to the Project Manager. The SHSO is on Site or readily accessible to the Site during all work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SHSO include:

- Managing the safety and health functions on this Site;
- Serving as the Site's point of contact for safety and health matters;
- Ensuring Site monitoring, worker training, and effective selection and use of PPE;
- Assessing Site conditions for unsafe acts and conditions and providing corrective action;
- Assisting the preparation and review of this HASP;
- Maintaining effective safety and health records as described in this HASP; and
- Coordinating with the QP and others as necessary for safety and health efforts.

**Qualified Person (QP)**

The Qualified Person (QP) is responsible for field operations and reports to the Project Manager (PM). The QP ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Qualified Person include:

- Executing the work plan and schedule as detailed by the PM;
- Coordination with the SHSO on safety and health; and
- Ensuring Site work compliance with the requirements of this HASP.

**Employees**

All Roux employees are responsible for reading and following all provisions of the Corporate Health and Safety Manual, including this HASP. Employees report to the QP at the project Site. Each employee is also responsible for the following:

- Wearing all appropriate PPE as outlined within this HASP;
- Attending all safety meetings;
- Inspecting tools and equipment prior to use, and taking any defective tools or equipment out of service;
- Appropriately documenting field events as they occur within a logbook or equivalent;
- Properly operating machinery and/or equipment only if trained to do so;
- Stopping work operations if unsafe conditions exist;
- Identifying and mitigating hazards when observed;
- Reporting all incidents and near misses to the Roux SHSO and QP immediately; and
- Knowing where emergency equipment is located (e.g. first aid kit, fire extinguisher).

**Subcontractors and Visitors**

Subcontractors and visitors are responsible for complying with the same health and safety requirements. It is the responsibility of all to make sure subcontractors and visitors comply and uphold the HASP. Subcontractors and visitors have the following additional responsibilities:

- Designating a qualified safety representative for the project that can make the necessary changes in work practices, as necessary;
- Attending all safety meetings while participating in Roux Site work activities;
- Reporting all incidents and near misses to Roux SHSO and QP immediately;
- Conducting initial and periodic equipment inspections in accordance with manufacturer and regulatory guidelines; and
- Providing copies of all Safety Data Sheets (SDS) to Roux SHSO for materials brought to the Site.

# 2.0 BACKGROUND

The following Site description and history summarizes information provided in previous reports for the Site submitted to the New York State Department of Environmental Conservation (NYSDEC).

Relevant background information is provided below, including a general description of the Site; a brief review of the Site's history with respect to hazardous material use, handling, and/or storage; and a review of known and potential releases of hazardous substances at the Site.

## 2.1 Site Description

The Site is bordered by the Genesee River and adjacent West River Wall to the east/southeast/south beyond a narrow strip of New York State-owned land, residential property to the west, vacant land (formerly a junkyard addressed as 15 Flint Street) to the northwest, and Flint Street with commercial land to the north across Flint Street. Property addressed as 5 Flint Street, containing a single, vacant three-story building (associated with the former Vacuum Oil Refinery) is also located near the north end of the Site. Although the 5 Flint Street parcel is located on the northern side of the Site, the Site also wraps around 5 Flint Street in a "U" shape. Currently, the majority of the Site contains dense vegetative cover and is overgrown primarily with trees, bushes and grasses/weeds. The remainder of the Site is comprised of private residential property, a variety of commercial building, and a public walkway. This area of vegetative cover is primarily early to mid-stage woods characterized by a mix of deciduous species that vary based on the areas of the Site such as wetland or "slighter higher moist woods." A bicycle/walking path with areas of maintained grass, constructed by the City of Rochester, traverses the southern and eastern perimeter of the Site along the Genesee River. A concrete bulkhead borders the Genesee River along the east/southeast Site boundary. According to historic information reviewed by Roux, the bulkhead has been in place since the facility was in operation.

## 2.2 Site History

The Vacuum Oil Company operated an oil refinery at portions of the Site from approximately 1866 to around the early 1890s. From the early 1890s until its closure in 1935, it operated as a blending facility. The facility consisted of several process and storage buildings and structures, tank farms, pipelines and rail lines. The processing and refining operations reportedly included processing crude oil transported to the Site in wooden barrels from the "Bradford Field" located in Pennsylvania in 1869. The crude oil was processed and used in the preparation of kerosene, naphtha and other finished lubricant products. Later, and subsequent to 1890, the facility began processing raw lubricant stocks which were finished, barreled/canned and shipped off Site. Significant products including lubricating oils, paraffin, neutral oils, spindle oils, naphtha, and marine engine oils were blended and distributed for sale. Barrels and tin cans were manufactured at the Site to provide containers for shipping and sale of the finished product. In 1916, the facility (sometimes referred to in the Historic and Current Site Conditions Report as "the Rochester Works") occupied 15 acres and maintained a large number of filters and other equipment for finishing lubricating oil stocks, a large compounding facility, and a barrel and can factory. The facility was demolished in the 1930s. Remnants of the facility exist at the Site including building foundations and slabs.

In addition to the above, two former railroad lines ran through the Site: 1) the Pennsylvania Railroad located approximately 100 feet northwest from the Genesee River and 2) the Erie Railroad located approximately 200 to 400 feet northwest from the Genesee River.

## 2.3 Known and Potential Releases of Hazardous Substances at the Site

According to the Historic and Current Site Conditions Report prepared by AMEC Earth & Environmental, Inc. (AMEC), field surveys of the Site were conducted in November and December 2004. During these field surveys, AMEC identified existing Site structures and features including concrete retaining walls and structure remnants, retaining (former canal) walls, drums, manhole covers and piping (including historic sewer and lines), machinery parts and industrial debris, a piece of molten plastic, slag material mounds, rubble and tire piles, fire hydrants, former railroad structures and structures identified as resembling floor pits. According to information included in the Site Investigation Report – Former Vacuum Oil Company, Site #828089P, dated March 2001 and prepared by NYSDEC, in September 1992, NYSDEC removed approximately 400 to 500 tons of petroleum sludge located in the area of former sludge pits (formerly a "railyard area at the southeastern portion of the Vacuum Oil facility near what is currently the Genesee River bike trail"). The petroleum sludge was discovered during construction of the bike path (trail) and upon testing, the sludge was found to be non-hazardous.

The Historic Site Conditions Report identified several previous investigations that have been completed at the Site. These previous investigations included: 1) two investigations by the NYSDEC (one in 1999 and the other in 2000) and 2) an investigation by the City of Rochester in 1989. Additional information regarding these previous investigations is provided in the Historic Site Conditions Report.

## 2.4 Known Current Environmental Site Conditions

The Site was investigated in accordance with the scope of work presented in the NYSDEC conditionally approved (November 19, 2015) Remedial Investigation Work Plan (RIWP) dated October 2015, prepared by O'Brien & Gere Engineers, Inc. (OBG), now part of Ramboll, and various historical investigation and data collection efforts conducted in 1999-2001, 2008, 2008-2009 and 2012. The Remedial Investigation (RI) was conducted between 2015 and 2018. The November 2019 Remedial Investigation Report (RIR), prepared by OBG, summarizes findings of the RI and was approved with the issuance of the Site's Decision Document September 2023.

The following is a summary of the geological and hydrogeological findings, the soil and groundwater data generated during the RI and previous Site investigations. The NYSDEC and NYSDOH have determined that the Site does not pose a significant threat to human health and the environment.

### 2.4.1 Surface Soil and Surface Cover

Surface soil (0-2 inch) and surface cover (0-2 feet) were evaluated together to identify potential direct exposure risks at the Site. Based on a comparison to applicable Site soil cleanup objectives (SCOs), Site-related contaminants of concern (COCs) in surface soil and surface cover were limited to semi-volatile organic compounds (SVOCs) and metals (arsenic and mercury). While less prevalent, polychlorinated biphenyls (PCBs), copper, lead, barium, and cadmium were also detected above Restricted Residential Soil Cleanup Objectives (RRSCOs) in some samples and are also considered COCs. Volatile organic compounds (VOCs) were not identified above RRSCOs in surface soil or surface cover samples. SVOCs and metals were the constituents identified most frequently above RRSCOs in surface soil or surface cover samples. Results of surface soil or surface cover sampling indicate:

- SVOCs, specifically, one or more of the polycyclic aromatic hydrocarbon (PAH) compounds (anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were identified above RRSCOs. The majority of surface soil and surface cover samples exceeding

RRSCOs for SVOCs were located on the 13 Cottage Street parcel, the former canal area of the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) parcel, and the 102 Violetta Street parcel near the bike path. Four locations (SS-112, SS-142, SS-141, and SS-147) on the 13 and 49 Cottage Street parcels contained total SVOCs greater than 100 ppm. There was evidence of on-Site dumping including parts cleaner, metal shavings debris, and concrete/brick debris in the vicinity of some of these sample locations.

- Arsenic was observed above RRSCOs in approximately half of the surface soil and surface cover samples analyzed, although the maximum concentration was much less than that observed in subsurface soil samples. The predominant locations of surface soil and surface cover samples where arsenic was present above Restricted- Residential SCOs are on the southern portion of the Site (south of the adjoining 5 Flint Street parcel). Mercury was detected above the RRSCOs in five samples.
- Surface soil and surface cover samples were screened using a photoionization detector (PID), and field observations including the presence of odors, staining, and discoloration were recorded. Sheens, staining, and/or petroleum-type odors were not encountered during surface soil and surface cover sampling.

### 2.4.2 Subsurface Soil

Similar to surface soil and surface cover samples, SVOCs and metals were identified most frequently above applicable Site SCOs in subsurface soil. Results of subsurface soil sampling indicate:

- SVOCs detected in subsurface soil samples above RRSCOs, and Protection of Groundwater Soil Cleanup Objectives (PGSCOs) were PAH compounds (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene). The locations with the highest concentrations of total SVOCs are near the center of the Site on the 13 Cottage Street parcel and the 10 Flint Street parcel.
- Arsenic was identified above RRSCOs and PGSCOs in 27 of the 123 locations analyzed for metals. Samples containing arsenic were located south of the adjoining 5 Flint Street Parcel on both the 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) and the 13 and 49 Cottage Street parcels. Three of the samples containing the highest concentrations of arsenic were located in the northern end of the former canal on the 10 Flint Street parcel near Flint Street.
- VOCs were detected above PGSCOs at one sample location, OVR-117 (7-7.6 ft bgs), located on the 13 Cottage Street parcel. Subsurface soil samples were screened using a PID for indications of potential VOCs, and field observations including the presence of odors, staining, and discoloration were recorded. The sheens, staining, and odors generally correlate to the areas also observed to have the highest PID readings, on the northern side of the Site in the former canal on 10 Flint Street, on the east and west sides of the adjoining 5 Flint Street parcel, and the 13 Cottage Street parcel, south of the adjoining 5 Flint Street parcel. Fill and waste materials including observations of fragmented bricks, cinders, coal ash, slag, and black granular material (bone black) were also noted in many of these locations.

### 2.4.3 Groundwater

Analytical results for groundwater were compared to Class GA Standards and Guidance Values (SGVs) provided in NYSDEC's Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (SGVs; NYSDEC 1998). Results of groundwater sampling indicate:

- Groundwater samples obtained during the RI identified VOCs and SVOCs (primarily PAHs) exceeding Class GA SGVs. VOCs detected in the groundwater include petroleum- related VOCs, chlorinated VOCs, and ketone compounds. Petroleum-related VOCs and chlorinated VOCs were present in wells bordering the 5 Flint Street parcel. SVOCs were detected in the groundwater above Class GA SGVs in three overburden wells located on the north end of the 10 Flint Street parcel and the 13 Cottage Street parcel.

- As previously discussed, although iron, manganese, magnesium, and sodium were detected above Class GA SGVs, these constituents are considered to be naturally occurring and not related to historic site operations. Arsenic was detected in the groundwater above Class GA SGVs in seven overburden wells located on the north end of the 10 Flint Street parcel between the adjoining 5 Flint Street and 15 Flint Street parcels and the 102 Violetta Street parcel, east of the adjoining 5 Flint Street parcel.

### 2.4.4 Soil Vapor

As discussed in the RI Report, soil vapor samples collected during the RI were located along the perimeter of the Site to assess the potential for off-site migration of soil vapor in the direction of adjoining western residential properties and to evaluate the potential for vapor intrusion. Results of soil vapor sampling indicate:

- Petroleum related VOCs and CVOCs are present in soil vapor at the Site, consistent with contaminants found in soil (petroleum VOCs/SVOCs) and groundwater (petroleum VOCs/SVOCs and CVOCs) at the Site. However, as discussed in the RI Report, the concentrations were low and do not suggest off-Site migration. In addition, the low concentrations of constituents detected in soil vapor suggest the probability for vapor intrusion into existing off-Site buildings is low. Constituents in nearby soil and groundwater samples were generally non-detect. Although there are low concentrations of VOCs identified in some of the groundwater samples collected from lower elevations, the limited constituents detected and the relative horizontal and vertical distance from the soil vapor sample locations suggests that these detections are not related to those identified in the soil vapor.

# 3.0 SCOPE OF WORK

Based on the selected remedy for the Site, the scope of work includes the following components:

- Pre-remediation activities, including site walks, monitoring well gauging and sampling, and vegetation clearing and grubbing, PDI to finalize vertical and lateral extents of GCM/PGSCO-designated source material;
- Excavation and off-Site disposal;
- Installation of a Site-wide Cover System (comprised of two feet of on-Site reuse soil or off-Site backfill analytically confirmed to meet RRSCOs for all constituents, buildings, pavement, other impervious hardscape) to prevent direct contact with contaminated soil remaining at the Site;
- Installation of the subsurface components of a passive vapor intrusion mitigation system beneath proposed buildings that can be activated (i.e., connected to an active depressurization unit), if necessary, depending on results from future vapor intrusion sampling;
- Abandonment of select groundwater monitoring wells and replacement if destroyed during Site excavation activities; and
- Implementation of institutional controls including an environmental easement and SMP to restrict the Site to restricted residential use, to manage disturbance of contaminated soil remaining at the Site, to restrict use of groundwater at the Site, to maintain the Site-wide Cover System, and to monitor groundwater.

If there are any changes with the scope a revision of the HASP will be required to address any new hazards.

# 4.0 SITE CONTROL

This Site control program is designed to reduce the spread of hazardous substances from contaminated areas to clean areas, to identify and isolate contaminated areas of the Site, to facilitate emergency evacuation and medical care, to prevent unauthorized entry to the Site, and to deter vandalism and theft.

## 4.1 Site Map

A map of this Site, showing Site boundaries, designated work zones, and points of entry and exit is provided in **Figure 2**.

## 4.2 Site Access

Access to the work areas at the Site is restricted to reduce the potential for exposure to its safety and health hazards. During hours of Site operation, Site entry and exit is authorized only at the points identified in **Figure 2**. Entry and exit at these points is controlled by a perimeter fence and gate with an entrance on Flint Street. When the Site is not operating, access to the Site is controlled by the following: a perimeter fence and a locked gate entrance.

## 4.3 Buddy System

While working in the Exclusion Zone, Site workers use the buddy system. The buddy system means that personnel work in pairs and stay in close visual contact to be able to observe one another and summon rapid assistance in case of an emergency. The responsibilities of workers using the buddy system include:

- Remaining in close visual contact with partner;
- Providing partner with assistance as needed or requested;
- Observing partner for signs of heat stress, chemical overexposure or other difficulties;
- Periodically checking the integrity of partner's PPE; and
- Notifying the QP or other Site personnel if emergency assistance is needed.

## 4.4 Site Communications

The following communication equipment is used to support on-site communication: cell phones and visual hand signals.

As applicable, hand signals will be used according to the following:

**Hand Signals**

| SIGNAL | MEANING |
|---|---|
| Hand gripping throat | Out of air, can't breathe |
| Grip partner's wrist | Leave area immediately |
| Hands on top of head | Need assistance |
| Thumbs up | I'm all right, okay |
| Thumbs down | No, negative |

A current list of emergency contact numbers is included in the Site-Specific Emergency Information at the beginning of this HASP.

## 4.5 Site Work Zones

This Site is divided into three (3) major zones, described below. These zones are characterized by the likely presence or absence of biological, chemical, or physical hazards and the activities performed within them. Zone boundaries are clearly marked at all times and the flow of personnel among the zones is controlled. The Site is monitored for changing conditions that may warrant adjustment of zone boundaries. Zone boundaries are adjusted as necessary to protect personnel and clean areas. Whenever boundaries are adjusted, zone markings are also changed, and workers are immediately notified of the change.

**Exclusion Zone**

The area where contamination exists is the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered part of the EZ. This zone will be clearly delineated by chain link fencing, caution tape, cones or other effective barriers, as necessary. Safety tape may be used as a secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The SHSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy (co-worker);
- Required minimum level PPE;
- Medical authorization;
- Training certification; and
- Requirement to be in the zone.

**Contamination Reduction Zone**

A Contamination Reduction Zone (CRZ) is established between the exclusion zone and the support zone. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of personnel and equipment. The CRZ will be used for general Site entry and egress in addition to access for heavy equipment and emergency support services. Personnel are not allowed in the CRZ without:

- A buddy (co-worker);
- Appropriate PPE;
- Medical authorization;
- Training certification; and
- Requirement to be in the zone.

**Support Zone**

The Support Zone (SZ) is an uncontaminated area that will be the field support area for the Site operations. The SZ will be available for field team parking, communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. The support facility will be located up-wind of Site operations, if possible, and may be used as a potential evacuation point. No potentially contaminated personnel or materials are allowed in this zone except appropriately packaged/decontaminated and labeled samples and drummed wastes.

# 5.0 JOB HAZARD EVALUATION

Roux's work at the Site is expected to entail a variety of physical, chemical, and biological hazards, all of which must be sufficiently managed to allow the work to be performed safely. Some of the hazards are Site-specific (i.e., they are associated with the nature, physical characteristics, and/or routine operation of the Site itself), while others are activity-specific (i.e., they are associated with [or arise from] the particular activity being performed). The various hazards can be grouped into the following categories:

- **Caught/Crushed** – the potential to become caught in, under, between, or by an object or parts of an object, such as equipment with parts that open and close or move up and down ("pinch points") or equipment that rotates, and the accompanying potential to have body parts cut, mangled, or crushed thereby.
- **Contact** – the potential to be struck by or against moving or stationary objects that can cause physical injury, such as heavy machinery, overhead piping, moving vehicles, falling objects, and equipment (including tools and hand-held equipment) or infrastructure with the ability to cut or impale.
- **Energy Sources** – the potential for bodily harm associated with energy sources, most notably electricity, but also including latent energy sources such as compressed air and equipment under tension (which when released could cause injurious contact or a fall).
- **Ergonomics** – the potential for musculoskeletal injury associated with lifting/carrying, pushing/pulling, bending, reaching, and other physical activity attributable to poor body position/mechanics, repetitive motion, and/or vibration.
- **Exposure** – the potential for injury/illness due to physical, chemical, or biological exposures in the work environment, including, but not limited to, temperature extremes, solar radiation, and noise (physical), chemical splashes and hazardous atmospheres (chemical), and animal/insect bites and poisonous plants (biological).
- **Falls** – the potential to slip or trip and thus fall or drop a load, resulting in bodily injury to oneself or others.

The foregoing is intended to provide Roux employees with a general awareness of the hazards involved with Site work. A more detailed review of the potential hazards associated with each specific activity planned for the Site (or on-going activity, as the case may be) is provided in the activity-specific Job Safety Analysis (JSA) forms in **Appendix A**. As can be seen in the JSA forms, the hazards are identified by category per the above, and specific measures designed to mitigate/manage those hazards are also identified. In preparing the JSA forms, all categories of hazards were considered, and all anticipated potential hazards were identified to the extent possible based on the experience of the personnel preparing and reviewing the JSA forms. However, there is always the possibility for an unanticipated hazard to arise, potentially as condition change over the course of the workday. Roux personnel must maintain a continual awareness of potential hazards in the work zone, regardless of whether the hazard is identified in the JSA form. Particular attention should be paid to hazards associated with exposure to hazardous substances (see **Table 1** for a listing of the hazardous substances most likely to be encountered in environmental media at the Site) and to Site personnel being located "in the line of fire" with respect to moving equipment, pinch points, and latent energy (e.g., being located or having body parts located within the swing radius of an excavator, between two sections of pipe being connected, below a piece of suspended equipment, or adjacent to a compressed air line).

## 5.1 Hazard Communication and Overall Site Information Program

The information in the JSAs and SDSs is made available to all employees and subcontractors who could be affected by it prior to the time they begin their work activities.

Modifications to JSAs are communicated during routine pre-work briefings and periodically updated as needed in the HASP. SDSs will be maintained by the SHSO/QP for new chemicals brought on-site as needed. Copies of SDSs can be found in **Appendix B**.

## 5.2 Noise

Noise is associated with the operation of heavy equipment, power tools, pumps, and generators. Noise is also a potential hazard when working near operating equipment such as excavators, drill rigs or pole drivers. High noise (i.e., < 85 dBA) operations may be evaluated by the SHSO utilizing a type 2 handheld sound level meter (SLM) operating on the "A"-weighted scale with slow response because this scale most closely resembles human response to noise and complies with OSHA 29 CFR 1910.95. Hearing protection is required in areas with noise exposure greater than 85 dBA. Double hearing protection (ear plugs and earmuffs) should be donned in areas where the noise exposure is more than 95 dBA. Noise exposure will be controlled by hearing protection as described above or by maintaining set-backs from high-noise equipment, as warranted. Personnel handling heavy equipment and using power tools that produce noise levels exceeding those described levels above are required by OSHA 29 CFR 1910.95 to wear the appropriate Noise Reduction Rating (NRR) level of hearing protection. Appropriate hearing protection will be evaluated by the SHSO as necessary in consultation with the OHSM and CHSD.

## 5.3 Slip, Trip, and Fall Hazards

Slip, trip, and fall hazards may include, but are not limited to, general slip and trip hazards associated with uneven ground, possible debris, wet grass, and equipment. Prior to work, walking paths will be assessed for solid footings, any ground penetrations that may cause a tripping hazard will be appropriately marked, and other areas will be noted and discussed with the field team.

Personnel shall be aware of their surroundings and footings at all time, and all accommodations should be made for proper housekeeping and organized equipment placement at the Site, where possible, to help prevent any slip, trip, and fall-related incidents. All tools and materials should be appropriately stored when not in use and placed in appropriate storage containers.

## 5.4 Biological Hazards

Biological hazards that may potentially be present at a Site, include poisonous plants, insects (ticks, spiders, bees), animals (snakes, dogs), etc. Information on biological hazards can be found within Roux's Biological Hazard Awareness Management Program located within Roux's Corporate Health and Safety Manual. Prior to beginning work, on-Site protocols shall be established by the project team, including subcontractors, in accordance with federal, state, county, city, and/or other guidance, as applicable.

# 6.0 EMERGENCY RESPONSE PLAN

This emergency response plan details actions to be taken in the event of Site emergencies. The PM and SHSO is responsible for the implementation of emergency response procedures onsite. The SHSO/PM provides specific direction for emergency action based upon information available regarding the incident and response capabilities and initiates emergency procedures and notification of appropriate authorities. In the event of an emergency, Site personnel are evacuated and do not participate in emergency response activities, response is facilitated through external emergency services.

## 6.1 Emergency Response

The SHSO, after investigating the incident and relevant information, shall determine the level of response required for containment, rescue and medical care. Limited on-site emergency response activities could occur therefore the SHSO is responsible for notifying external emergency response agencies. The SHSO provides relevant information to the responding organizations, including, but not limited to, the hazards associated with the emergency incident, potential containment problems, and missing Site personnel.

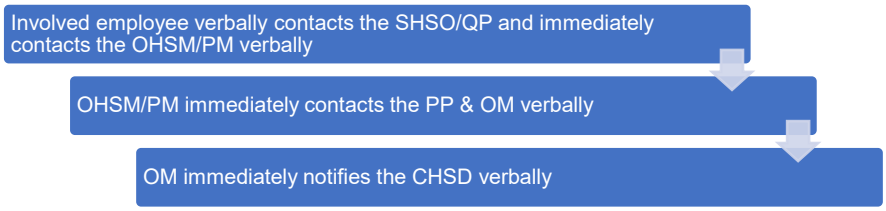
## 6.2 Emergency Alerting and Evacuation

If evacuation notice is given, Site workers leave the worksite, if possible, by way of the nearest exit. Appropriate primary and alternate evacuation routes and assembly areas have been identified and are shown on the Site Plan with Emergency Muster Area (**Figure 2**). The routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by SHSO/PM.

Personnel exiting the Site gather at a designated assembly point. To determine that everyone has successfully exited the Site, personnel will be accounted for at the assembly point. If any worker cannot be accounted for, notification is given to the SHSO, PM, and any arriving response authorities so that appropriate action can be initiated. Subcontractors on this Site have coordinated their emergency response plans to ensure that these plans are compatible and potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

## 6.3 Emergency Medical Treatment and First Aid

In the event of a work-related injury or illness, employees are required to follow the procedures outlined below. All work-place injury and illness situations require Roux's Project and Corporate Management Team to be notified when an injury/illness incident occurs, and communication with the contracted Occupational Health Care Management Provider, WorkCare, Inc., is initiated, as necessary. The Injury/Illness Notification Flowchart is provided below and within Roux's Incident Investigation and Reporting program included within Roux's Corporate Health and Safety Manual.



If on-Site personnel require any medical treatment, the following steps will be taken:

a. If the situation is life-threatening or appears to be potentially life-threatening, call 911 to request immediate medical attention.

b. Notify Roux's Project and Corporate Management Team for any work-related injury and/or illness occurrence and communicate with the contracted Occupational Health Care Management Provider, WorkCare, immediately following the notifications provided above.

c. Based on discussions with the Project Team, Corporate Management and the WorkCare evaluation, if medical attention beyond onsite first aid is warranted, transport the injured / ill person (IP) to the Urgent Care Center, or notify the Fire Department or Ambulance Emergency service and request an ambulance or transport the victim to the hospital, and continue communications with Corporate Management Team. An Urgent Care/Hospital Route map with location to Work Fit Medical/Strong Memorial Hospital is included in the Site-Specific Emergency Information.

d. Decontaminate to the extent possible prior to administration of first aid or movement to medical or emergency facilities.

e. First aid medical support will be provided by onsite personnel trained and certified in First Aid, Cardio Pulmonary Resuscitation (CPR), Automatic External Defibrillation (AED), and Blood-Borne Pathogens (BBP) Awareness, until relieved by emergency medical services (EMS).

f. The SHSO and PM will perform a Loss Investigation (LI), and the Project Team will complete the final Loss Report. If a Roux employee is involved in a vehicular incident, the employee must also complete the Acord Automobile Loss Notice.

# 7.0 ENVIRONMENTAL CONDITIONS AND RESPONSE

## 7.1 Adverse Weather Conditions

In the event of adverse weather conditions, the SHSO or project principal will determine if work can continue without jeopardizing the health and safety of field workers. Some of the items related to adverse weather conditions to be considered prior to determining if work should continue include:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related conditions. If wind speed is greater than 15 mph averaged over a 15-minute period or wind gusts over 25 mph, earthmoving operations will be ceased;
- Limited visibility; and
- Electrical storm potential.

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions may include heavy rain, fog, high winds, and lightning. The SHSO and/or PM shall observe daily weather reports and evacuate, if necessary, in case of inclement weather conditions.

## 7.2 Electrical Storm Guidelines

In the event that lightning and/or thunder are observed while working onsite, all onsite activities shall stop and personnel shall seek proper shelter (e.g., substantial building, enclosed vehicle, etc.). Work shall not resume until the threat of lighting has subsided and no lightning or thunder has been observed for 30 minutes. If the possibility of lightning is forecast for the day, advise the onsite personnel on the risks and proper procedure at the pre-work safety briefing. Continuously monitor for changing weather conditions and allow enough time to properly stop work if lightning is forecast.

## 7.3 Environmental Stressors, Heat Stress, Heat Exhaustion, and Heat Stroke

It is the employer's responsibility to monitor weather forecasts and ambient air temperatures, both prior to the work shift and during the shift. The National Oceanic and Atmospheric Administration records average minimum/maximum temperatures of 26.2/72.4 degrees Fahrenheit during the year in Rochester, New York.

To prevent potential heat illness, the following strategies will be implemented:

- Adjusting personnel work/rest intervals;
- Monitoring for symptoms of heat illness;
- Providing shaded rest areas;
- Providing cool potable water so that each employee has access to at least one quart per hour for the entire shift, free of charge;
- Allowing for employees to acclimatize to the weather conditions and work demands;
- Observe workers during a heat wave (i.e., when the temperature is at least 80°F, and 10 degrees hotter than the average temperature of the five preceding days); and
- Implementing high heat procedures when the temperature reaches 95°F.

Roux's Heat Illness Prevention Plan is implemented when the when ambient temperatures exceed 80°F. Roux's Heat Illness Prevention Program can be found within **Appendix C**. Additional information regarding heat illnesses is provided below. This can include, but is not limited to, access to shade that is sufficient in size to fit all workers who are on break; a car with air conditioning is acceptable, too. Preventative cool-down breaks shall be allowed at any time, and anyone taking such a break will be monitored for heat illness symptoms and not required to return to work until all symptoms (if present) of heat illness have disappeared. If necessary, first aid will be offered, but if symptoms are severe, emergency response procedures will be implemented per Section 6.3. Anyone who has shown symptoms of severe heat illness will not be sent home without being offered first aid or medical treatment.

High heat procedures must be implemented when temperatures reach 95°F. These procedures include:

- Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if the reception in the area is reliable.
- Observing employees for alertness and signs or symptoms of heat illness. The employer shall ensure effective employee observation/monitoring by implementing one or more of the following:
    - Supervisor or designee observation of 20 or fewer employees;
    - Mandatory buddy system; and
    - Regular communication with sole employee such as by radio or cellular phone, or other effective means of observation.
- Designating one or more employees on each worksite as authorized to call for emergency medical services and allowing other employees to call for emergency services when no designated employee is available.
- Encouraging employees throughout the work shift to drink plenty of water.
- A review of the high heat procedures during the daily tailgate meeting and remind employees of their right to take a cool-down rest when necessary.

### 7.3.1 Heat Stress

Heat stress is the body's response to excessive heat and can be a significant potential hazard. The risk of heat stress can be increased with heavy physical activity and/or the use of personal protective equipment in hot, humid weather environments. There are also personal risk factors that can contribute to the risk of suffering from heat stress, such as obesity, water intake, alcohol and caffeine consumption, pregnancy, age, medication, etc. Heat illness includes heat cramps, heat exhaustion, heat syncope, and heat stroke.

### 7.3.2 Heat Cramps

Heat cramps may be brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body resulting in painful muscle cramps, typically in the legs.

First aid treatment includes, but is not limited to, shade, rest, and fluid replacement. Typically, the individual should recover within one-half hour while being monitored constantly. If the individual has not improved substantially within 30 minutes and the body temperature has not decreased, the individual should be transported to a hospital for medical attention.

Per Roux's Heat Illness Prevention Plan, employees shall have access to potable drinking water that is fresh, pure, suitably cool, free of charge and in sufficient quantities. Access to shade shall be present when temperatures exceed 80 degrees Fahrenheit and shall be available when temperatures do not exceed 80 degrees Fahrenheit.

### 7.3.3 Heat Exhaustion

Heat exhaustion may occur in an individual who has been exposed to excessive heat while working or exercising. The circulatory system of the individual fails as blood collects near the skin to rid the body of excess heat through transference. The signs and symptoms of heat exhaustion are as follows:

- Rapid and shallow breathing;
- Weak pulse;
- Cold and clammy skin with heavy perspiration;
- Skin appears pale;
- Fatigue and weakness;
- Dizziness; and
- Elevated body temperature.

First aid treatment includes, but is not limited to, cooling the victim, elevating the feet, and replacing fluids.

If the individual is not substantially improved within 30 minutes and the body temperature has not decreased, the individual should be transported to the hospital for medical attention.

### 7.3.4 Heat Stroke

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a MEDICAL EMERGENCY requiring immediate cooling of the victim and transport to a medical facility. The signs and symptoms of heat stroke are as follows:

- Dry, hot, red skin;
- Body temperature approaching or above 105°F;
- Confusion, altered mental state, slurred speech;
- Seizures;
- Large (dilated) pupils; and
- Loss of consciousness – the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to a medical facility. Heat stress is a significant hazard if any type of protective equipment (semi-permeable or impermeable) that prevents evaporative cooling when worn in hot weather environments.

## 7.4 Cold Stress

Cold stress is a danger at low temperatures and when the wind-chill factor is low. Prevention of cold-related illnesses is a function of whole-body protection. Adequate insulating clothing must be used when the air temperature is below 60°F. A work/rest regimen will be initiated when ambient temperatures and protective clothing cause a stressful situation. In addition, reduced work periods followed by rest in a warm area may be necessary in extreme conditions. The signs and symptoms of cold stress include the following:

- Severe shivering;
- Slowing;
- Stumbling or repeated falling;
- Collapse;
- Abnormal behavior;
- Weakness;
- Inability to walk; and/or
- Unconsciousness.

First aid requires removing the victim from the cold environment and seeking medical attention immediately. Also, prevent further body heat loss by covering the victim lightly with blankets. Do not cover the victim's face. If the victim is still conscious, administer hot drinks and encourage activity such as walking, wrapped in a blanket.

# 8.0 SAFETY PROCEDURES

This section of the HASP presents the specific safety procedures to be implemented during Roux's activities at the Site in order to protect the health and safety of various on-site personnel. Minimum OSHA-mandated procedures are presented first, followed by client- and Site-specific procedures. Lastly, activity-specific procedures are discussed. These Site and activity-specific procedures supplement the general safety procedures included in Roux's Corporate Health and Safety Manual, which also must be followed in their entirety.

## 8.1 Training

At a minimum, Site personnel who will perform work in areas where there exists the potential for toxic exposure will be health and safety-trained prior to performing work onsite per OSHA 29 CFR 1910.120l and 29 CFR 1926.65(e). More specifically, all Roux, subcontractor, and other personnel engaged in sampling and remedial activities at the Site and who are exposed or potentially exposed to hazardous substances, health hazards, or safety hazards must have received at a minimum the 40 hour initial HAZWOPER training consistent with the requirements of 29CFR 1910.120(e)(3)(i) training and a minimum of 3 days' actual field experience under the direct supervision of a trained experienced supervisor, plus 8 hours of refresher training on an annual basis. All individuals will have a current 8-hour refresher certification. Depending on tasks performed, less training may be permitted. Evidence of such training must be maintained at the Site at all times. Furthermore, all on-Site management and supervisory personnel directly responsible for or who supervise the employees engaged in Site remedial operations, must have received an additional 8 hours of specialized training at the time of job assignment on topics including, but not limited to, the employer's safety and health program and the associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques, plus 8 hours of refresher training on an annual basis. Additionally, all workers who will be required to don a respirator will be properly trained on their employer's Respiratory Protection Program, which also includes being medically cleared to wear a respirator and passed a fit test, at least initially prior to use, and then annually thereafter in accordance with 29 CFR 1910.134, Respiratory Protection.

Roux personnel training records are maintained in a corporate database with records available upon request from either the OHSM/SHSO/CHSD or Human Resources Department. Certificates will be made available upon request of the NYSDEC and NYSDOH.

## 8.2 Site-Specific Safety Briefings for Visitors

A site-specific briefing is provided to all site visitors who enter this site beyond the site entry point. For visitors, the site-specific briefing provides information about site hazards, the site lay-out including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

## 8.3 HASP Information and Site-Specific Briefings for Workers

Site personnel review this HASP and are provided a Site-specific tailgate briefing prior to the commencement of work to ensure employees are familiar with this HASP and the information and requirements it contains, as well as the relevant JSAs included in **Appendix A**. Additional briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during on-going Site characterization and analysis of changing conditions. Conditions for which we schedule additional briefings

include but are not limited to: changes in site conditions, changes in the work schedule/plan, newly discovered hazards, and incidents occurring during Site work.

## 8.4 Medical Surveillance

The medical surveillance section of the Health and Safety Plan describes how worker health status is monitored at this site. Medical surveillance is used when there is the potential for worker exposure to hazardous substance at levels above OSHA Permissible Exposure Limits (PEL) or other published limits. The purpose of a medical surveillance program is to medically monitor worker health to ensure that personnel are not adversely affected by site hazards. The provisions for medical surveillance at this site are based on the site characterization and job hazard analysis found in Section 4 of this HASP and are consistent with OSHA requirements in 29 CFR 1910.120(f) as applicable.

### 8.4.1 Site Medical Surveillance Program

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and job hazard analysis documented in Section 4 and JSAs within **Appendix A** of this HASP and in compliance with the requirements of 29 CFR 1910.120(f)(2). Based on site information and use of direct reading instruments, limited use of respirators (less than 30 days per year), and the absence of an employee-staffed HAZMAT team, a limited medical surveillance program is required and implemented at this site. The medical surveillance program provides that:

1. Workers assigned to tasks requiring the use of respirators receive medical examinations in accordance with 29 CFR 1910.134(e) to ensure they are physically capable to perform the work and use the equipment, and
2. If a worker is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substance or health hazards, medical examinations are provided to that worker as soon as possible after the occurrence and as required by the attending physician.
3. These medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to workers free of cost, without loss of pay, and at a reasonable time and place. In addition, the need to implement a more comprehensive medical surveillance program will be re-evaluated after any apparent over-exposure.

### 8.4.2 Medical Recordkeeping Procedures

Medical recordkeeping procedures are consistent with the requirements of 29 CFR 1910.1020 and are described in the company's overall safety and health program. A copy of that program is available at our Islandia, New York office.

The following items are maintained in worker medical records:

- Respirator fit test and selection;
- Physician's medical opinion of fitness for duty (pre-placement, periodic, termination);
- Physician's medical opinion of fitness for respirator protection (pre-placement, periodic); and
- Exposure monitoring results.

### 8.4.3 Program Review

The medical program is reviewed to ensure its effectiveness. The Corporate Health and Safety Manager, in coordination with the Human Resources Director, is responsible for this review. At minimum, this review consists of:

- Review of accident and injury records and medical records to determine whether the causes of accidents and illness were promptly investigated and whether corrective measures were taken wherever possible;

- Evaluation of the appropriateness of required medical tests based on site exposures; and
- Review of emergency treatment procedures and emergency contacts list to ensure they were site-specific, effective, and current.

## 8.5 Personnel Protection

Site safety and health hazards are eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards are still present, a combination of engineering controls, work practices and PPE are used to protect employees. Appropriate personal protective equipment (PPE) shall be worn by Site personnel when there is a potential exposure to chemical, biological or physical hazards (e.g., falling objects, flying particles, sharp edges, electricity, and noise), as determined by the SHSO. The level of personal protection, type and kind of equipment selected will depend on the hazardous conditions and in some cases cost, availability, compatibility with other equipment, and performance. An accurate assessment of all these factors will be made before work can be safely executed.

Roux maintains a comprehensive written PPE program that addresses proper PPE selection, use, maintenance, storage, fit and inspection. Roux's PPE program can be found within **Appendix D**. PPE to be used at the Site will meet the appropriate American National Standards Institute (ANSI) standards and the following OSHA (General/Construction Industry) standards for minimum PPE requirements.

The minimum level of PPE for entry onto the Site is Level D. The following equipment shall be worn:

- Work uniform (long pants, sleeved shirt);
- Hard hat;
- Steel or composite toe work boots (must comply with American Society for Testing and Materials [ASTM]) F 2412-05, Standard Test Methods for Foot Protection and ASTM F 2413-05, Standard Specification for Performance Requirements for Foot Protection);
- Safety Glasses (must comply with one of the following ANSI/ISEA Z87.1-2010, ANSI Z87.1-2003, ANSI Z87.1-2003);
- Boot Covers (as needed);
- Hearing protection (as needed);
- High visibility clothing (shirt/vest); and
- Hand protection (e.g., minimum cut resistance meeting ANSI 105-2000 Level 2).

Note that jewelry shall be removed or appropriately secured to prevent it from becoming caught in rotating equipment or unexpectedly snagged on a fixed object (e.g., wrist watches, bracelets, rings, chains and necklaces, open earrings). Do not wear loose clothing and all shoulder-length hair should be tied back.

Site specific PPE ensembles and materials are identified within task specific JSAs located within **Appendix A**, and any upgrades or downgrades of the level of protection (i.e., not specified in the JSA) must be approved by the PP and immediately communicated to all Roux personnel and subcontractors as applicable. PPE is used in accordance with manufacturer's recommendations.

### 8.5.1 Additional Personal Protection

As outlined above the minimum PPE for entry onto the Site is modified Level D. Outlined below are the requirements for Level C and B PPE.

**EPA Level C Protection**

***Personal Protective Equipment:***

- Full-face, air-purifying, cartridge-equipped respirator* (Mine Safety and Health Administration/ National Institute of Occupational Safety and Health [MSHA/ NIOSH] specifically approved for protection from organic vapors or particulates);
- Chemical-resistant clothing (coverall; hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls);
- Cotton coveralls;
- Gloves (outer), chemical-resistant, nitriles;
- Gloves (inner), cut resistant (with minimum blade cut-rating of ANSI 105-2000 Level 2);
- Boots (inner), chemical-resistant, steel (or composite) toe and including task-specific boot requirements as consistent with ASTM F2413-11;
- Boots (outer), chemical-resistant (disposable);
- Hard hat;
- Hearing protection (as needed); and
- Escape mask (as needed).

*Cartridges in use will be changed out based on their End of Service Life Indicator. If organic vapor (OV) cartridges are worn for benzene exposures above 1 ppm, the cartridge shall be removed from service at the end of the calculated service life or before the next shift, whichever is sooner. For other contaminants present a cartridge change out schedule will be provided based off 3M Select & Service Life Software or in consultation with the CHSD; worst case assumptions will be made to provide a conservative estimate on cartridge change out. If multiple contaminants are present at varying degrees, the work must cease operation, as cartridges in use may not cover all contaminants present. Screening will be carried out during work activities as specified in Section 8.6 Air Monitoring Plan. Organic vapors adsorbed on an organic vapor cartridge can migrate through the carbon bed without airflow. Desorption of the contaminant after partial use of the chemical cartridge can occur after a short period (hours) without use (e.g., overnight). This is most significant for the most volatile and poorly retained organic vapors (e.g., boiling point < 65 degrees Celsius [°C]). For organic vapors with a boiling point less than 65 degrees C, it is recommended that the organic vapor cartridge never be used longer than one shift, even if the estimated service life is greater than 8 hours, and the cartridge is used for only a short time during the shift.

**Criteria for Selection-Level C:**

***Meeting any of these criteria warrants use of Level C protection.***

- Airborne hazards are known to be present but are unlikely to exceed protection factors provided by air purifying respirators.
- Continuous total organic vapor readings in the breathing zone register between 50 ppm and to less than 100 ppm on a PID (such as a MiniRAE 3000 or other comparable instrument), and chemical specific (e.g., benzene/vinyl chloride/formaldehyde) readings utilizing colorimetric indicator tubes (e.g., Dräeger or Sensidyne) are undetectable.
- See the Combustible Gases table for decisions based on LEL within Section 8.5. Air Monitoring Plan.
- Measured air concentrations of known organic vapors will be reduced by the respirator to at or below one half of the PEL, and the individual and combined compound concentrations are within the service limit of the respirator cartridge.
- Atmospheric contaminant concentrations do not exceed Immediately Dangerous to Life and Health (IDLH) concentrations.
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.
- Job functions have been determined not to require self-contained breathing apparatus.

Notes:

1. Benzene and or other specific compounds may also be monitored initially and periodically in the breathing zone utilizing activated sampling devices approved for use based on lower occupational exposure limit.
2. Modifications of Level C will be used to increase or decrease the level of skin protection during activities that increase or preclude, respectively, the degree of contact with chemical hazards. Modifications for increased protection may include, but are not limited to, the use of chemical resistant coveralls (e.g., Tyveks) and cut and chemical resistant gloves. Any modifications to Level C will require approval of the SHSO, and PM in consultation with the CHSD.

**EPA Level B Protection (Contact the OHSM and/or CHSD)**

***Personal Protection Equipment:***

- Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved);
- Chemical-resistant clothing (overall and long-sleeved jacket; coveralls; hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls);
- Cotton coveralls;
- Chemical-resistant gloves (outer) nitriles;
- Gloves (inner), cut-resistant (with minimum blade cut rating of ANSI Level 2);
- Boots (inner), chemical-resistant, steel (or composite) toe, and task-specific boot requirements as consistent with ASTM F2413-11;
- Boots (outer), chemical-resistant, (disposable);
- Hard hat;
- Hearing protection (as needed); and
- 2-way radio communications (intrinsically safe).

**Criteria for Selection-Level B:**

- Meeting any one of these criteria warrants use of Level B protection.
- PID instrument (such as a MiniRAE 3000 or other comparable instrument) readings in the breathing zone are greater than 50 ppm and less than 100 ppm and benzene is detectable utilizing colorimetric indicator tubes (e.g., Dräeger or Sensidyne).
- Airborne hazards are known to be present but are not identified or quantified.
- The type(s) and atmospheric concentration(s) of toxic substance(s) have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would-be atmospheres:
    - With IDLH concentrations;
    - Exceeding limits of protection afforded by a full-face, air-purifying respirator; or
    - Containing substances requiring supplied-air PPE, but substances and/or concentrations do not represent a serious skin hazard.
    - The atmosphere contains less than 19.5% oxygen.
- Site operations make it highly unlikely that the small, unprotected area of the head or neck will be contacted by splashes of extremely hazardous substances.
- If work is performed in an enclosed space.

Note that jewelry shall be removed or appropriately secured to prevent it from becoming caught in rotating equipment or unexpectedly snagged on a fixed object. (e.g., wristwatches, bracelets, rings, chains and necklaces, open earrings). Do not wear loose clothing and all shoulder length hair should be tied back.

Site-specific PPE ensembles and materials are identified within task specific JSAs located within **Appendix A**, and any upgrades or downgrades of the level of protection (i.e., not specified in the JSA) must be immediately communicated to all Roux personnel and subcontractors, as applicable. PPE is used in accordance with manufacturer's recommendations.

### 8.5.2 Hearing Conservation

Hearing protection is made available when noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 dBA. Hearing protection is required when the 8-hour time weighted average sound level ≥ 85 dBA, or when noise levels exceed 140 dBA at any point or exceeds 115 dBA for at least 15 minutes. Where noise exposure meets or exceeds this level, noise is listed as a physical hazard in the JSA for the tasks/operation, and hearing protection is included as one of the control measures (PPE).

## 8.6 Monitoring

An air monitoring program is important to the safety of on- and off-Site personnel, and the surrounding area. A preliminary survey, to establish background conditions in the immediate sampling area, may be made prior to the initiation of Site work including, but not limited to, monitoring wind direction (e.g., wind socks) and approximate temperature during all invasive Site activities. This survey will be conducted with the appropriate pre-calibrated air monitoring instrument(s), as warranted by the field activity. Once this survey has been complete, any changes in the type of PPE will be determined and relayed to those working on-Site.

Work zone air monitoring will be performed to verify that the proper level of PPE is used, and to determine if increased protection or work stoppage is required. The following equipment shall be used to monitor conditions:

- A Photoionization Detector (PID) with a lamp energy of 10.6 eV will be used to provide direct readings of organic vapor concentrations during intrusive activities to determine that personnel protection is adequate. Concentrations shall be recorded during intrusive activities with the potential to encounter contaminant vapors.
- Colorimetric detection tubes shall be used based on PID action levels to qualitatively identify possible contaminants as applicable.
- A pre-calibrated multi-gas meter with combustible Lower Explosive Limit (LEL), oxygen (O2), carbon monoxide (CO), and hydrogen sulfide (H2S) sensors shall be used to monitor the potential for oxygen-deficient atmospheres, explosive concentrations of organic vapors, and toxic gases during intrusive operations. The calibration for this device will be performed using a known gas composition calibration mixture.

Personal exposure monitoring utilizing activated charcoal tubes may be considered based on whether or not the area sample results are at or above half of the PEL. The decision to perform the monitoring will be made by, and under the control of, the CHSD.

Below are monitoring action levels for Site-specific chemicals of concern. In the event PID readings above the thresholds identified below are sustained for 5 minutes in the breathing zone, worker protection will require upgrading following notification to the OHSM and applicable parties.

### 8.6.1 Action Levels for Air Monitoring

PPE can remain at Level D if breathing zone VOC concentrations are less than 5 ppm and benzene is non-detect. Personnel are required to evacuate the Site when breathing zone VOC readings exceed 25 ppm.

The following tables include summaries of the air monitoring, work practices, and action levels for the expected contaminants. The action levels to initiate testing with colorimetric tubes for airborne volatiles is 1 ppm (PID reading) and is based on the Permissible Exposure Limit (PEL) for benzene (1 ppm). The colorimetric tubes are used to confirm the presence or absence of specific constituents, and they do not provide a measured concentration.

PPE does not need to be upgraded if breathing zone VOC concentrations are less than 5 ppm. Personnel are required to evacuate the Site when breathing zone VOC readings exceed 25 ppm.

The following tables include summaries of the air monitoring, work practices, and action levels for the expected contaminants.

| Air Monitoring Summary and Action Levels<br>Organic Vapors | |
|---|---|
| **PID Reading in Breathing Zone (ppm)** | **Action** |
| <5 ppm | Continue Monitoring, ventilate space |
| ≥ 5 ppm - ≤ 25 ppm | Ventilate space until PID reads < 5 ppm. If < 5 ppm cannot be achieved, upgrade to Level C[1]. |
| ≥ 25 ppm | Ventilate space and evacuate area.<br>Consult with CHSD. |

Background concentrations should be established at the beginning of each work day. It may be necessary to re-establish background concentrations and ambient conditions vary through the day.

1 Measured air concentrations of known organic vapors will be reduced by the respirator to one half of the PEL or lower, and the individual and combined compound concentrations shall be within the service limit of the respirator cartridge.

| Air Monitoring Summary and Action Levels<br>Oxygen | |
|---|---|
| **$O_2$ Reading in Breathing Zone (%)[1]** | **Action** |
| 20.9% $O_2$ | Oxygen level normal |
| < 19.5% $O_2$ | Oxygen deficient<br>Interrupt task/Evacuate area |
| >23.5% $O_2$ | Oxygen enriched<br>Interrupt task/Evacuate area |

1. Action levels based on USEPA Standard Operating Safety Guides; Table 5-1

| Air Monitoring Summary and Action Levels<br>Carbon Monoxide | |
|---|---|
| **CO Reading in Breathing Zone (ppm)[1]** | **Action** |
| <12.5 ppm | Inspect exhaust system for leaks or other sources of CO. Monitor initially and every 15 minutes during use of CO-generating equipment. |
| 12.5-25 ppm | Ventilate area. Monitor continuously and record measurements. Contact PM. |
| >25 ppm | Cease Field Operations. Ventilate area. |

1. Based upon the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) of 25 ppm as an 8-hour time weighted average (TWA) and OSHA's Permissible Exposure Limit (PEL) of 50 ppm as an 8-hour TWA concentration.

| Air Monitoring Summary and Action Levels<br>Combustible Gases | |
|---|---|
| **Lower Explosive Limit (LEL) Reading** | **Action** |
| < 4% LEL | Site activities will continue with normal monitoring |
| 4% – 20% LEL | Stop work until levels dissipate to <4% LEL |
| > 20% LEL | Potential explosion hazard. Halt all site activities, research source of release, aerate work area, suppress source. |
| **Air Monitoring Summary and Action Levels<br>Hydrogen Sulfide** | |
| **Hydrogen Sulfide ($H_2S$) Reading** | **Action** |
| <10 ppm | Site activities will continue with normal monitoring |
| ≥10 ppm | Stop work until levels dissipate to <10 ppm; use mechanical ventilation if possible. Consult with CHSD if unable to reduce concentrations below 10 ppm. |

### 8.6.2 Air Monitoring Equipment and Calibration

A PID calibrated to an appropriate calibration mixture will be used to detect organic vapors in and around the work areas. Monitoring will be conducted in and around all work areas and at the workers breathing zone before activities commence to establish a background level, then at 15-minute intervals throughout the day. All equipment will be calibrated according to the manufacturer's recommendation. A calibration log will be maintained and will include the name of the person who performed the calibration, the date and time calibrated, and the instrument reading at the time of calibration. A manual bellows pump or equivalent with colorimetric tubes for specific compounds will be utilized to determine the course of action related to upgrading or downgrading the level of respiratory protection, as applicable.

If air monitoring data indicate safe levels of potentially harmful constituents at consistent intervals (5-minute intervals), then monitoring can be conducted less frequently (every 30 minutes). This determination will be made by the onsite SHSO. Monitoring data, including background readings and calibration records, will be documented. Work to be performed on-Site will conform to Roux's Standard Operating Procedures (SOPs). Conformance with these guidelines as well as the guidelines described in this HASP will aid in mitigating the physical and chemical hazards mentioned throughout this HASP.

## 8.7 Tailgate Safety Meetings

The Site Safety Officer will provide daily safety briefings (e.g., tailgate meetings) including, but not limited to, the following scenarios:

- When new operations are to be conducted;
- Whenever changes in work practices must be implemented; and
- When new conditions are identified and/or information becomes available.

Daily safety briefings shall be recorded on the Roux Daily Tailgate Health and Safety Meeting Log/Daily Site Safety Checklist, and all completed forms will become a part of the project file. A blank copy of the Roux Daily Tailgate Health and Safety Meeting Log/Daily Site Safety Checklist is included as Appendix G.

## 8.8 Spill Containment

Spill containment equipment and procedures should, at a minimum, meet the requirements of the facility's Spill Prevention, Control and Countermeasure Plan, if applicable. Otherwise, spill containment equipment and procedures must be considered depending on the task, including, but not limited to, chemical/product transfer points and handling.

### 8.8.1 Initial Spill Notification and Response

Any worker who discovers a hazardous substance spill will immediately notify the SHSO. The worker will, to his/her best ability, report the hazardous substance involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, and any associated injuries without compromising their own safety.

### 8.8.2 Spill Evaluation and Response

The SHSO is responsible for evaluating spills and determining the appropriate response. When this evaluation is being made, the spill area will be isolated and demarcated to the extent possible. If necessary to protect nearby community members, notification of the appropriate authorities is made by the PM as appropriate. On-Site response is limited to small spills (e.g., <10 gallons); large spills require external emergency responders who will be contacted by the SHSO.

## 8.9 Decontamination

The decontamination section of the HASP describes how personnel and equipment are decontaminated when they leave the Exclusion Zone. This section also describes how residual waste from decontamination processes is disposed. The site decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may accumulate on personnel or equipment. These procedures minimize worker contact with contaminants and protect against the transfer of contaminants to clean areas of the site and off-site. They also extend the useful life of PPE by reducing the amount of time that contaminants contact and can permeate PPE surfaces. Decontamination is facilitated within the CRZ at this site, if applicable.

### 8.9.1 Decontamination Procedures for Personnel and PPE

The following are general decontamination procedures established and implemented at this site.

1. Decontamination is required for all workers exiting a contaminated area. Personnel may re-enter the SZ only after undergoing the decontamination procedures described below in the next section.
2. Protective clothing is decontaminated, cleaned, laundered, maintained and/or replaced as needed to ensure its effectiveness.
3. PPE used at this site that requires maintenance or parts replacement is decontaminated prior to repairs, or
4. PPE used at this site is decontaminated or prepared for disposal on the premises. Personnel who handle contaminated equipment have been trained in the proper means to do so to avoid hazardous exposure.
5. This site uses an off-site laundry for decontamination of PPE. The site has informed that facility of the hazards associated with contaminated PPE from this site.

6. The site requires and trains workers that if their permeable clothing is splashed or becomes wetted with a hazardous substance, they will immediately exit the work zone, perform applicable decontamination procedures, shower, and change into uncontaminated clothing.
7. Procedures for disposal of decontamination waste at a permitted facility and meets applicable local, State, and Federal regulations.

### 8.9.2 Decontamination Procedures for Equipment

All tools, equipment, and machinery from the EZ or CRZ are decontaminated in the CRZ prior to removal to the SZ. Equipment decontamination procedures are designed to minimize the potential for hazardous skin or inhalation exposure and to avoid cross-contamination and chemical incompatibilities.

General Equipment Decontamination Procedures:

1. Decontamination is required for all equipment exiting a contaminated area. Equipment may re-enter the SZ only after undergoing the equipment decontamination procedures.
2. Vehicles that travel regularly between the contaminated and clean areas of the site are carefully decontaminated each time they exit the EZ, and the effectiveness of that decontamination is monitored to reduce the likelihood that contamination will be spread to other parts of the site.
3. Particular attention is given to decontaminating tires, scoops, and other parts of heavy equipment that are directly exposed to contaminants and contaminated soil.
4. Procedures for disposal of decontamination waste at a permitted facility and shall meet applicable local, State, and Federal regulations.

The following items may be used to decontaminate equipment:

- Fresh water rinse;
- Acetone rinse;
- Non-phosphorus detergent wash
- Distilled water rinse; and
- A steam cleaner or pressure washer (heavy equipment only).

### 8.9.3 Monitoring the Effectiveness of Decontamination Procedures

Visual examination and sampling are used to evaluate the effectiveness of decontamination procedures. Visual examination is used to ensure that procedures are implemented as described and that they appear to control the spread of contaminants under changing site conditions. Visual examination is also used to inspect for signs of residual contamination or for contaminant permeation of PPE.

Personnel who work in contaminated areas of the site, either the Contamination Reduction Zone (CRZ) or the Exclusion Zone, are trained in the principles and practices of decontamination described in this section of the HASP and in related SOPs. If site procedures are changed as a result of inspection and monitoring, all affected employees are notified of these changes.

## 8.10 Confined Space Entry

The projected scope of work does expect the need for Confined Space Entry.

The following is a list of the safety requirements for confined space entry at the Site:

- **ROUX PERSONNEL ARE NOT AUTHORIZED TO ENTER AN OSHA PERMIT REQUIRED CONFINED SPACE;**
- Currently the scope of work **DOES NOT** require personnel to enter permitted confined space for this project; and

- Any changes to the field activities that may necessitate confined space entry will be reported to the Project Principal and OHSM.

Confined space is defined as any space, depression, or enclosure that:

- Has limited opening for entry and egress;
- Is large enough for an employee to enter and perform assigned work; and
- Is not intended for continuous occupancy.

A permit required confined space is one that meets the definition of a confined space and has one or more of the following characteristics:

- May contain or produce life-threatening atmospheres due to oxygen deficiency the presence of toxic, flammable, or corrosive contaminants;
- Contains a material that has the potential for engulfment;
- Has an internal configuration that may cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section; and
- Contains any other serious safety or health hazards.

Although Roux personnel will not perform confined space entry, it is expected that subcontractors performing cleaning and mitigation and/or remedial measures activities may be required to enter structures that are considered to be a permit required confined space. Permitting of the confined space as well as hazard mitigation for entry will be completed by the subcontractor in accordance with 29 CFR 1910.146 or 1926.1201-1213 and/or applicable local/client requirements.

## 8.11 Client and Site-Specific

In addition to the OSHA-specific procedures discussed above, there may be client and site-specific safety procedures that must be adhered to during the performance of remedial activities at the Site.

## 8.12 Unusual or Significant Risks

Field activities that appear to have unusual or significant risks that cannot be adequately managed with existing risk tools such as LPS, HASPs, traffic safety plans, work permits, design and O&M practices, equipment HAZOPS or other safety tools must be referred to the CHSD to help with the assessment and management of the associated potential safety risks. Examples include the use of explosives for demolition, use of firearms to control wildlife, rappelling, demolition over water, diving, etc.

## 8.13 Activity-Specific Hazards

In addition to the general hazards discussed above, there are activity-specific hazards associated with each work activity planned for the Site. An activity-specific JSA has been completed for each of the activities planned for the Site. JSAs are provided in **Appendix A**. In the event that new work activities or tasks are planned, JSAs will be developed and implemented prior to performing the new activities. In the absence of a JSA, the personnel performing work must prepare a field JSA and receive clearance from a designated competent safety official prior to performing any task with significant risk. In emergency situations where time is critical SPSAs will be utilized to identify the task, associated hazards and mitigative actions to take. For lower risk activities (as deemed by the discretion of a Competent Person) where a JSA is determined to not be needed, the individual(s) conducting the activities must perform SPSAs prior to and during the work.

### 8.13.1 Electrical and Other Utility Assessment and Accommodations

Roux shall perform a site walk to identify any potential overhead electrical or utility lines. All applicable guidelines will be followed in the vicinity of overhead power and utility lines (see Section 8.13.3 below).

Roux has also reviewed all available Site maps showing buried utility lines to identify potential hazards, which revealed that no underground hazards are known to exist in the vicinity of the areas of the Site pertinent to this HASP.

### 8.13.2 Subsurface Work

Subsurface work activities will require adherence to Roux's Corporate Subsurface Utility Clearance Management program found within **Appendix E**.

#### 8.13.2.1 Excavations and Trenching

Trenching and excavation work activities carried out by Roux and their subcontractors shall comply with applicable OSHA standards (i.e., 29 CFR 1926.650-652). Regional Notification Centers (i.e., Underground Services Alert) shall be notified at least two working days prior to the start of any digging or excavation work per state requirements (i.e., 811-One Call). Personnel responsible for excavation activities will be trained in their job responsibilities. Additionally, for trenches 4 feet or deeper, where employees will enter, the trench needs to have a stairway, ladder or other safe means of egress, and located so that employees don't have to travel farther than 25 feet horizontally. Where employees will enter trenches greater than 5 feet deep, the trench must have some type of protective system or sloped sidewalls appropriately to prevent cave-ins.

The SHSO or other responsible Roux personnel will be present on-Site during all Roux contracted excavation and backfill operations and will supplement health and safety monitoring conducted by Subcontractor air quality screening to ensure that appropriate levels of protection and safety procedures are utilized. The proximity of chemical, water, sewer, and electrical lines will be identified by Roux and/or their subcontractor before any subsurface activity or sampling is attempted. Prior to any excavation activities, trees, shrubbery, and other objects that can potentially pose as a hazard during excavation should be supported or removed from the excavation area. The following safe work practices will be implemented during this task.

- The proximity of chemical, water, sewer, and electrical lines will be identified by a facility representative prior to beginning any subsurface activity;
- At the start of every day, a competent person will inspect excavations to evaluate if the area is stable and safe to enter. Inspections will be conducted as needed throughout the excavation operations. If deemed necessary, a competent person may also conduct inspections after rainfall or any other event that can potentially affect the integrity of the excavation. Employees will not enter excavations where water has accumulated until protective measures have been implemented;
- Prior to entering excavations greater than 4 feet in depth, air monitoring for oxygen and hazardous atmospheres must be conducted to assure atmospheric conditions are within normal levels described in Section 8.6. Continuous air monitoring with a standard multi-gas detector ($O^2$, LEL%, CO, $H^2S$) shall be used during the course of work within an excavation; if action limits are reached workers shall safely exit the excavation. Upgrades to worker protection should be evaluated with the SHSO and PP in consultation with the CHSD. Emergency rescue equipment, such as breathing apparatuses and safety harnesses connected to an extraction device, will be readily available in the event of hazardous atmospheric conditions;
- While earthmoving, stay out of the excavator's delineated heavy equipment exclusion zone and away from the excavation sides where there is potential for cave in (within excavations that are 6 feet or more in depth, a delineated perimeter 6 feet away from the excavated edge is required);

- During loading and unloading operations, stand away from haul trucks and other vehicles to avoid contact with any falling loads; and
- Traffic cones, caution tape, or other barriers will be set up around the perimeter of the excavation when employees are working along the excavation edge and for any excavation that will be left open overnight or unattended for more than two days.

**Maximum Allowable Slopes**

| Soil or Rock Type | Maximum Allowable Slopes (H:V)[1] for Excavations Less Than 20 Feet Deep[3] |
|---|---|
| Stable Rock | Vertical (90°) |
| Type A[2] | 3/4 : 1 (53°) |
| Type B | 1 : 1 (45°) |
| Type C | 1 1/2 : 1 (34°) |

29 CFR 1926 Subpart P Appendix B Sloping and Benching Table B-1

Notes:

[1] Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

[2] A short-term maximum allowable slope of 1/2H : 1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 meters) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 meters) in depth shall be 3/4H : 1V (53°).

[3] Sloping or benching for excavations greater than 20 feet deep shall be designed and stamped by a registered professional engineer.

Proper stockpiling (i.e., 2 feet minimum distance from the excavation edge), containment, transport, storage, and disposal practices will be utilized and is dependent upon the potential type and amount of waste generated during operations. The location of safety equipment and evacuation procedures will be established prior to initiation of operations according to this HASP.

### 8.13.3 Heavy Equipment

Use of heavy equipment at the Site will require adherence to Roux's Corporate Heavy Equipment Exclusion Zone Management Program found within **Appendix F**. Additionally, operation of the drill rig/other heavy equipment will maintain clearances from overhead power lines in accordance with 29 CFR 1926.1408 Table A Minimum Clearance Distances provided below.

**Minimum Required Clearances for Energized Overhead Power Lines**

| Nominal System Voltage of Power Line (K V) | Minimum Required Clearance (feet) |
|---|---|
| 0-50 | 10 |
| 51-100 | 12 |
| 101-200 | 15 |
| 201-300 | 20 |
| 301-500 | 25 |
| 501-750 | 35 |
| 751-1000 | 45 |

1 kilovolt (KV) = 1,000 volts

## 8.14 Traffic Control

If Site operations encroach upon public streets or highways and a hazard exists to Site personnel because of traffic conditions, a traffic control plan will be implemented in accordance with the United States Department of Transportation's (DOT's) "Manual on Uniform Traffic Control Devices."

## 8.15 Sanitation

Sanitation facilities will be provided in accordance with the sanitation standards (29 CFR 1910.141, 29 CFR 1926.51 and 29 CFR 1928.110). Sanitation facilities will be maintained and kept in good conditions at all times.

# 9.0 FIELD TEAM REVIEW

Each person performing work at or visiting this site shall sign this section after site-specific training is completed and before being permitted to access the CRZ or Exclusion Zone.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with the provision contained therein.

**Site/Project: Portion of the F**ormer Vacuum Oil Refinery, **Rochester, New York**

| Name & Company | Signature | Date |
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# 10.0 APPROVALS

By their signature, the undersigned certify that this HASP is approved and will be utilized at the former Vacuum Oil Refinery Site.

Nick Suraci

Nicholas Suraci – Site Health and Safety Officer — 11/13/2025 Date

Paul W Werthmann

Paul Werthmann - Office Health and Safety Manager — 11/13/2025 Date

Eric Runstrom– Project Manager — 11/13/2025 Date

Ian Reed – Project Principal — 11/13/2025 Date

# TABLES

1. Toxicological Properties of Hazardous Substances Present at the Site

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| **ORGANOCHLORINE PESTICIDES (OCP)** | | | | | | | | | |
| DDT | 50-29-3 | TWA 1 mg/m3 | TWA 0.5 mg/m3 | TWA 1 mg/m3 | 500 mg/m3 | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen] | Eyes, skin, central nervous system, kidneys, liver, peripheral nervous system | White, odorless and tasteless, very stable, water-insoluble, synthetic<br>BP: 260°F<br>Fl.Pt. = 162-171°F<br>LEL: NA<br>UEL: NA |
| Aldrin | 309-00-2 | TWA 0.1 mg/m3 | TWA 0.25 mg/m3 | TWA 0.25 mg/m3 | 25 mg/m3 | Inhalation, ingestion, skin and/or eye contact | headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort); myoclonic jerks of limbs; clonic, tonic convulsions; coma; hematuria (blood in the urine), azotemia; [potential occupational carcinogen] | Developmemntal, Endocrine, Liver, Immune System, Nervous System, | Colorless to dark-brown crystalline solid with a mild chemical odor.<br>BP: 293°F<br>Fl.Pt. = 150°F<br>LEL: NA<br>UEL: NA |
| Lindane (gamma-BHC) | 58-89-9 | TWA 0.5 mg/m3 | TWA 0.5 mg/m3 | TWA 0.5 mg/m3 | 50 mg/m3 | Inhalation, ingestion, skin and/or eye contact | irritation eyes, skin, nose, throat; headache; nausea; clonic convulsions; resp difficulty; cyanosis; aplastic anemia; muscle spasm; In Animals: liver, kidney damage | Eyes, skin, respiratory system, central nervous system, blood, liver, kidneys | White to yellow, crystalline powder with a slight, musty odor.<br>BP: 614°F<br>Fl.Pt. = 150°F<br>LEL: NA<br>UEL: NA |
| Dieldrin | 860-57-1 | TWA 0.1 mg/m3 | TWA 0.25 mg/m3 | TWA 0.25 mg/m3 | 25 mg/m3 | Inhalation, ingestion, skin and/or eye contact | headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; ; In Animals: liver, kidney damage [potential occupational carcinogen] | Developmemntal, Endocrine, Liver, Immune System, Nervous System, | Colorless to light-tan crystals with a mild, chemical odor.<br>BP: NA (Decomposes)<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| **VOLATILE ORGANIC COMPOUNDS (VOCs)** | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | TWA 350 ppm<br>STEL 450 ppm | C 350 ppm (1900 mg/m$^3$) [15-minute] | TWA 350 ppm (1900 mg/m$^3$) | 700 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage | Eyes, skin, central nervous system, cardiovascular system, liver | Colorless liquid with a mild, chloroform-like odor.<br>BP: 165°F<br>Fl.Pt. = NA<br>LEL: 7.5%<br>UEL: 12.5%<br>Combustible Liquid, but burns with difficulty |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | TWA 1 ppm [skin] | Ca TWA 1 ppm (7 mg/m^3) [skin] | TWA 5 ppm (35 mg/m^3) [skin] | Ca [100 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Nausea, vomiting, abdominal pain; tremor fingers; jaundice, hepatitis, liver tenderness; dermatitis; leukocytosis (increased blood leukocytes); kidney damage; [potential occupational carcinogen] | Skin, liver, kidneys, central nervous system, gastrointestinal tract | Colorless to pale-yellow liquid with a pungent, chloroform-like odor<br>BP: 296°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | TWA 1000 ppm<br>STEL 1250 ppm | TWA 1000 ppm (7600 mg/m3)<br>ST 1250 ppm (9500 mg/m3) | TWA 1000 ppm (7600 mg/m3) | 2000 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation skin, throat, drowsiness, dermatitis; central nervous system depression; In Animals: cardiac arrhythmias, narcosis | Skin, heart, central nervous system, cardiovascular system | Colorless to water-white liquid with an odor like carbon tetrachloride at high concentrations. [Note: A gas above 118°F.]<br>BP: 118°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| 1,1,2-Trichloroethane | 79-00-5 | TWA 10 ppm [skin] | Ca TWA 10 ppm (45 mg/m3) [skin] | TWA 10 ppm (45 mg/m3) [skin] | Ca [100 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen] | Eyes, respiratory system, central nervous system, liver, kidneys | Colorless liquid with a sweet, chloroform-like odor<br>BP: 237°F<br>Fl.Pt. = NA<br>LEL: 6%<br>UEL: 15.5%<br>Combustible Liquid, forms dense soot |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 75-34-3 | TWA 100 ppm | TWA 100 ppm (400 mg/m^3) | TWA 100 ppm (400 mg/m^3) | 3,000 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation skin; central nervous system depression; liver, kidney, lung damage | Skin, liver, kidneys, lungs, central nervous system | Colorless, oily liquid with a chloroform-like odor.<br>BP: 135°F<br>Fl.Pt. = 2°F<br>LEL: 5.4%<br>UEL: 11.4%<br>Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F. |
| 1,1-Dichloroethene | 75-35-4 | TWA 5 ppm | Ca | None | Ca | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen] | Eyes, skin, respiratory system, central nervous system, liver, kidneys | Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor<br>BP: 89°F<br>Fl.Pt. = -2°F<br>LEL: 6.5%<br>UEL: 15.5%<br>Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F |
| 1,2,3-Trichlorobenzene | 87-61-6 | Cameo Chemicals Source https://cameochemicals.noaa.gov/chemical/10051 | NA | NA | NA | Inhalation, skin absorption, ingestion, skin and/or eye contact | Inhalation may cause irritation of respiratory tract. Irritating to the eyes. May redden skin on contact. Ingestion may cause liver damage. | Skin, eyes, respiratory tract, liver | A white solid with a sharp chlorobenzene odor. Insoluble in water and denser than water. Hence sinks in water<br>Fl.Pt. = 234.9°F |
| 1,2,4-Trichlorobenzene | 120-82-1 | C 5 ppm | C 5 ppm (40 mg/m3) | None | N.D. | inhalation, skin absorption, ingestion, skin and/or eye contact | irritation eyes, skin, mucous membrane; In Animals: liver, kidney damage; possible teratogenic effects | Eyes, skin, respiratory system, liver, reproductive system | Colorless liquid or crystalline solid (below 63°F) with an aromatic odor<br>BP: 416°F<br>Fl.Pt. = 222°F<br>LEL (302°F): 2.5%<br>UEL (302°F): 6.6%<br>Class IIIB Combustible Liquid: Fl.P. at or above 200°F.<br>Combustible Solid |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | NA | Ca | TWA 0.001 ppm | Ca | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat; drowsiness; nausea, vomiting; pulmonary edema; liver, kidney injury; sterility; [potential occupational carcinogen] | Eyes, skin, respiratory system, central nervous system, liver, kidneys, spleen, reproductive system, digestive system | Dense yellow or amber liquid with a pungent odor at high concentrations. [pesticide] [Note: A solid below 43°F.]<br>BP: 384°F<br>Fl.Pt. = (oc) 170°F<br>LEL: NA<br>UEL: NA<br>Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F. |
| 1,2-Dibromoethane | 106-93-4 | None listed<br>Skin | Ca TWA 0.045 ppm<br>C 0.13 ppm<br>[15-minute] | TWA 20 ppm<br>C 30 ppm<br>50 ppm<br>[5-minute maximum peak] | Ca [100 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, respiratory system; dermatitis with vesiculation; liver, heart, spleen, kidney damage; reproductive effects; [potential occupational carcinogen] | Eyes, skin, respiratory system, liver, kidneys, reproductive system | Colorless liquid or solid (below 50°F) with a sweet odor. [fumigant]<br>BP: 268°F<br>Fl.Pt. = 50°F<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid |
| 1,2-Dichlorobenzene | 95-50-1 | TWA 25 ppm<br>STEL 50 ppm | C 50 ppm (300 mg/m3) | C 50 ppm (300 mg/m3) | 200 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, nose; liver, kidney damage; skin blisters | Eyes, skin, respiratory system, liver, kidneys | Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide]<br>BP: 357°F<br>Fl.Pt. = 1°F<br>LEL: 2.2%<br>UEL: 9.2%<br>Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F. |
| 1,2-Dichloroethane | 107-06-2 | TWA 10 ppm | Ca TWA 1 ppm (4 mg/m3)<br>ST 2 ppm (8 mg/m3) | TWA 50 ppm<br>C 100 ppm<br>200 ppm [5-minute maximum peak in any 3 hours] | Ca [50 ppm] | Inhalation, ingestion, skin absorption, skin and/or eye contact | Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen] | Eyes, skin, kidneys, liver, central nervous system, cardiovascular system | Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.]<br>BP: 182°F<br>Fl.Pt. = 56°F<br>LEL: 6.2%<br>UEL: 16%<br>Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F. |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloropropane | 78-87-5 | TWA 10 ppm<br>Dermal Sensitizer (DSEN) | Ca | TWA 75 ppm (350 mg/m3) | Ca [400 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; In Animals: central nervous system depression; [potential occupational carcinogen] | Eyes, skin, respiratory system, liver, kidneys, central nervous system | Colorless liquid with a chloroform-like odor. [pesticide]<br>BP: 206°F<br>Fl.Pt. = 60°F<br>LEL: 3.4%<br>UEL: 14.5%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F. |
| 1,3-Dichlorobenzene | 541-73-1 | https://cameochemicals.noaa.gov/chemical/8514 | | | | Inhalation, skin absorption, ingestion, skin and/or eye contact | INHALATION: Causes headache, drousiness, unsteadiness. Irritating to mucous membranes. EYES: Severe irritation. SKIN: Severe irritation. INGESTION: Irritation of gastric mucosa, nausea, vomiting, diarrhea, abdominal cramps and cyanosis. | | Colorless liquid. Sinks in water.<br>BP: 343°F<br>Fl.Pt. = 146°F<br>LEL: 2.02%<br>UEL: 9.2% |
| 1,4-Dichlorobenzene | 106-46-7 | TWA 10 ppm | Ca | TWA 75 ppm (450 mg/m3) | Ca [150 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; In Animals: liver, kidney injury; [potential occupational carcinogen] | Liver, respiratory system, eyes, kidneys, skin | Colorless or white crystalline solid with a mothball-like odor. [insecticide]<br>BP: 345°F<br>Fl.Pt. = 150°F<br>LEL: 2.5%<br>UEL: NA<br>Combustible Solid, but may take some effort to ignite. |
| 1,4-Dioxane | 123-91-1 | TWA 20 ppm [skin] | Ca C 1 ppm (3.6 mg/m3) [30-minute] | TWA 100 ppm (360 mg/m3) [skin] | Ca [500 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | irritation eyes, skin, nose, throat; drowsiness, headache; nausea, vomiting; liver damage; kidney failure; [potential occupational carcinogen] | Eyes, skin, respiratory system, liver, kidneys | Colorless liquid or solid (below 53°F) with a mild, ether-like odor.<br>BP: 214°F<br>Fl.Pt. = 55°F<br>LEL: 2.0%<br>UEL: 22%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F |
| 2-Butanone | 78-93-3 | TWA 200 ppm<br>STEL 300 ppm | TWA 200 ppm (590 mg/m3)<br>ST 300 ppm (885 mg/m3) | TWA 200 ppm (590 mg/m3) | 3000 ppm | inhalation, ingestion, skin and/or eye contact | irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis | Eyes, skin, respiratory system, central nervous system | Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor<br>BP: 175°F<br>Fl.Pt. = 16°F<br>LEL (200°F): 1.4%<br>UEL (200°F): 11.4%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F |
| 2-Hexanone | 591-78-6 | TWA 5 ppm<br>STEL 10 ppm<br>[skin] | TWA 1 ppm (4 mg/m3) | TWA 100 ppm (410 mg/m3) | 1600 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, nose; peripheral neuropathy: lassitude (weakness, exhaustion), paresthesia; dermatitis; headache, drowsiness | Eyes, skin, respiratory system, central nervous system, peripheral nervous system | Colorless liquid with an acetone-like odor<br>BP: 262°F<br>Fl.Pt. = 77°F<br>LEL: NA<br>UEL: 8.0%<br>Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F |
| 4-Methyl-2-pentanone | 108-10-1 | TWA 20 ppm<br>STEL 75 ppm | TWA 50 ppm (205 mg/m3)<br>ST 75 ppm (300 mg/m3) | TWA 100 ppm (410 mg/m3) | 500 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; In Animals: liver, kidney damage | Eyes, skin, respiratory system, central nervous system, liver, kidneys | Colorless liquid with a pleasant odor<br>BP: 242°F<br>Fl.Pt. = 64°F<br>LEL (200°F): 1.2%<br>UEL (200°F): 8.0%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F |
| Acetone | 67-64-1 | TWA 250 ppm<br>STEL 500 ppm | TWA 250 ppm (590 mg/m^3) | TWA 1000 ppm (2400 mg/m^3) | 2500 ppm [10% LEL] | Inhalation, ingestion, skin and/or eye contact | irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis | Eyes, skin, respiratory system, central nervous system | Colorless liquid with a fragrant, mint-like odor<br>BP: 133°F<br>Fl.Pt. = 0°F<br>LEL: 12.8%<br>UEL: 2.5%<br>Class IB Flammable liquid: Fl.P. below 73°F and BP at or above 100°F. |
| Benzene | 71-43-2 | TWA 0.5 ppm<br>STEL 2.5 ppm | Ca TWA 0.1 ppm<br>ST 1 ppm | TWA 1 ppm<br>ST 5 ppm | Ca [500 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen] | Eyes, skin, respiratory system, blood, central nervous system, bone marrow | Colorless to light yellow liquid with an aromatic odor [Note: Solid below 42 °F]<br>BP: 176°F<br>Fl.Pt. = 12°F<br>LEL: 1.2%<br>UEL: 7.8%<br>Class IB Flammable liquid. Fl.P. below 73°F and BP at or above 100°F. |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Bromochloromethane | 74-97-5 | TWA 200 ppm | TWA 200 ppm (1050 mg/m3) | TWA 200 ppm (1050 mg/m3) | 2000 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, throat; confusion, dizziness, central nervous system depression; pulmonary edema | Eyes, skin, respiratory system, liver, kidneys, central nervous system | Colorless to pale-yellow liquid with a chloroform-like odor. [Note: May be used as a fire extinguishing agent.]<br>BP: 155°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid |
| Bromodichloromethane | 75-27-4 | https://cameochemicals.noaa.gov/chemical/16064 | | | | Inhalation, ingestion, skin and/or eye contact | Symptoms of exposure to this compound may include irritation of the skin, eyes, mucous membranes and respiratory tract. It may also cause narcosis. Other symptoms may include nausea, dizziness and headache. | Liver and kidney damage. Central nervous system effects may also occur. | Clear colorless liquid<br>BP: 189°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Bromoform | 75-25-2 | TWA 0.5 ppm | TWA 0.5 ppm (5 mg/m3) [skin] | TWA 0.5 ppm (5 mg/m3) [skin] | 850 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, respiratory system; central nervous system depression; liver, kidney damage | Eyes, skin, respiratory system, central nervous system, liver, kidneys | Colorless to yellow liquid with a chloroform-like odor. [Note: A solid below 47°F.]<br>BP: 301°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid |
| Bromomethane | 74-83-9 | TWA 1 ppm [skin] | Ca | C 20 ppm (80 mg/m3) [skin] | Ca [250 ppm] | Inhalation, skin absorption (liquid), skin and/or eye contact (liquid) | Irritation eyes, skin, respiratory system; muscle weak, incoordination, visual disturbance, dizziness; nausea, vomiting, headache; malaise (vague feeling of discomfort); hand tremor; convulsions; dyspnea (breathing difficulty); skin vesiculation; liquid: frostbite; [potential occupational carcinogen] | Eyes, skin, respiratory system, central nervous system | Colorless gas with a chloroform-like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.]<br>BP: 38°F<br>Fl.Pt. = NA (Gas)<br>LEL: 10%<br>UEL: 16.0%<br>Flammable Gas, but only in presence of a high energy ignition source. |
| Carbon disulfide | 75-15-0 | TWA 1 ppm [skin] | TWA 1 ppm (3 mg/m3)<br>ST 10 ppm (30 mg/m3) [skin] | TWA 20 ppm<br>C 30 ppm<br>100 ppm<br>(30-minute maximum peak) | 500 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects | Central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system | Colorless to faint-yellow liquid with a sweet ether-like odor. [Note: Reagent grades are foul smelling.]<br>BP: 116°F<br>Fl.Pt. = -22°F<br>LEL: 1.3%<br>UEL: 50.0%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F. |
| Carbon tetrachloride | 56-23-5 | TWA 5 ppm<br>STEL 10 ppm<br>[skin] | Ca ST 2 ppm (12.6 mg/m3)<br>[60-minute] | TWA 10 ppm<br>C 25 ppm<br>200 ppm (5-minute maximum peak in any 4 hours) | Ca [200 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen] | Central nervous system, eyes, lungs, liver, kidneys, skin | Colorless liquid with a characteristic ether-like odor<br>BP: 170°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid |
| Chlorobenzene | 108-90-7 | TWA 10 ppm | NA | TWA 75 ppm (350 mg/m3) | 1000 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; In Animals: liver, lung, kidney injury | Eyes, skin, respiratory system, central nervous system, liver | Colorless liquid with an almond-like odor<br>BP: 270°F<br>Fl.Pt. = 82°F<br>LEL: 1.3%<br>UEL: 9.6%<br>Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F. |
| Chloroethane | 75-00-3 | TWA 100 ppm [skin] | Handle with caution in the workplace | TWA 1000 ppm (2600 mg/m3) | 3800 ppm [10%LEL] | Inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact | Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage | Liver, kidneys, respiratory system, cardiovascular system, central nervous system | Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. [Note: Shipped as a liquefied compressed gas.]<br>BP: 54°F<br>Fl.Pt. = NA (gas), -58°F (liquid)<br>LEL: 3.8%<br>UEL: 15.4%<br>Flammable Gas |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Chloroform | 67-66-3 | TWA 10 ppm | Ca ST 2 ppm (9.78 mg/m3) [60-minute] | C 50 ppm (240 mg/m3) | Ca [500 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen] | Liver, kidneys, heart, eyes, skin, central nervous system | Colorless liquid with a pleasant odor<br>BP: 143°F<br>Fl.Pt. = -82°F<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid |
| Chloromethane | 74-87-3 | TWA 50 ppm<br>STEL 100 ppm | Ca | TWA 100 ppm<br>C 200 ppm<br>300 ppm (5-minute maximum peak in any 3 hours) | Ca [2000 ppm] | Inhalation, skin and/or eye contact (liquid) | Dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; liquid: frostbite; reproductive, teratogenic effects; [potential occupational carcinogen] | Central nervous system, liver, kidneys, reproductive system | Colorless gas with a faint, sweet odor which is not noticeable at dangerous concentrations. [Note: Shipped as a liquefied compressed gas.]<br>BP: -12°F<br>Fl.Pt. = NA (Gas)<br>LEL: 8.1%<br>UEL: 17.4%<br>Flammable Gas |
| cis-1,2-Dichloroethene | 156-59-2 | TWA 200 ppm (All isomers) | TWA 200 ppm (790 mg/m3) | TWA 200 ppm (790 mg/m3) | 1000 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, respiratory system; central nervous system depression | Eyes, respiratory system, central nervous system | Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.<br>BP: 118-140°F<br>Fl.Pt. = 36-39°F<br>LEL: 5.6%<br>UEL: 12.8%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F |
| cis-1,3-Dichloropropene | 10061-01-5 | https://cameochemicals.noaa.gov/chemical/20168 | | | | Inhalation, ingestion, skin and/or eye contact | Symptoms of exposure to this compound may include local irritation of the eyes skin and respiratory tract; dermatitis, gasping, coughing, substernal pain, extreme respiratory distress, lacrimation, central nervous system depression, skin irritation, acute gastrointestinal distress with pulmonary congestion and edema. It also may cause injury to the liver, kidneys and heart. | Skin, eyes, mucous membranes, liver, kidney, heart | Colorless to amber liquid with a sweetish odor.<br>BP: 219.7°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Cyclohexane | 110-82-7 | TWA 100 ppm | TWA 300 ppm (1050 mg/m3) | TWA 300 ppm (1050 mg/m3) | 1300 ppm [10%LEL] | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma | Eyes, skin, respiratory system, central nervous system | Colorless liquid with a sweet, chloroform-like odor. [Note: A solid below 44°F.]<br>BP: 177°F<br>Fl.Pt. = 0°F<br>LEL: 1.3%<br>UEL: 8.0%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F. |
| Dibromochloromethane | 124-48-1 | https://cameochemicals.noaa.gov/chemical/16183 | | | | Inhalation, ingestion, skin and/or eye contact | Symptoms of exposure to this compound may include irritation of the skin, eyes, mucous membranes and upper respiratory tract. It may also cause fatigue. Other symptoms may include central nervous system effects, lung and cornea irritation and liver and kidney damage. Prolonged exposure can cause nausea, dizziness, headache and narcosis. | Skin, eyes, mucous membranes, upper respiratory tract | Clear colorless to yellow-orange liquid<br>BP: 246-248°F<br>Fl.Pt. = Greater than 200°F<br>LEL: NA<br>UEL: NA |
| Dichlorodifluoromethane | 75-71-8 | TWA 1000 ppm | TWA 1000 ppm (4950 mg/m3) | TWA 1000 ppm (4950 mg/m3) | 15,000 ppm | Inhalation, skin and/or eye contact (liquid) | Dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite | Cardiovascular system, peripheral nervous system | Colorless gas with an ether-like odor at extremely high concentrations. [Note: Shipped as a liquefied compressed gas.]<br>BP: -22°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Nonflammable Gas |
| Ethyl benzene | 100-41-4 | TWA 20 ppm | TWA 100 ppm (435 mg/m$^3$)<br>ST 125 ppm (545 mg/m^3) | TWA 100 ppm (435 mg/m$^3$) | 800 ppm [10%LEL] | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma | Eyes, skin, respiratory system, central nervous system | Colorless liquid with an aromatic odor.<br>BP: 277°F<br>Fl.Pt. = 55°F<br>LEL: 0.8%<br>UEL: 6.7%<br>Class IB Flammable Liquid below 73°F and BP at or above 100°F |
| Isopropyl benzene | 98-82-8 | TWA 5 ppm | TWA 50 ppm (245 mg/m3) [skin] | TWA 50 ppm (245 mg/m3) [skin] | 900 ppm [10%LEL] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma | Eyes, skin, respiratory system, central nervous system | Colorless liquid with a sharp, penetrating, aromatic odor<br>BP: 306°F<br>Fl.Pt. = 96°F<br>LEL: 0.9%<br>UEL: 6.5%<br>Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Methyl Acetate | 79-20-9 | TWA 200 ppm<br>STEL 250 ppm | TWA 200 ppm (610 mg/m3)<br>ST 250 ppm (760 mg/m3) | TWA 200 ppm (610 mg/m3) | 3100 ppm [10%LEL] | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat; headache, drowsiness; optic nerve atrophy; chest tightness; In Animals: narcosis | Eyes, skin, respiratory system, central nervous system | Colorless liquid with a fragrant, fruity odor<br>BP: 135°F<br>Fl.Pt. = 14°F<br>LEL: 3.1%<br>UEL: 16%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F. |
| Methylcyclohexane | 108-87-2 | TWA 400 ppm | TWA 400 ppm (1600 mg/m3) | TWA 500 ppm (2000 mg/m3) | 1200 ppm [LEL] | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat; dizziness, drowsiness; In Animals: narcosis | Eyes, skin, respiratory system, central nervous system | Colorless liquid with a faint, benzene-like odor<br>BP: 214°F<br>Fl.Pt. = 25°F<br>LEL: 1.2%<br>UEL: 6.7%<br>Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F. |
| Methylene chloride | 75-09-2 | TWA 50 ppm [skin]<br>STEL 100 ppm | Ca | [1910.1052] TWA 25 ppm<br>ST 125 ppm | Ca [2300 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numb, tingle limbs; nausea; [potential occupational carcinogen] | Eyes, skin, cardiovascular system, central nervous system | Colorless liquid with a chloroform-like odor. [Note: A gas above 104°F.]<br>BP: 104°F<br>Fl.Pt. = NA<br>LEL: 13%<br>UEL: 23%<br>Combustible Liquid |
| Methyl-t-butyl ether | 1634-04-4 | TWA 50 ppm | NA | NA | NA | Inhalation, skin absorption, ingestion, skin and/or eye contact | May cause dizziness or suffocation. Contact may irritate or burn eyes or skin. May be harmful if swallowed. | Eyes, skin | A colorless liquid with a distinctive anesthetic-like odor.<br>BP: 131°F<br>Fl.Pt. = -14°F<br>LEL: NA<br>UEL: NA |
| o-Xylene | 95-47-6 | TWA 20 ppm<br><br>(All isomers) | TWA 100 ppm (435 mg/m3)<br>ST 150 ppm (655 mg/m3) | TWA 100 ppm (435 mg/m3) | 900 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis | Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys | Colorless liquid with an aromatic odor<br>BP: 292°F<br>Fl.Pt. = 90°F<br>LEL: 0.9%<br>UEL: 6.7%<br>Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F |
| Styrene | 100-42-5 | TWA 10 ppm<br>STEL 20 ppm<br>OTO (ototoxicant) | TWA 50 ppm (215 mg/m3)<br>ST 100 ppm (425 mg/m3) | TWA 100 ppm<br>C 200 ppm<br>600 ppm (5-minute maximum peak in any 3 hours) | 700 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects | Eyes, skin, respiratory system, central nervous system, liver, reproductive system | Colorless to yellow, oily liquid with a sweet, floral odor<br>BP: 293°F<br>Fl.Pt. = 88°F<br>LEL: 0.9%<br>UEL: 6.8%<br>Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F |
| Tetrachloroethene | 127-18-4 | TWA 25 ppm<br>STEL 100 ppm | Ca<br>Minimize workplace exposure concentrations | TWA 100 ppm<br>C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm | Ca [150 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen] | Eyes, skin, respiratory system, liver, kidneys, central nervous system | Colorless liquid with a mild, chloroform-like odor<br>BP: 250°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene |
| Sodium Hydroxide | 1310-73-2 | Ceiling 2 $mg/m^3$ | C 2 $mg/m^3$ | TWA 2 $mg/m^3$ | 10 $mg/m^3$ | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, mucous membrane; pneumonitis; eye, skin burns; temporary loss of hair | Eyes, skin, respiratory system | Colorless to white, odorless solid (flakes, beads, granular form).<br>BP: 2534°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Solid, but when in contact with water may generate sufficient heat to ignite combustible materials. |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Sulfuric Acid | 7664-93-9 | TWA 0.2 mg/m$^3$ (as thoracic particulate mass) | TWA 1 mg/m$^3$ | TWA 1 mg/m$^3$ | 15 mg/m$^3$ | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis | Eyes, skin, respiratory system, teeth | Colorless to dark-brown, oily, odorless liquid.[Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.]<br>BP = 554°F<br>Fl.Pt. = NA<br>LEL = NA<br>UEL = NA<br>Noncombustible Liquid, but capable of igniting finely divided combustible materials. |
| trans-1,2-Dichloroethene | 156-60-5 | 200 ppm (All isomers) | TWA 200 ppm (790 mg/m3) | TWA 200 ppm (790 mg/m3) | 1000 ppm | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, respiratory system; central nervous system depression | Eyes, respiratory system, central nervous system | Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.<br>BP: 118-140°F<br>Fl.P: 36-39°F<br>LEL: 5.6%<br>UEL: 12.8%<br>Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F. |
| trans-1,3-Dichloropropene | 10061-02-6 | https://cameochemicals.noaa.gov/chemical/18110 | | | | Inhalation, ingestion, skin and/or eye contact | Symptoms of exposure to this compound may include local irritation of the eyes skin and respiratory tract, dermatitis, gasping, coughing, substernal pain, extreme respiratory distress, lacrimation, central nervous system depression, acute gastrointestinal distress with pulmonary congestion and edema. It may also cause injury to the liver, kidneys and heart | Skin, eyes, mucous membranes, liver, kidney, heart | A clear colorless liquid with chloroform odor<br>BP: 234°F<br>Fl.P: NA<br>LEL: NA<br>UEL: NA |
| Toluene | 108-88-3 | TWA 20 ppm<br>(ototoxicant) | TWA 100 ppm (375 mg/m$^3$)<br>ST 150 ppm (560 mg/m$^3$) | TWA 200 ppm<br>C 300 ppm<br>500 ppm (10-minute maximum peak) | 500 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage | Eyes, skin, respiratory system, central nervous system, liver, kidneys | Colorless liquid with a sweet, pungent, benzene-like odor.<br>BP: 232°F<br>Fl.P: 40°F<br>LEL: 1.1%<br>UEL: 7.1%<br>Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F. |
| Trichloroethene (TCE) | 79-01-6 | TWA 10 ppm<br>STEL 25 ppm | Ca | TWA 100 ppm<br>C 200 ppm<br>300 ppm (5-minute maximum peak in any 2 hours) | Ca [1000 ppm] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen] | Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system | Colorless liquid (unless dyed blue) with a chloroform-like odor.<br>BP: 189°F<br>Fl.Pt. = NA<br>LEL(77°F): 8.0%<br>UEL(77°F): 10.5%<br>Combustible Liquid, but burns with difficulty. |
| Trichlorofluoromethane | 75-69-4 | STEL C 1000 ppm | C 1000 ppm (5600 mg/m3) | TWA 1000 ppm (5600 mg/m3) | 2000 ppm | Inhalation, ingestion, skin and/or eye contact | Incoordination, tremor; dermatitis; cardiac arrhythmias, cardiac arrest; asphyxia; liquid: frostbite | Skin, respiratory system, cardiovascular system | Colorless to water-white, nearly odorless liquid or gas (above 75°F)<br>BP: 75°F<br>Fl.P: NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Liquid Nonflammable Gas |
| Vinyl Chloride (chloroethylene) | 75-01-4 | TWA 1 ppm | Ca | TWA 1 ppm<br>C 5 ppm [15-minute] | Ca (ND) | Inhalation, skin and/or eye contact (liquid) | Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen] | Liver, central nervous system, blood, respiratory system, lymphatic system | Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations.[Note: Shipped as a liquefied compressed gas.]<br>BP: 7°F<br>Fl.Pt. = NA (Gas)<br>LEL: 3.6%<br>UEL: 33.0%<br>Flammable Gas |
| Xylene (m, o & p isomers) | 108-38-3,<br>95-47-6,<br>106-42-3 | TWA 20 ppm | NA | NA | NA | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis | Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys | Colorless liquid with an aromatic odor<br>BP: 282°F, 292°F, 281°F<br>Fl. Pt. 82°F, 90°F, 81°F<br>LEL: 1.1%, 0.9%, 1.1%<br>UEL: 7.0%, 6.7%, 7.0%<br>Class IC Flammable Liquid at or above 73°F and below 100°F. |
| Zinc Oxide (dust) | 7440-66-6 | TWA 2 mg/m3 (repsirable)<br>STEL 10 mg/m$^3$ (respirable) | TWA 5 mg/m^3<br>C 15 mg/m^3 | TWA 15 mg/m^3 (total dust)<br>TWA 5 mg/m^3 (resp dust)<br>TWA 5 mg/m^3 (fume) | 500 mg/m^3 | Inhalation | Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function | Respiratory system | White, odorless solid.<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Solid |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| **SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)** | | | | | | | | | |
| 2-Chloronaphthalene | 91-58-7 | https://cameochemicals.noaa.gov/chemical/16185 | | | | Inhalation, ingestion, skin and/or eye contact | Chloracne, cysts, headache, fatigue, vertigo, anorexia and jaundice | | Monoclinic plates or off-white crystalline powder<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| 2-Methylnaphthalene | 91-57-6 | TWA 0.5 ppm<br>TLV-SL 3 mg/100 cm2<br>[skin] | https://cameochemicals.noaa.gov/chemical/20668 | | | Inhalation, ingestion, skin and/or eye contact | Headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and comatose | Skin, eyes, mucous membranes and upper respiratory tract | White crystalline solid<br>Combustible solid<br>BP: 466-468 ° F<br>Fl.Pt. = 208 ° F<br>LEL: NA<br>UEL: NA |
| Acenaphthene | 83-32-9 | https://cameochemicals.noaa.gov/chemical/10358 | | | | Inhalation, ingestion, skin and/or eye contact | Irritation of the skin, eyes, mucous membranes and upper respiratory tract, vomiting | Skin, eyes, mucous membranes and upper respiratory tract | White needles<br>BP: 534 ° F<br>Fl.Pt. = NA<br>LEL: 0.6%<br>UEL: NA |
| Acenaphthylene | 208-96-8 | https://cameochemicals.noaa.gov/chemical/16157 | | | | Inhalation, ingestion, skin and/or eye contact | | | Colorless crystalline solid<br>BP: 509 to 527 ° F at 760 mm Hg<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Anthracene (as coal tar pitch volatiles) | 120-12-7 | TWA 0.2 mg/m3 (as Benzene solubles) | Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction) | TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002] | Ca [80 mg/m3] | Inhalation, skin and/or eye contact | Dermatitis, bronchitis, [potential occupational carcinogen] | Respiratory system, skin, bladder, kidneys | Black or dark-brown amorphous residue<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Combustible Solids |
| Benzo[a]anthracene | 56-55-3 | https://cameochemicals.noaa.gov/chemical/16171 | | | | Inhalation, injestion, skin and/or eye contact | | | Colorless leaflets or plates or coarse gold powder with a greenish-yellow fluorescence. May reasonably be expected to be a carcinogen.<br>BP: 815° F at 760 mm Hg<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Benzo[a]pyrene (as coal tar pitch volatiles) | 50-32-8 | TWA 0.2 mg/m3 (as Benzene solubles) | Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction) | TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002] | Ca [80 mg/m3] | Inhalation, skin and/or eye contact | Dermatitis, bronchitis, [potential occupational carcinogen] | Respiratory system, skin, bladder, kidneys | Black or dark-brown amorphous residue<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Combustible Solids |
| Benzo[b]fluoranthene | 205-99-2 | None listed | https://cameochemicals.noaa.gov/chemical/16172 | | | Inhalation, injestion, skin and/or eye contact | | | Needles or yellow fluffy powder<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Benzo[g,h,i]perylene | 191-24-2 | https://cameochemicals.noaa.gov/chemical/16174 | | | | Inhalation, injestion, skin and/or eye contact | Inhalation of material may be harmful. Contact may cause burns to skin and eyes. Inhalation of Asbestos dust may have a damaging effect on the lungs. Fire may produce irritating, corrosive and/or toxic gases. Some liquids produce vapors that may cause dizziness or suffocation. Runoff from fire control may cause pollution. | Lungs, skin, eyes | Colorless to white crystalline solid. Water insoluble.<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Benzo[k]fluoranthene | 207-08-9 | https://cameochemicals.noaa.gov/chemical/16173 | | | | Inhalation, injestion, skin and/or eye contact | When heated to decomposition this compound emits acrid smoke and irritating fumes. | | Pale yellow needles or yellow crystalline solid<br>BP: 896° F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Chrysene (as coal tar pitch volatiles) | 218-01-9 | TWA 0.2 mg/m3 (as Benzene solubles) | Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction) | TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002] | Ca [80 mg/m3] | Inhalation, skin and/or eye contact | Dermatitis, bronchitis, [potential occupational carcinogen] | Respiratory system, skin, bladder, kidneys | Black or dark-brown amorphous residue<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Combustible Solids |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Dibenzo(a,h)anthracene | 53-70-3 | https://cameochemicals.noaa.gov/chemical/16192 | | | | Inhalation, injestion, skin and/or eye contact | Symptoms of exposure to this compound may include irritation. This compound is harmful if swallowed or inhaled. It may cause irritation. When heated to decomposition it emits acrid smoke, irritating fumes and toxic fumes of carbon monoxide and carbon dioxide. | Lungs | White crystals or pale yellow solid. Sublimes<br>BP: 975° F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Fluoranthene | 206-44-0 | https://cameochemicals.noaa.gov/chemical/16213 | | | | Inhalation, injestion, skin and/or eye contact | When heated to decomposition this compound emits acrid smoke and fumes. | | Light yellow fine crystals<br>BP: 482° F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Fluorene | 86-73-7 | https://cameochemicals.noaa.gov/chemical/16214 | | | | Inhalation, injestion, skin and/or eye contact | | | White leaflets. Sublimes easily under a vacuum. Fluorescent when impure.<br>BP: 563° F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | https://cameochemicals.noaa.gov/chemical/16218 | | | | Inhalation, injestion, skin and/or eye contact | | | Yellow crystals<br>BP: 997° F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Naphthalene | 91-20-3 | TWA 10 ppm [skin] | TWA 10 ppm (50 mg/m3)<br>ST 15 ppm (75 mg/m3) | TWA 10 ppm (50 mg/m3) | 250 ppm | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage | Eyes, skin, blood, liver, kidneys, central nervous system | Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]<br>BP: 424°F<br>Fl.P: 174°F<br>LEL: 0.9%<br>UEL: 5.9%<br>Combustible Solid, but will take some effort to ignite |
| Phenanthrene | 85-01-8 | https://cameochemicals.noaa.gov/chemical/16236 | | | | Inhalation, injestion, skin and/or eye contact | Symptoms following exposure to this compound may include skin sensitization, dermatitis, bronchitis, cough, dyspnea, respiratory neoplasm, kidney neoplasm, skin irritation, and respiratory irritation. | Skin, respiratory tract | Colorless monoclinic crystals with a faint aromatic odor. Solutions exhibit a blue fluorescence.<br>BP: 642° F<br>Fl.Pt. = 340° F<br>LEL: NA<br>UEL: NA |
| Pyrene (see coal tar pitch volatiles) | 129-00-0 | TWA 0.2 mg/m3 (as Benzene solubles) | Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction) | TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002] | Ca [80 mg/m3] | Inhalation, skin and/or eye contact | Dermatitis, bronchitis, [potential occupational carcinogen] | Respiratory system, skin, bladder, kidneys | Black or dark-brown amorphous residue<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Combustible Solids |
| **METALS** | | | | | | | | | |
| Aluminum | 7429-90-5 | TWA 1 mg/m3 | TWA 10 mg/m^3 (total)<br>TWA 5 mg/m^3 (resp) | TWA 15 mg/m^3 (total)<br>TWA 5 mg/m^3 (resp) | N.D. | Inhalation, skin and/or eye contact | Irritation eyes, skin, respiratory system | Eyes, skin, respiratory system | Silvery-white, malleable, ductile, odorless metal<br>BP: 4221°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Combustible Solid, finely divided dust is easily ignited; may cause explosions. |
| Antimony | 7440-36-0 | TWA 0.5 mg/m3 (as Sb) | TWA 0.5 mg/m3<br>[*Note: The REL also applies to other antimony compounds (as Sb).] | TWA 0.5 mg/m3<br>[*Note: The PEL also applies to other antimony compounds (as Sb).] | 50 mg/m3 (as Sb) | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly | Eyes, skin, respiratory system, cardiovascular system | Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder<br>BP: 2975°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame. |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | TWA 0.01 mg/m3 | Ca C 0.002 mg/m3 [15-minute] | [1910.1018] TWA 0.010 mg/m3 | Ca [5 mg/m3 (as As)] | Inhalation, skin absorption, skin and/or eye contact, ingestion | Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen] | Liver, kidneys, skin, lungs, lymphatic system | Metal: Silver-gray or tin-white, brittle, odorless solid<br>BP: Sublimes<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame |
| Barium | 7440-39-3 | TWA 0.5 mg/m3 | 0.5 mg Ba/m3 TWA | 0.5 mg Ba/m3 TWA | 50 mg Ba/m3 | Inhalation, ingestion, skin and/or eye contact | Inhalation or contact with vapors, substance or decomposition products may cause severe injury or death. Contact may cause burns to skin, eyes, and mucous membranes. May be toxic by ingestion, inhalation and skin absorption. Used to make other chemicals. | Lungs, skin, eyes, and mucous membrane | A silver to white metallic solid<br>BP: 1337°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Beryllium | 7440-41-7 | TWA 0.00005 mg/$m^3$ | Ca C 0.0005 mg/m^3 | TWA 0.002 mg/m^3<br>C 0.005 mg/$m^3$<br>0.025 mg/m3<br>[30-minute maximum peak] | Ca [4 mg/m^3 (as Be)] | Inhalation, skin and/or eye contact | Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen] | Eyes, skin, respiratory system | Hard, brittle, gray-white solid<br>BP: 4532°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Solid in bulk form, but a slight explosion hazard in the form of a powder or dust. |
| Cadmium | 7440-43-9 | TWA 0.01 mg/$m^3$ total dust<br>TWA 0.002 mg/m^3 (as Cd) respirable fraction | Ca | TWA 0.005 mg/$m^3$ | Ca [9 mg/m3 (as Cd)] | Inhalation, ingestion | Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen] | Respiratory system, kidneys, prostate, blood | Silver-white/blue tinged lustrous, odorless solid.<br>BP: 1409°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible - will burn in powder form |
| Calcium | 7440-70-2 | https://cameochemicals.noaa.gov/chemical/309 | | | | Inhalation, ingestion, skin and/or eye contact | Contact with eyes or skin produces caustic burns. | Eyes, skin | A silvery, soft metal that turns grayish white on exposure to air.<br>BP: 2714°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Chromium | 7440-47-3 | TWA 0.5 mg/$m^3$ (metal)<br>TWA 0.003 mg/$m^3$ (water-soluble Cr III compounds)<br>TWA 0.0002 mg/$m^3$ (water-soluble Cr VI compounds)<br>STEL 0.0005 mg/m3 (water-soluble Cr VI compounds) | TWA 0.5 mg/$m^3$ | TWA 1 mg/$m^3$ | 250 mg/$m^3$ (as Cr) | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin; lung fibrosis (histologic) | Eyes, skin, respiratory system | Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.<br>BP: 4788°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible - will burn in dust form if heated in a flame |
| Cobalt | 7440-48-4 | TWA 0.02 mg/m3 [DSEN] [RSEN] | TWA 0.05 mg/m3 | TWA 0.1 mg/m3 | 20 mg/m3 (as Co) | Inhalation, ingestion, skin and/or eye contact | Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; resp hypersensitivity, asthma | Skin, respiratory system | Odorless, silver-gray to black solid<br>BP: 5612°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures. |
| Copper | 7440-50-8 | TWA 0.2 mg/$m^3$ (fume)<br>TWA 1 mg/m3 (dusts and mists) | TWA 1 mg/m^3 | TWA 1 mg/$m^3$ | 100 mg/$m^3$ (as Cu) | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, nose, pharynx; nasal septum perforation; metallic taste; dermatitis; In Animals: lung, liver, kidney damage; anemia | Eyes, skin, respiratory system, liver, kidneys (increased risk with Wilson's disease) | Reddish, lustrous, malleable, odorless solid.<br>BP: 4703°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible - powdered form may ignite |
| Iron (as iron oxide) | 7439-89-6 | TWA 5 mg/m3 (respirable particulate mass) | TWA 1 mg/m^3 | NA | NA | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting; possible liver damage | Eyes, skin, respiratory system, liver, gastrointestinal tract | Appearance and odor vary depending upon the specific soluble iron salt.<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Solids |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Lead | 7439-92-1 | TWA 0.05 mg/m3 | TWA (8-hour) 0.050 mg/m3 | [1910.1025] TWA 0.050 mg/m3 | 100 mg/m3 (as Pb) | Inhalation, ingestion, skin and/or eye contact | Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension | Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue | A heavy, ductile, soft, gray solid<br>BP: 3164°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Noncombustible Solid in bulk form |
| Magnesium | 7439-95-4 | https://cameochemicals.noaa.gov/chemical/6949 | | | | Eye and/or skin contact | Dust irritates eyes in same way as any foreign material. Penetration of skin by fragments of metal is likely to produce local irritation, blisters, and ulcers which may become infected. | Eyes | A light silvery metal<br>BP: 1202°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Manganese | 7439-96-5 | TWA 0.02 mg/m3 [R]<br>TWA 0.1 mg/m3 [I] | TWA 1 mg/m3<br>ST 3 mg/m3 | C 5 mg/m3 | 500 mg/m3 (as Mn) | inhalation, ingestion | Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage | respiratory system, central nervous system, blood, kidneys | A lustrous, brittle, silvery solid<br>BP: 3564°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Metal: Combustible Solid |
| Mercury | 7439-97-6 | TWA 0.1 mg/m3, as Hg Aryl compounds<br>TWA 0.025 mg/m3 as Hg, inorganic forms including metallic mercury | Hg Vapor: TWA 0.05 mg/m3 [skin]<br>Other: C 0.1 mg/m3 [skin] | TWA 0.1 mg/m3 | 10 mg/m3 (as Hg) | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria | Eyes, skin, respiratory system, central nervous system, kidneys | Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]<br>BP: 674°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Metal: Noncombustible Liquid |
| Nickel | 7440-02-0 | TWA 1.5 mg/m^3 [elemental]<br>TWA 0.1 mg/m^3 [soluble inorganic compound]<br>TWA 0.2 mg/m^3 [insoluble inorganic compound]<br>TWA 0.1 mg/m^3 [Nickel subsulfide] | Ca TWA 0.015 mg/m^3 | TWA 1 mg/m^3 | Ca [10 mg/m3 (as Ni)] | Inhalation, ingestion, skin and/or eye contact | Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen] | Nasal cavities, lungs, skin | Lustrous, silvery, odorless solid.<br>BP: 5139°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Combustible Solid; nickel sponge catalyst may ignite spontaneously in air. |
| Potassium | 9/7/7440 | https://cameochemicals.noaa.gov/chemical/4289 | | | | Eye and/or skin contact | Will burn skin and eyes | Skin, eyes | Potassium is a soft silvery metal though normally grayish white due to oxidation<br>BP: 1425°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Selenium | 7782-49-2 | TWA 0.2 mg/m3 | TWA 0.2 mg/m3 | TWA 0.2 mg/m3 | 1 mg/m3 (as Se) | Inhalation, ingestion, skin and/or eye contact | Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; In Animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage | Eyes, skin, respiratory system, liver, kidneys, blood, spleen | Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.]<br>BP: 1265°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Combustible Solid |
| Silver | 7440-22-4 | TWA 0.1 mg/m3 [Metal, dust, and fume]<br>TWA 0.01 mg/m3 [Soluble compounds, as Ag] | TWA 0.01 mg/m3 | TWA 0.01 mg/m3 | 10 mg/m3 (as Ag) | Inhalation, ingestion, skin and/or eye contact | Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance | Nasal septum, skin, eyes | Metal: White, lustrous solid<br>BP: 3632°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA<br>Metal: Noncombustible Solid, but flammable in form of dust or powder |
| Sodium | 7440-23-5 | https://cameochemicals.noaa.gov/chemical/7794 | | | | Skin contact | Severe burns caused by burning metal or by caustic soda formed by reaction with moisture on skin | Skin | A silvery soft metal that becomes grayish white upon exposure to air<br>BP: 1621°F<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Thallium | 7440-28-0 | 0.02 mg/m3 inhallable particulate matter | TWA 0.1 mg/m3 [skin] | TWA 0.1 mg/m3 [skin] | 15 mg/m3 (as Tl) | Inhalation, skin absorption, ingestion, skin and/or eye contact | Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs | Eyes, respiratory system, central nervous system, liver, kidneys, gastrointestinal tract, body hair | Appearance and odor vary depending upon the specific soluble thallium compound<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.**

| Compound | CAS # | ACGIH TLV | NIOSH REL | OSHA PEL | IDLH | Routes of Exposure | Toxic Properties | Target Organs | Physical/Chemical Properties |
|---|---|---|---|---|---|---|---|---|---|
| Vanadium | 7440-62-2 | https://cameochemicals.noaa.gov/chemical/16147 | | | | Inhalation, skin absorption, ingestion, skin and/or eye contact | Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution | Skin | Silvery-whitish powder<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| Zinc | 7440-66-6 | https://cameochemicals.noaa.gov/chemical/4814 | | | | Inhalation, skin absorption, ingestion, skin and/or eye contact | Inhalation or contact with vapors, substance or decomposition products may cause severe injury or death. May produce corrosive solutions on contact with water. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution | Lungs | A grayish powder<br>BP: NA<br>Fl.Pt. = NA<br>LEL: NA<br>UEL: NA |
| **PCBs** | | | | | | | | | |
| PCBs (total) | 11097-69-1, 53469-21-9 | TWA 0.5 mg/m3 [skin]<br>TWA 1 mg/m3 [skin] | Ca TWA 0.001 mg/m3<br>Ca TWA 0.001 mg/m3 | TWA 0.5 mg/m3 [skin]<br>TWA 1 mg/m3 [skin] | Ca [5 mg/m3]<br>Ca [5 mg/m3] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen] | Skin, eyes, liver, reproductive system | Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor<br>BP: 689-734°F, 617-691°F<br>Fl.Pt. = NA, NA<br>LEL: NA<br>UEL: NA<br>Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins. |
| **Petroleum Hydrocarbons** | | | | | | | | | |
| Gasoline | 86290-81-5 | TWA 300 ppm<br>STEL 500 ppm | Ca | None | Ca [N.D.] | Inhalation, skin absorption, ingestion, skin and/or eye contact | Irritation eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid); possible liver, kidney damage; [potential occupational carcinogen] | Eyes, skin, respiratory system, central nervous system, liver, kidneys | Clear liquid with a characteristic odor<br>BP: 102°F<br>Fl.Pt. = -45°F<br>LEL: 1.4%<br>UEL: 7.6% |

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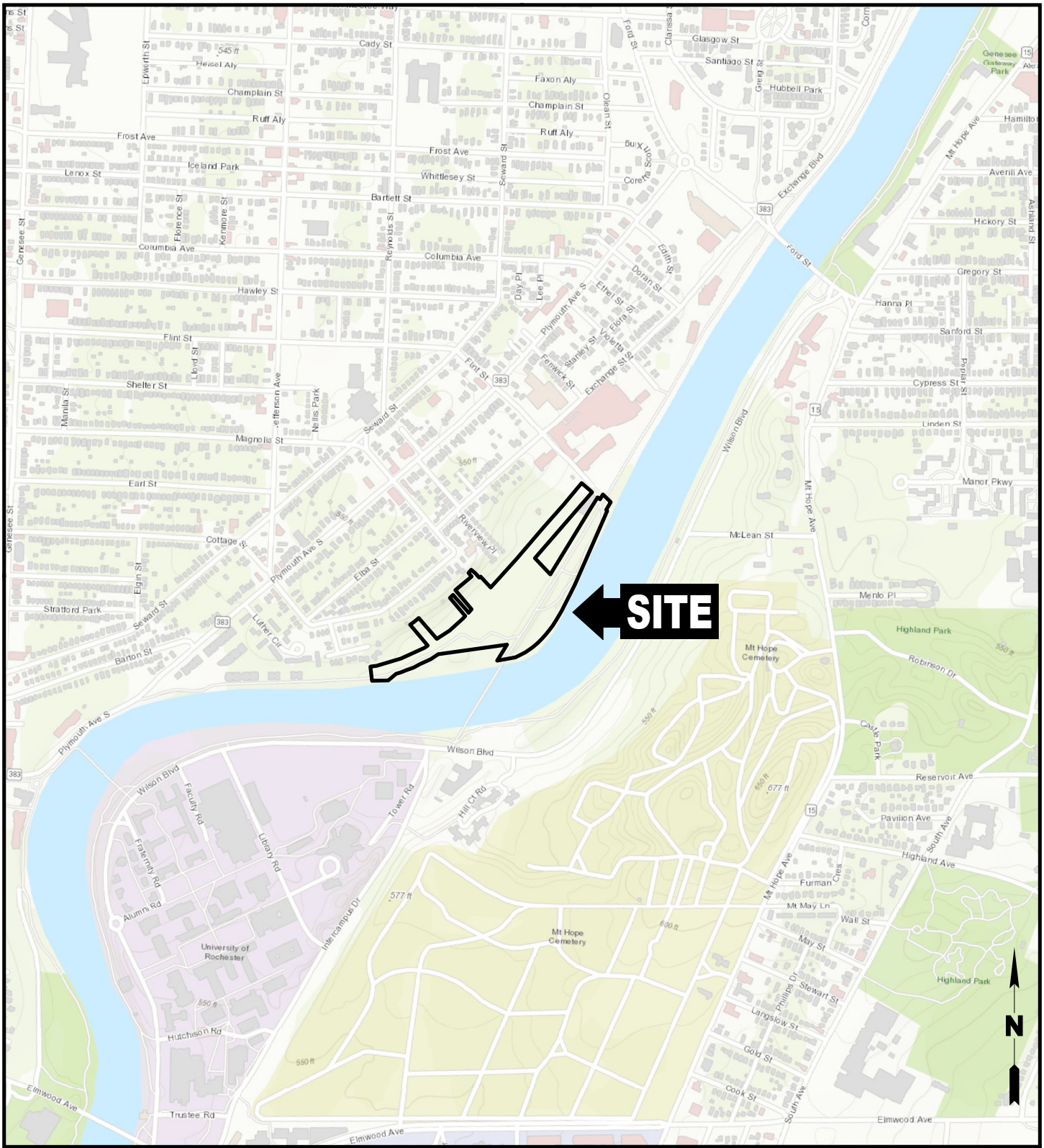
**Abbreviations:**

ACGIH – American Conference of Governmental Industrial Hygienists.
BP – boiling point at 1 atmosphere, °F
C – Ceiling, is a concentration that should not be exceeded during and part of the working exposure.
Ca – Carcinogenic.
CAS# - Chemical Abstracts Service registry number which is unique for each chemical.
DSEN - Dermal Sensitization
Ft Pt. – Flash point
IDLH - Immediately Dangerous to Life and Health concentrations represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
LEL – Lower explosive (flammable) limit in air, % by volume (at room temperature)
$mg/m^3$ – Milligrams of substance per cubic meter of air
NIOSH - National Institute for Occupational Safety and Health.
OSHA – Occupational Safety and Health Administration
OTO - Ototoxicant
PEL - OSHA Permissible Exposure Limit (usually) a time weighted average concentration that must not be exceeded during any 8 hour work shift of a 40 hr work week.
ppm – parts per million
REL – NIOSH Recommended Limit indicated a time weighted average concentration that must not be exceeded during any 10 hour work shift of a 40 hr work week
RSEN - Respiratory Sensitization
SG - Specific Gravity
STEL – ACGIH Short-term exposure limit (ST)
TLV - ACGIH Threshold Limit Values (usually 8 hour time weighted average concentrations).
TWA – 8-hour, time-weighted average
UEL – Upper explosive (flammable) limit in air, % by volume (at room temperature)
VP - Vapor Pressure

# FIGURES

1. Site Location Map
2. Site Plan with Emergency Muster Area




QUADRANGLE LOCATION

SOURCES

- BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.

NOTES

- ALL FEATURES SHOWN ARE APPROXIMATE

1,000 0 1,000 FEET

TITLE:

# SITE LOCATION MAP
# BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

PREPARED FOR:

10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| COMPILED BY: SB | DATE: 11/08/25 | FIGURE |
| PREPARED BY: SB | SCALE: AS SHOWN | 1 |
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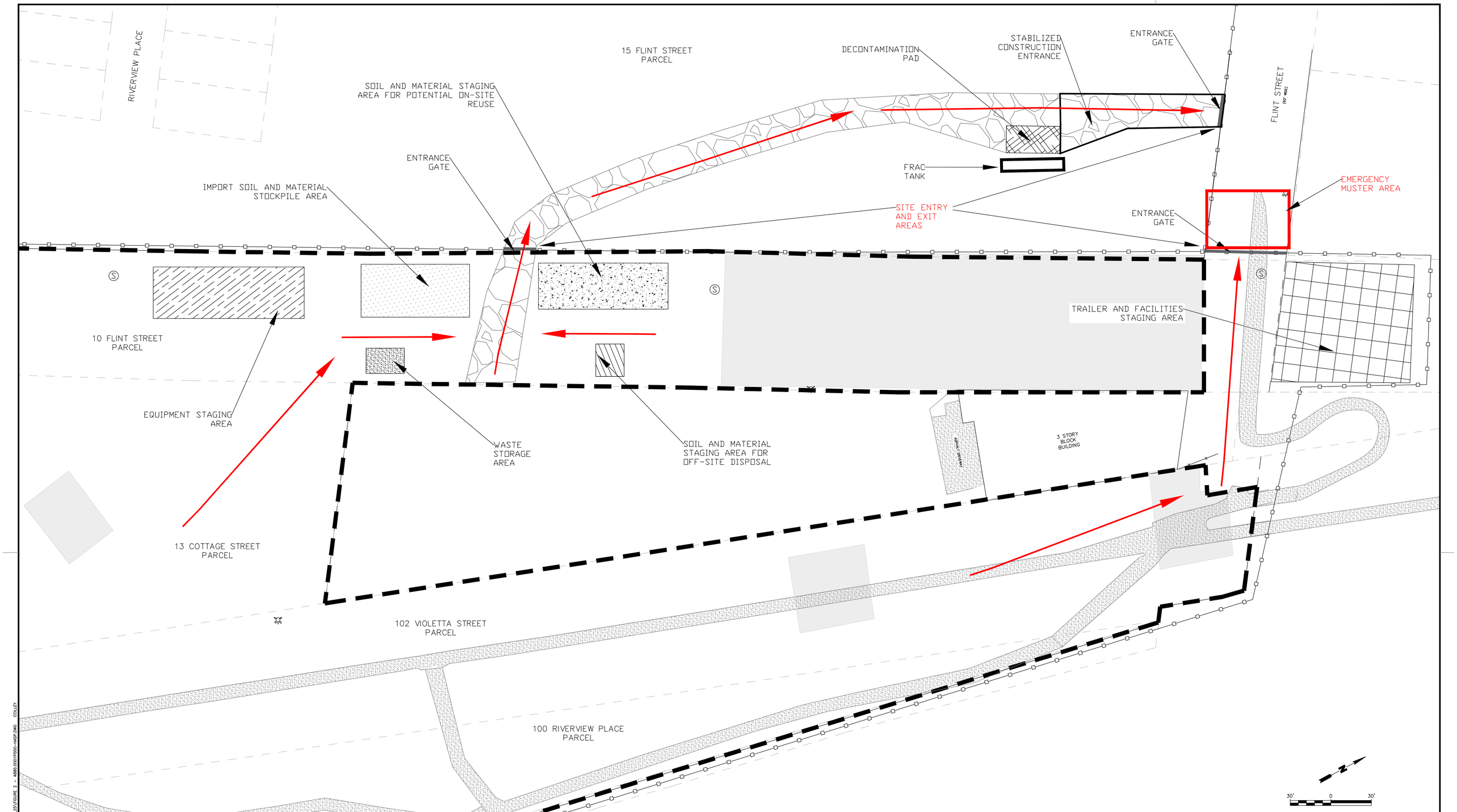


NOTES

1. LOCATIONS OF FENCING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACTIVE WORK AREAS.
2. PROPOSED EXCAVATION AREAS AS SHOWN ON FIGURE 5 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.
3. BROWNFIELD CLEANUP PROGRAM SITE LIMITS AS SHOWN ON FIGURE 2 OF RAMBOLL'S REMEDIAL ALTERNATIVES ANALYSIS REPORT, DATED JUNE 2023, AND PRESENTED IN THE SEPTEMBER 2023 DECISION DOCUMENT FOR SITE.
4. BASEMAP FEATURES OBTAINED FROM NUSSBAUMER & CLARKE, INC., OCTOBER 2025.
5. THE PROPERTY BOUNDARIES OBTAINED FROM THE CITY OF ROCHESTER OPEN DATA PORTAL ( SEPTEMBER 2024)

LEGEND

- SANITARY MANHOLE
- HYDRANT
- BCP BOUNDARY
- CURRENT LOCATION OF FENCE
- PROPERTY BOUNDARIES FROM OPEN DATA PORTAL
- EXCAVATION AREAS
- SITE ACCESS ROAD
- DECONTAMINATION PAD
- FRAC TANK
- EVACUATION ROUTES
- EMERGENCY MUSTER AREA

LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS:

- SOIL AND MATERIAL STAGING AREA FOR OFF-SITE DISPOSAL
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- IMPORT SOIL AND MATERIAL STOCKPILE AREA
- SOIL AND MATERIAL STAGING AREA FOR POTENTIAL ON-SITE REUSE
- EQUIPMENT STAGING AREA

Title:

# SITE PLAN WITH EMERGENCY MUSTER AREA BCP SITE # C828190

PORTION OF FORMER VACUUM OIL REFINERY SITE
ROCHESTER, NEW YORK

Prepared for:
10 FLINT STREET LLC AND CITY OF ROCHESTER

ROUX

| | | |
|---|---|---|
| Compiled by: CC | Date: 11/3/25 | FIGURE |
| Prepared by: CC | Scale: AS SHOWN | 2 |
| Project Mgr: SB | Project: 4880.0001P00 | |
| File: FIGURE 2 - 4880.0001P000-HASP.DWG | | |

S:\CLIENTS\10 FLINT STREET LLC\CAD\REPORT FIGURES 11_4_25\FIGURE 2 - 4880.0001P000-HASP.DWG COLLEY

# APPENDICES

A. Job Safety Analysis (JSA) Forms
B. SDSs for Chemicals Used
C. Heat Illness Prevention Program
D. Personal Protective Equipment (PPE) Management Program
E. Subsurface Utility Clearance Management Program
F. Heavy Equipment Exclusion Zone Policy
G. Roux Daily Tailgate Health and Safety Meeting Log/Daily Site Safety Checklist

# APPENDIX A

Job Safety Analysis (JSA) Forms

| JOB SAFETY ANALYSIS | Ctrl. No. GEN-005 | DATE 4/10/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **GENERIC** | **Construction** | **Cutting with Gas-powered Saw, Sawzall or Plasma Cutter** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Ray Greenidge | Sr. Compliance Manager | Brian Hobbs | CHSD |
| | | | |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☒ REFLECTIVE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES | ☐ GOGGLES<br>☒ FACE SHIELD (gas powered saw and plasma cutter)<br>☒ HEARING PROTECTION<br>☒ SAFETY SHOES: Steel-toed boots | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: Fluorescent Long sleeved shirt and / or reflective safety vest | ☒ GLOVES: Cut-resistant, leather, nitrile<br>☒ OTHER: Chaps for gas powered saw. Welding suit for plasma cutting. |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Sawzall/extension cord

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Set up/ Secure work area. | **1a. CONTACT:** Personnel could enter the work area | 1a. Establish the work zone using 42" cones, caution tape, or fixed rigid barrier. Inform others of work activity. |
| **2.** Precutting procedure. | **2a. CONTACT:** Improper blade, malfunctioning guards, unsecured materials, flying debris | 2a. Inspect all equipment for defects, replace or service if not functioning optimally. Check that all guards are working and in place, replace if missing. Ensure that blades are sharp and clean to avoid binding and/or burning. Cut on flat/secure work surfaces. Do not cut badly warped wood or boards with knots or nails.<br>2a. Unplug saw before handing it off to another person.<br>2a. Wear safety glasses, long-sleeved shirt and leather gloves. Utilize job specific PPE such as welding jacket or chaps when using gas powered saw or a plasma cutter. |
| | **2b. EXPOSURE:** Loud noises, dust, bright UV light | 2b. When using gas powered saw, wet down area to be cut prior to cutting if high dust levels are anticipated.<br>2b. Wear hearing protection. Wear a dust mask if large amounts of dust are expected; cut upwind if possible.<br>2b. When plasma cutting, wear a face shield with shaded glasses rated to block UV light generated by the plasma cutter. |
| | **2c. ENERGY SOURCE:** Potential for electric shock | 2c. Inspect extension cord for damage. If damaged, tag out and repair / replace. Do not operate saw while standing in water. Ensure GFCI protection at outlet or via attachment.<br>2c. Ensure all electrical equipment is rated for the task. |

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.
[2] A hazard is a potential danger. Break hazards into six types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.
[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **3.** Saw Cutting. | **3a. CONTACT:**<br>Fingers could be cut, lacerated or amputated by reciprocating blade; also flying debris and sparks | 3a. Cut away from body. Keep fingers away from moving blade. No loose clothing. Never leave saw running unattended. Unplug saw before changing blades or making adjustments / repairs. Set-up barrier to contain sparks. Cut on flat/secure work surfaces.<br>3a. Wear Safety glasses<br>3a. Ensure that the saw blade stops rotating/reciprocating before placing saw on the ground. |
| | **3b. CONTACT:**<br>Amputation and line of fire injury. | 3b. Maintain a minimum 15-foot exclusion zone and ensure that operator and other personnel are kept out of the line-of-fire of the equipment. |
| | **3c. FALL:**<br>Tripping hazards caused by cutting/grinding debris, extension cords. | 3c. Keep debris generated in designated storage containers. Keep work area free of Slip, Trip and Fall hazards.<br>3c. Do not route extension cords through walking/working path. |
| | **3d. EXERTION/ERGONOMICS:**<br>Lifting heavy or awkward materials may cause muscle strain. | 3d. Maintain Proper Body Position while operating lifting and moving with equipment. Keep load close to body, knees bent, and back straight.<br>3d. Take frequent breaks or switch personnel if cutting for an extended period of time. |
| | **3e. EXPOSURE:**<br>Personnel may be exposed to fire hazard during Hot Work Activities. | 3e. Complete Hot Work Permit, Designate Fire Watch.<br>3e. Conduct work zone inspection:<br>– Verify that all combustible or flammable materials or equipment fuel sources have been removed from within 35 feet of the proposed hot work.<br>– If combustible or flammable materials or equipment fuel sources have not been removed from within 35 feet of the hot work, verify that engineering and procedural controls have been emplaced: curtains, blankets, wetting, ventilation.<br>3e. Two 20-lb. Type ABC Fire extinguishers required.<br>3e. Conduct continuous air monitoring / Lower Explosive Limit (LEL) screenings. Action Level: 10% of the LEL.<br>3e. If ambient air concentrations exceed LEL Action Levels, STOP WORK and contact supervisor.<br>3e. Wear hard hat, long sleeved-shirt and safety glasses. Utilize job specific PPE such as welding jacket or chaps and welding glasses when using gas powered saw or a plasma cutter. |
| **4.** Secure area when leaving tools unattended. | **4a. CONTACT:**<br>Unauthorized personnel may enter the work area | 4a. Unplug saw when not being used. Store equipment in designated storage areas when not being used. |
| | **4b. FALL:**<br>Slip/trip/fall | 4b. Store tool in designated storage location when it is not being used, secure all extension cords, keep all equipment out of walkways.<br>4b. Keep work area free of Slip, Trip and Fall Hazards. |

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.
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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| JOB SAFETY ANALYSIS | Ctrl. No. GEN-007 | DATE 4/10/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **GENERIC** | **General Site Activity** | **Driving** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Valerie Sabatasso | Project Scientist | Brian Hobbs | CHSD |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ AIR PURIFYING RESPIRATOR | ☒ GLOVES: Leather/ cut-resistant level 2 |
| ☒ HARD HAT: when outside vehicle | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☐ OTHER _____ |
| ☐ LIFELINE / BODY HARNESS | ☒ HEARING PROTECTION | ☒ PPE CLOTHING: high visibility vest, when outside vehicle | |
| ☒ SAFETY GLASSES:when outside vehicle | ☒ SAFETY TOE BOOTS: when outside vehicle | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Motor Vehicle (i.e. car, truck, SUV)

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Driving to/leaving Site | **1a. CONTACT:** Severe injury/disability, property damage, monetary loss (insurance premiums, deductibles, loss of license/job) caused by collision with or struck by other vehicles, obstructions, pedestrians, animals, etc.<br><br>*Common factors that may lead to CONTACT incident, but not limited to:<br>• distracted driving (cell phone, GPS, radio, billboards, "rubber necking")<br>• lack of situational awareness<br>• unfamiliarity with traffic patterns/road layout<br>• weather conditions (wet/icy roads, hydroplaning, black ice)<br>• weariness<br>• high speeds<br>• obstructed vision (solar glare, debris on windshield, blind spots, large vehicle at the front)<br>• changes in travel pathway (construction, snow banks, non-operational signals, potholes, detours, special events)<br>• improper vehicle maintenance (non-operational signal light, worn tires, cracked windshield, ineffective wipers)<br>• loose or unsecure objects | 1a. PLAN AHEAD – review/make yourself familiar with maps and driving directions before beginning the drive to the Site. Do not attempt to drive and review maps/directions at the same time. Pull over and stop your vehicle before looking at maps/directions.<br><br>1a. Complete a basic vehicle inspection before driving. Verify Inspection and Registration are current, tires and wipers are in good condition, all lights are functional, all glass/mirrors are undamaged, the horn is functional, roof/hood/trunk are free from accumulated snow and visibility is not impaired due to snow/ice/frost/fog on windows.<br><br>1a. Do not hang items in car that can obstruct your view or become projectiles in a collision.<br><br>1a. Do not get distracted using touch screen radios or GPS units built into newer models. Keep your eyes on the road and stay alert.<br><br>1a. Follow posted speed limits and obey traffic signals and roadway signs.<br><br>1a. Always wear your seat belt and shoulder harness when driving.<br><br>1a. When driving around large vehicles and trucks, maintain extra space as these vehicles may not be able to see a smaller car too close.<br><br>1a. Follow the "Rules of the Road" including: using your turn signals, coming to a complete stop, and allowing vehicles the right of way (yield) when they are when traffic laws require.<br><br>1a. Apply the Smith Five Keys® of safe driving<br>• Aim High in Steering®<br>- Expand eye lead time to a minimum of 15 seconds<br>• Get the Big Picture®<br>- Maintain proper a 4 second minimum following distance at all times<br>- Scan mirrors every 5-8 seconds to achieve a circle of awareness<br>- Position your vehicle so you can see relevant/non-relevant objects<br>• Keep Your Eyes Moving®<br>- Try to maintain about 180 degrees of visibility<br>- Avoid blank and fixed stares. Avoid focusing on one object for more than 2 seconds<br>• Leave Yourself an Out®<br>- Avoid traveling in traffic clusters<br>- Surround yourself with space<br>- Anticipate the actions of others |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Driving to/leaving Site (cont'd) | **1a. CONTACT:**<br>Severe injury/disability, property damage, monetary loss (insurance premiums, deductibles, loss of license/job) caused by collision with or struck by other vehicles, obstructions, pedestrians, animals, etc. | • Make Sure They See You®<br>- Maintain eye contact with on-coming vehicles/pedestrians<br>- Use warning devices (e.g., hand signals, high-lights, horns etc.)<br>- Proper timing is essential<br>1a. Do not perform reconnaissance or inspections while driving. Your vehicle should be parked in a safe location when viewing or surveying the Site and vicinity<br>1a. Avoid sudden turns and stops. Don't drive recklessly – be in control of vehicle at all times.<br>1a. In inclement weather, first determine if work can be POSTPONED. Otherwise, plan according to weather conditions including checking forecast along entirety of travel route (especially, for long distances). Reduce speed as road conditions warrant. Travelling with winter car equipment in the winter is strongly recommended (i.e., shovel, scraper, brush, blanket, extra clothing, flashlight, bag of sand). If your vehicle has 4-wheel drive, review the operators manual and understand operating procedure prior to engaging 4-wheel drive. If at any point on your drive weather becomes too severe to proceed safely pull over if safe to do so or seek nearest cover (e.g., overpass)<br>1a. If feeling drowsy or sleepy, do not drive. Pull over in a safe place to rest if you experience any signs of drowsiness. Make sure to get adequate sleep the night before an early drive.<br>1a. Never operate a vehicle under the influence of alcohol or illegal substances or medications affecting your performance.<br>1a. Keep your eyes on the road. Do not call or talk on cellular phones. Pull over to a safe location if you must answer or make a call.<br>1a. When parking, pull-through when possible. If backing is required visually inspect area to ensure it is free from obstructions prior to backing in and relying solely on mirrors; use spotters when available. |
| **2.** Entering/Exiting Vehicle. | **2a. CAUGHT:**<br>Personal injury (broken fingers/hand) while entering or exiting vehicles<br>**2b. FALL:**<br>Personal injury (twisted ankle, deep contusion, concussion, broken wrist/arm, etc.) from slip/fall on uneven or unstable or slippery surface while exiting/entering vehicle<br>**2c. CONTACT:**<br>Severe injury/disability, property damage, monetary loss (insurance premiums, deductibles, loss of license/job) caused by collision with or struck by other vehicles, obstructions, pedestrians, animals, etc. | 2a. Open and close doors slowly. Never put hands or feet in between door and vehicle to avoid pinch points.<br>2b. When exiting the vehicle make sure your feet are on firm footing and weight is evenly distributed before exiting/standing. In inclement weather use hands to support yourself, by holding the car door and/or steering wheel, when exiting the vehicle.<br>2c. Check both directions for traffic before opening door. Do not exit vehicle if traffic does not permit you to exit safely<br>2c. Check anticipated path of door prior to opening, do not open door into any obstructions (e.g., bollards, high curbing) |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-010 | DATE 4/10/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **Generic** | **Surveying** | **Elevation Surveying** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Bjorn Wespestad | Senior Engineer | Brian Hobbs | CHSD |
| William Hansen | Senior Engineer | | |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ AIR PURIFYING RESPIRATOR | ☒ GLOVES: Cut-resistant or leather |
| ☒ HARD HAT | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☒ OTHER: Long sleeve Shirt |
| ☐ LIFELINE / BODY HARNESS | ☐ HEARING PROTECTION | ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing | |
| ☒ SAFETY GLASSES | ☒ SAFETY SHOES: Steel-toe boots | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Surveying equipment (i.e., leveling rod/measuring ruler, tripod and autolevel).

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Check in with Site manager/ property owner. | **1a. CONTACT/EXPOSURE/FALL:** Lack of communication could result in H&S incident. | 1a. Inform Site personnel of work scope, timeline and location(s).<br>1a. Inquire about other activities taking place at the Site.<br>1a. If applicable, obtain General Work permit for the day. |
| **2.** Locate surveying position for instrument and rod and set-up work area | **2a. FALL:** Slip/trip hazards | 2a. Inspect area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.) and obstructions prior to setting up at the survey location. Keep eyes engaged with walking surface while in movement. Remember "Walking is Working."<br>2a. Conduct housekeeping and maintain clear paths to walk in and remove debris as required. |
| | **2b. CONTACT:** Traffic (surveying locations could potentially be in parking areas and sidewalks) | 2b. Be aware of oncoming traffic. Utilize a flagman / spotter for locations in streets or high-traffic areas.<br>2b. Place 42 inch cones around the work area and delineate work zone with caution tape, snow fencing or safety bars, if necessary.<br>2b. Wear appropriate PPE including long-sleeved high visibility clothing and or reflective safety vest.<br>2b. Face traffic, maintain eye contact with oncoming vehicles and establish a safe exit route. |
| | **2c. OVEREXERTION:** Hazard due to carrying, lifting, and bending while transporting equipment | 2c. Use proper body positioning and lifting techniques; keep back straight, lift with legs, keep load close to body, and never reach with a load.<br>2c. Avoid carrying too much equipment at one time and team-lift equipment that is heavier than 50 lb. |
| | **2d. CAUGHT/CONTACT:** Pinch Points / sharp edges associated with setting up the tripod | 2d. Wear cut resistant gloves when handling the tripod and keep fingers away from pinch points located near moving parts of the tripod. Don't carry tripod by the pointed ends. |
| | **2e. OVEREXERTION:** Hazard due to bending awkwardly to look through the autolevel | 2e. When practical, set the height of the autolevel optic so as to minimize bending at the waist. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **3.** Open / close manhole cover to well that is being surveyed (if necessary). | **3a. OVEREXERTION:**<br>Muscle strain | 3a. See 2c. Bend knees when reaching to open well. Use manhole lifting hook or pry bar to avoid bending. |
| | **3b. CAUGHT:**<br>Pinch points associated with removing / replacing manholes and working with hand tools | 3b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools.<br>3b. Use proper tools (ratchet and crowbar, pry bar or magnet for well cover) and inspect before use.<br>3b. Do not put fingers under well cover. |
| | **3c. EXPOSURE:**<br>To potentially hazardous vapors<br>To biological hazards | 3c. No open flames/heat sources.<br>3c. To minimize exposure to vapors, allow well to vent after opening it and before survey activities begin.<br>3c. Work on the upwind side of manhole/well.<br>3.c Use caution while opening lids to inspect work area for bees and insects inside of covers.<br>3c. Use insect/tick repellent as necessary. |
| | **3d. CONTACT:**<br>With traffic | 3d. See 2b. |
| **4.** Perform survey. | **4a. FALL:**<br>Slip/trip hazards | 4a. See 2a. |
| | **4b. CONTACT:**<br>Traffic (surveying locations could be potentially located in parking areas and sidewalks) | 4b. See 2b.<br>4b. Personnel using the scope will be devoting most of their attention to the surveying activity and shall be aware of vehicular and pedestrian traffic. Personnel holding the measuring stick should be extra vigilant of survey personnel and communicate any potential hazards to the instrument person via handheld radio or similar means. Ensure reflective safety vest is worn. |
| | **4c. ENERGY SOURCES:**<br>Electrical shock from survey rod striking overhead electric lines or lights | 4c. Prior to raising and extending the survey rod, personnel should thoroughly inspect the area above the measuring point. If overhead electrical lines are encountered within 20 feet of the measuring point; stop work and consult with the Office Health and Safety Officer. |
| **5.** Break down work area. | **5a. CONTACT:**<br>Traffic (surveying locations can potentially be in parking areas and sidewalks) | 5a. See 2b. |
| | **5b. EXERTION:**<br>Hazard due to carrying, lifting, and bending while transporting equipment | 5b. See 2c. |
| | **5c. CONTACT:**<br>Personal injury or equipment damage by striking surroundings with an extended rod or unsecured tripod leg | 5c. Ensure rod is entirely collapsed prior to mobilization / demobilization between survey points.<br>5c. Ensure tripod legs are fully collapsed and secured with strap prior to mobilization / demobilization between set-ups. |

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| JOB SAFETY ANALYSIS Ctrl. No. GEN-013 | DATE 4/10/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE: | WORK ACTIVITY (Description): | |
|---|---|---|---|
| **Generic** | **Gauging and Sampling** | **Gauging and Sampling** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| Tim Unalp | SHSO | Brian Hobbs | CHSD |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☒ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES | ☐ GOGGLES<br>☐ FACE SHIELD<br>☐ HEARING PROTECTION<br>☒ SAFETY SHOES: Composite-toed or steel-toed boots | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing | ☒ GLOVES: Leather, Nitrile and cut resistant<br>☒ OTHER: Knee pads, Insect Repellant, sunscreen (as needed) |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

42-inch Safety Cones, Caution Tape, Interface Probe with Ground Clamp, and/or Water Level Meter, 20-lb., Type ABC Fire Extinguisher, Buckets. Tools as needed: Socket Wrench, Screw Driver, Crow Bar, Mallet, and Wire Brush.

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Mobilization to monitoring well(s). | **1a. FALL:** Personal injury from slip/trip/fall due to uneven terrain and/or obstructions. | 1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization.<br>1a. Use established pathways, walk and/or drive on stable, secure ground and avoid steep hills or uneven terrain.<br>1a. If working near open water with an unguarded edge, wear life vest. |
| | **1b. CONTACT:** With traffic/third parties. | 1b. Identify potential traffic sources and delineate work area with 42-inch traffic safety cones. Position vehicle to protect against oncoming traffic. Use caution tape to provide a more visible delineation of the work area if necessary.<br>1b. Wear appropriate PPE including high visibility clothing or reflective vest.<br>1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. |
| | **1c. EXERTION:** Muscle strain from lifting equipment | 1c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight.<br>4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier.<br>4c. Make multiple trips to carry equipment. |
| | **1d. EXPOSURE:** To biological hazards. | 1d. Inspect work area for bees and insects.<br>1d. Use insect/tick repellent as necessary. |
| **2.** Open/close well. | **2a. EXERTION:** Muscle strain. | 2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well. |
| | **2b. CAUGHT:** Pinch/crush points associated with removing/replacing manholes and working with hand tools. | 2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools.<br>2b. Use proper tools (ratchet and pry bar or magnet for well cover) and inspect before use.<br>2b. Do not put fingers under well cover. |
| | **2c. CAUGHT:** Pinch points associated with placing J-plug back onto PVC pipe. | 2c. See 2b.<br>2c. Keep fingers out of line-of-fire when securing cap. |
| | **2d. EXPOSURE:** To potential hazardous vapors. | 2d. No open flames/heat sources.<br>2d. To minimize exposure to vapors, allow well to vent after opening it and before sampling activities begin.<br>2d. Stand up-wind if possible, to avoid inhaling vapors. |
| **3.** Gauge well. | **3a. CONTACT:** With contamination (e.g. contaminated groundwater). | 3a. Wear chemical-resistant disposable gloves (over cut-resistant gloves) and safety glasses when gauging well.<br>3a. Insert and remove probe slowly to avoid splashing.<br>3a. Use an absorbent pad to clean probe. |
| | **3b. CONTACT:** With traffic. | 3b. See 1b. |
| | **3c. Exposure:** To static electricity, fire or explosion. | 3c. Ground interface probe to a designated grounding point/rod, well casing or suitably electrically conductive surface to dissipate static electricity. |

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| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **4.** Purge and sample well | **4a. EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives. | 4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives.<br>4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling.<br>4a. Fill sample containers over purge container to avoid spilling water onto the ground.<br>4a. Use an absorbent pad to clean spills.<br>4a. When using a bailer to purge a well, pull the bailer slowly from the well to avoid splash hazards.<br>4a. When sampling or purging the water using a bailer, pour out water slowly to reduce the potential for splash hazards with groundwater.<br>4a. When using a tubing valve always remove the valve slowly after sample collection to release any pressure and avoid pressurized splash hazards.<br>4a. When collecting a groundwater sample always point sampling apparatus (tubing, bailer, etc.) away from face and body. |
| | **4b. CONTACT:** Personal injury from cuts, abrasions, or punctures by glassware or sharp objects. | 4b. To avoid spills or breakage, place sample ware on even surface.<br>4b. Do not over tighten caps on glass sample ware.<br>4b. Wear chemical-resistant nitrile disposable gloves over cut-resistant (i.e., Kevlar) gloves when sampling and handling glassware (i.e., VOA vials) or when using cutting tools. |
| | **4c. EXERTION:** Muscle strain while carrying equipment. | 4c. Use proper lifting techniques when handling/moving equipment, bend knees and keep back straight.<br>4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier.<br>4c. Make multiple trips to carry equipment. |
| | **4d. CONTACT:** With traffic. | 4d. See 1b. |
| | **4e. CONTACT:** Pinch points with groundwater pump components (i.e., wheel, line, clamps). | 4e. Wear leather/cut-resistant gloves when working with groundwater pumps.<br>4e. Never place hands on or near pinch points such as the wheel, clamps or other moving parts during pump operations.<br>4e. Use the correct mechanisms, such as a pump reel, to lower pump into well.<br>4e. Never attempt to manually stop any moving part of equipment including hose reels and/or tubing. |
| | **4f. EXERTION:** Muscle strain from repetitive motion of bailing and sampling a well. | 4f. See 4c.<br>4f. Include a stretch break when repetitive motions are part of the task. |
| **5.** Management of purge water. | **5a. EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). | 5a. Do not overfill container and pour liquids slowly so that they do not splash.<br>5a. Properly dispose of used materials/PPE in appropriate container in designated storage area. |
| | **5b. EXERTION:** Muscle strain from lifting/carrying and moving containers. | 5b. Use proper lifting techniques when lifting / carrying or moving container(s) (see 4c.).<br>5b. Do not overfill container(s). |
| **6.** Decontaminate equipment. | **6a. EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). | 6a. Work on the upwind side, where possible, of decon area.<br>6a. Wear chemical-resistant disposable gloves and safety glasses.<br>6a. Use an absorbent pad to clean spills. |
| | **6b. CAUGHT:** Pinch points associated with handling hand tools | 6b. See 2b.<br>6b. Inspect hand tools for sharp edges before decontaminating. |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-014 | DATE: 4/10/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY: | WORK TYPE: | WORK ACTIVITY (Description): | |
|---|---|---|---|
| **Generic** | **Drilling** | **Hollow Stem Auger Soil Borings / Well Installation** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| Douglas Ferraiolo | Project Geologist | Brian Hobbs | CHSD |
| Tim Unalp | SHSO | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES | ☒ GOGGLES: Spoggles required if winds exceed 15 mph.<br>☐ FACE SHIELD<br>☒ HEARING PROTECTION: (as needed).<br>☒ SAFETY SHOES: Steel or Composite Toe. | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: Fluorescent long-sleeve shirt or long-sleeve shirt and reflective safety vest. | ☒ GLOVES: Leather, Cut-Resistant, and Nitrile.<br>☒ OTHER: Insect Repellant, Sunscreen (as needed). |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Truck-Mounted Drilling Rig or Track Rig, Saw, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Interface Probe, 20 lb. Type ABC Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs.

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

**"SHOW ME YOUR HANDS"**
**Driller and helper should show that hands are clear from controls and moving parts**

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Mobilization / demobilization and establish a work area. | **1a. See Mobilization/ Demobilization JSA GEN-015.** | 1a. See Mobilization / Demobilization JSA GEN-015. |
| **2.** Raising tower / derrick of drilling rig. | **2a. CONTACT:** Overhead hazards. | 2a. Prior to raising the tower / derrick, the area above the drilling rig will be inspected for overhead hazards (wires, tree limbs, piping or other structures) that may be contacted by the rig's tower or drilling rods.<br>2a. The tower / derrick must not be raised beneath overhead power lines unless approved by the Roux PM.<br>2a. Maintain a minimum of 10' from all overhead structures.<br>2a. Do not move the rig while the tower / derrick is raised. |
| | **2b. CONTACT:** Amputation / crush points when raising the rig and instability of rig. | 2b. Inspect the equipment prior to use and avoid any potential amputation points.<br>2b. Lower outriggers to ensure stability prior to raising rig tower derrick. Keep feet and body out of the line of fire when lowering out-riggers.<br>2b. Inspect the set-up location for uneven terrain. Level or avoid area if needed.<br>2b. If the rig needs to be mounted, be sure to use three points of contact. |
| **3.** Advancement of augers for soil boring installation. | **3a. CONTACT:** Equipment imbalance during advancement of drill equipment. | 3a. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and / or tip.<br>3a. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred.<br>**3a. Drillers will maintain the "Purple Zone" policy surrounding augers to ensure no personnel come into contact with augers while in use. Workers will spray paint a 3' semi-circle surrounding the augers to visually show that no personnel should enter the "Purple Zone" while drilling activities are being conducted.**<br>3a. In addition, personnel and equipment that are non-essential to the advancement of the borehole will be positioned away from the rig at a distance that is at least as far as the boom is high (minimum exclusion zone of 20 feet). |
| | **3b. CONTACT:** Flying / spraying debris. | 3b. Wear all required PPE (especially hand, eye, and ear protection).<br>3b. Maintain minimum EZ distance (i.e. swing/tip radius of rig) when rig is in operation to avoid potential line of fire hazards from flying materials or debris. |
| | **3c. CAUGHT:** Limb/extremity amputation, abrasion, and crushing. | 3c. Inspect the equipment prior to use for potential pinch points.<br>3c. Test all emergency shutdown devices prior to drilling.<br>3c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt.<br>3c. Inspect augers, do not use if auger flight is damaged or bent. |
| **Assess** | **Analyze** | **Act** |

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[2] A hazard is a potential danger. Break hazards into six types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.
[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

| [1]JOB STEPS | [2]POTENTIAL HAZARDS | [3]CRITICAL ACTIONS |
|---|---|---|
| **3.** Advancement of augers for soil boring installation (Continued). | | 3c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.<br>3c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment particularly when installing auger flights and steel override casings.<br>3c. Drillers and helpers will understand and use the "Show Me Your Hands" Policy.<br>3c. Spinning augers should have an exclusion zone of 20 feet when in operation. |
| | **3d. FALL:** Slip/trip/fall hazards. | 3d. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.<br>3d. Do not climb over stored materials/equipment; walk around. Practice good housekeeping.<br>3d. Use established pathways and walk on stable, secure ground.<br>3d. Use three points of contact when mounting or dismounting the rig.<br>3d. Remove soil cuttings to avoid a tripping hazard from developing near augers. |
| | **3e. EXPOSURE:** Inhalation of contamination / vapors. | 3e. Air monitoring using a calibrated photoionization detector (PID) to periodically monitor the breathing zone of the work area.<br>3e. The Action Level for breathing zone air is five parts per million (sustained) as detected by the PID.<br>3e. If a reading of >5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional appropriate precautions in accordance with the site specific health and safety plan. |
| | **3f. EXPOSURE:** Noise and dust. | 3f. Wet borehole area with sprayer to minimize dust. Stand upwind and keep body positioned away from rig.<br>3f. Wear hearing protection while drill rig is operating and / or the noise levels exceed 85 dBA. |
| | **3g. EXERTION:** Installing well casings and lifting augers. | 3g. Keep back straight and bend at the knees.<br>3g. Utilize team lifting for objects heavier than 50lbs.<br>3g. Use mechanical lifting device for odd shaped objects. |
| **4.** Installation of well materials. | **4a. CONTACT:** Installing well materials while also pulling up augers.<br>**4b. CAUGHT:** Possible pinch or crush hazard assembling PVC and sending down the borehole.<br>**4c. FALL:** Slip/trip/fall hazards with hand tools and materials.<br>**4d. EXPOSURE:** Potential contamination, harmful vapors, dust, and / or noise.<br>**4e. EXERTION:** Lifting heavy bags of materials to backfill borehole. | 4a. Potential contact with augers during installation of well materials.<br>4a. Keep distance from augers and do not place any materials while augers are in motion.<br>4b. Keep all body parts out of potential pinch points while placing PVC together and sending down borehole.<br>4c. See 3d.<br>4d. See 3e and 3f.<br>4d. Stand upwind to avoid exposure to dust generated from packing materials.<br>4e. See 3g. |
| **5.** Cleaning the auger flights | **5a. CONTACT:** Cuts/scrapes or puncture wound from contacting auger. | 5a. Follow "Show Me Your Hands" Procedure and make sure auger is out of gear before contacting auger with tool or hand.<br>5a. Pull cleaning tool across your body with handle away from body; do not push toward the auger.<br>5a. Do not clean more than ¾ turn around the auger at a time.<br>5a. Wear cut resistant and leather gloves.<br>5a. Always use two hands to operate cleaning tool.<br>5a. Inspect tool before use and remove from service if handle or metal are cracked/fatigued.<br>5a. Stand out of the line of fire. |
| **6.** Decontaminate equipment. | **6a. EXPOSURE / CONTACT:** To contamination (e.g., contaminated groundwater, vapors).<br>**6b. EXPOSURE**: To chemicals in cleaning solution (including ammonia). | 6a. Wear chemical-resistant disposable gloves and safety glasses.<br>6a. Contain decontamination water so that it does not spill.<br>6a. Use an absorbent pad to clean spills, if necessary.<br>6b. See 3e. Wear all appropriate PPE and stand upwind of any exposed cleaning solutions. |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-015 | DATE: 4/10/2023 | ☐NEW ☒REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) | |
|---|---|---|---|
| **GENERIC** | **Site Recon** | **Mobilization/Demobilization** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| Tim Unalp | SHSO | Brian Hobbs | CHSD |
| | | | |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES | ☐ GOGGLES<br>☐ FACE SHIELD<br>☒ HEARING PROTECTION (as needed)<br>☒ SAFETY SHOES: Steel Toe or composite toe | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: Fluorescent reflective vest of high-visibility clothing; long sleeve shirt; long pants | ☒ GLOVES: Leather, nitrile, and cut resistant (as needed)<br>☐ OTHER |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Required Equipment: Varies

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**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| 1. Mobilize/demobilize and establish work area | **1a. FALL:** Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping. | 1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle.<br>1a. Inspect walking path for uneven terrain, steep hills, obstructions, and/or weather-related hazards (i.e., ice, snow, and puddles) prior to mobilizing equipment. Use established pathways. Walk on stable/secure ground.<br>1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping; organize and store equipment neatly in one area at its lowest potential energy.<br>1a. Wear boots with adequate treads.<br>1a. Delineate unsafe areas with 42” cones, caution tape and/or flagging. |
| | **1b. CONTACT:** Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities. | 1b. Observe and maintain the posted speed limits.<br>1b. When first arriving onsite, park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers.<br>1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities and to discuss any special hazards. Ensure that short-service employees (SSE) are identified.<br>1b. Identify potential traffic sources.<br>1b. Wear PPE including high visibility clothing or reflective vest.<br>1b. Use a spotter while moving work vehicles; plan ahead to avoid backing whenever possible.<br>1b. Maintain a minimum exclusion zone when vehicles are in motion (i.e. greater than swing/tip radius of equipment). When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver-to-spotter visibility.<br>1b. Delineate work area with 42” cones, flags, caution tape, and/or other barriers.<br>1b. Position “Work Area” signs at Site entrances, if possible, or at either side of work area. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| | | 1b. Position largest vehicle to protect against oncoming traffic.<br>1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route.<br>1b. Observe potential overhead and ground surface features that may interfere with moving equipment. Clear the path of physical hazards prior to initiating mobilization. |
| | **1c. CAUGHT:** Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment. | 1c. Make sure driver has engaged parking brake and placed wheel chocks in a position to prevent movement. Be sure that vehicle is parked in front/down gradient (positioned to best block oncoming traffic) of work area.<br>1c. Wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects/cutting tools/glass.<br>1c. Keep body parts away from line-of-fire of equipment.<br>1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure.<br>1c. Remove any loose jewelry. Avoid wearing loose clothing and/or ensure loose clothing is secure.<br>1c. Secure all items on the equipment, tighten up any items or features that have potential to shift or break during mobilization. |
| | **1d. OVEREXERTION:** Muscle strains while lifting/carrying equipment. | 1d. Use body positioning and lifting techniques that avoid muscle strain; keep back straight, lift with legs, turn with whole body, keep load close to body, and never reach with a load.<br>1d. Ensure that loads are balanced. Use assistance (mechanical or additional person) to carry equipment that is either unwieldy or over 50 lbs. |
| | **1e. EXPOSURE:** Personal injury from exposure to biological and environmental hazards. | 1e. Inspect area to avoid contact with biological hazards (i.e. poisonous plants, stinging insects, ticks, etc.).<br>1e. Wear long sleeved clothes treated with Permethrin, apply insect repellant containing DEET to exposed skin, and inspect clothes and skin for ticks during and after work.<br>1e. Apply sunscreen (SPF 15+) if exposure to sun for 30 minutes or more is expected. |
| | **1f. EXPOSURE:** Weather related injuries. | 1f. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, nausea, rapid and shallow breathing). Take breaks in cool places and hydrate as needed.<br>1f. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks in warm areas as needed.<br>1f. Wear clothing appropriate for weather and temperature conditions (e.g., rain jackets, snow pants, multiple layers).<br>1f. If lightning is observed, wait 30 minutes in a sheltered location (car is acceptable) before resuming work. |
| | **1g. EXPOSURE:** Personal injury from noise hazards. | 1g. Wear hearing protection if sound levels exceed 85 dBA (if you must raise your voice for normal conversation). |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-016 | DATE: 4/10/2023 | ☐NEW ☒REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **GENERIC** | **Construction – Concrete & Asphalt** | **Concrete Sidewalk Flag / Well Pad Replacement** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Ron Lombino | Senior Hydrogeologist | Brian Hobbs | CHSD |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES | ☐ GOGGLES<br>☒ FACE SHIELD: (When Jackhammering)<br>☒ HEARING PROTECTION: (While Jackhammering or when Compressor is Running)<br>☒ SAFETY SHOES: Steel or Composite toe | ☐ AIR PURIFYINGRESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: High visibility long sleeved shirt/ Safety vest | ☒ GLOVES: Cut Resistant and/or Leather<br>☒ OTHER: Dust Mask |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Required Equipment: Concrete Truck, Concrete Mixer, Jack Hammer, Air Saw or Gas-Powered Saw, Compressor, Hand Tools, Wheel Barrel, Multi-Gas Meter, Safety Cones, Caution Tape, 20-lb. Type ABC Fire Extinguisher, "Work Area" Signs, Pressurized Water Sprayer, Flush-Mounted Curb Boxes

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| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Verify pre-clearance protocol and mobilize/demobilize. | **1a. CONTACT:** Property damage, personal injury, or underground utilities. | 1a. Confirm that local utility companies were contacted prior to sidewalk flag / concrete pad replacement. Obtain One Call Tickets<br>**1a. Walk the Site to evaluate utility markings and review maps and complete subsurface clearance form.** |
| | **1b. CONTACT:** With traffic (including any unintended movement of the work truck), contact / interference with other site activities. | 1b. Identify potential traffic hazards.<br>1b. Use a spotter while moving work vehicles; plan ahead to avoid backing up when unnecessary. Use additional spotters if necessary.<br>1b. Ensure that truck has wheel chocks in place when parked and compressor is chocked if detached from truck.<br>1b. Delineate work area with cones, flags, caution tape, and/or other barriers. Construct pedestrian walkway, if needed. Use truck to barricade if possible.<br>1b. Maintain a minimum exclusion zone based on equipment.<br>1b. Position "Men at Work" signs at site entrances or on either side of exclusion zone.<br>1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route; wear bright colored clothing/safety vest. |
| **2.** Concrete saw cutting and jackhammering. | **2a. CONTACT:** Flying debris and hoses. | 2a. Wear PPE (especially hand, eye, ear and face shield).<br>2a. Use anti-whip devices on compressor hoses.<br>2a. Maintain a minimum exclusion zone based on equipment.<br>2a. If third party vehicles are close by, ask third parties to move vehicles or construct shield (e.g. poly sheeting or plywood) to protect cars. |
| | **2b. EXPOSURE:** Inhalation/exposure to hazardous vapors and/or concrete dust, noise. | 2b. Monitor breathing zone with a calibrated PID and multi-gas meter. If vapors sustain levels > 5 ppm, the Roux field personnel must temporarily cease work and instruct all Site personnel to step away from the area of elevated readings.<br>2b. Wet concrete while using saw to minimize dust. If possible, use Vactron as dust suppression in freezing weather conditions.<br>2b. Stand upwind and keep body behind saw.<br>2b. No open flames/heat sources.<br>2b. Wear hearing protection when saw, jackhammer or air compressor is in operation. |
| | **2c. EXERTION:** Poor body positioning and/or from handling equipment and materials. | 2c. Keep back straight, lift with legs, keep load close to body, and never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use the buddy system for maneuvering loads greater than 50 lbs. or a mechanical lifting device. |

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| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **2.** Concrete saw cutting and jackhammering (Continued). | **2d. FALL:** Tripping/falling due to uneven terrain, weather conditions, and materials /equipment stored at the Site, broken up concrete. | 2d. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.<br>2d. Equipment and tools will be staged in a designated, convenient, stable, and orderly manner. Store at the lowest point of potential energy and out of the walkway and immediate work area.<br>2d. Ensure power cords and water lines are grouped when used within the work area.<br>2d. Concrete flag and flush-mounted curb box will be finished flush to grade so as not to present a slip/trip hazard.<br>2d. Place concrete chunks into an appropriate disposal container (drum, roll-off, dump truck, etc.). |
| | **2e. CAUGHT:** Pinch points associated with the equipment and vacuum hose. | 2e. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools.<br>2e. Inspect the equipment prior to use for potential pinch points.<br>2e. Test all emergency shutdown devices prior to performing task.<br>2e. Inspect saw blade for worn surface or missing teeth; switch blade if damaged or blunt.<br>2e. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.<br>2e. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. Maintain established exclusion zone distance.<br>2e. Use the **"Show Me Your Hands"** Policy. |
| **3.** Mixing/Pouring concrete and installing manhole. | **3a. CONTACT:** Burn from handling/pouring concrete. | 3a. Wear required PPE (including Nitrile gloves, long sleeved shirts, safety glasses) when handling dry/wet concrete and forming concrete flags.<br>3a. Inspect all transfer equipment (Concrete Truck, wheel barrel, etc.) prior to pouring concrete.<br>3a. All non-essential personnel should stay away from the immediate work area; position body out of line-of-fire of equipment and concrete flow. Maintain established exclusion zone distance. |
| | **3b. EXERTION:** Poor body positioning and use or from handling equipment and materials. | 3b. See 2c. |
| | **3c. FALL:** Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the site. | 3c. See 2d. |
| | **3d. EXPOSURE:** Concrete silicates pose dermal and inhalation hazard. | 3d. Wear nitrile {inner} gloves and long sleeve shirt to mitigate dermal contact.<br>3d. Dust mask must be worn for personnel mixing concrete. |
| **4.** Move drum to designated staging area (if used). | **4a. Refer to Drum Handling JSA for Potential Hazards.** | 4a. **Refer to Drum Handling JSA for Critical Actions.** |
| **5.** Decontaminate equipment | **5a. EXPOSURE:** Wet concrete and dust. | 5a. Wear chemical-resistant disposable gloves and safety glasses.<br>5a. Use an absorbent pad to clean spills. |
| | **5b. EXPOSURE:** Chemicals in cleaning solution including ammonia. | 5b. See 3a. |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-017 | DATE: 04/10/2023 | ☐NEW ☒REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY: | WORK TYPE: | WORK ACTIVITY (Description): | |
|---|---|---|---|
| **GENERIC** | **Drilling** | **Monitoring and Recovery Well Development** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| Ron Lombino | Senior Hydrogeologist | Brian Hobbs | CHSD |
| Courtney Lind | Senior Engineer | | |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ AIR PURIFYING RESPIRATOR | ☒ GLOVES: Leather or cut-resistant and Nitrile |
| ☒ HARD HAT | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☒ OTHER: Insect repellant, sunscreen (as needed) |
| ☐ LIFELINE / BODY HARNESS | ☒ HEARING PROTECTION (as needed) | ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing | |
| ☒ SAFETY GLASSES | ☒ SAFETY SHOES: Composite-toe or steel toe boots | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Required Equipment as needed: Truck Rig or support truck, Trailer, 42-inch Safety cones and flags, Caution Tape, Interface Probe, Power Source, Submersible Pump, Surge Block/Plunger, 20 lb. Type ABC Fire Extinguisher, Holding Tanks and/or Buckets, Absorbent Pads, 5-gas meter, Tools as needed: Socket and Pipe Wrench, Screw Driver, Pry Bar, Ratchet, Vault Key, Clamp or Vice Grip.

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**"SHOW ME YOUR HANDS"**
**Driller and helper should show that hands are clear from controls and moving parts**

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Mobilization / Demobilization (**Review Mobilization and Demobilization JSA - GEN-015**) | **1a. CONTACT:** Equipment/property damage. | 1a. The truck rig's tower/derrick will be lowered and secured prior to mobilization.<br>1a. Set-up the work area / position equipment in a manner that eliminates or reduces the need for backing of trucks and trailers.<br>1a. All non-essential personnel should **maintain an exclusion zone greater than the swing/tip radius of equipment.**<br>1a. Beep horn twice before backing up.<br>1a. When backing up with an attached trailer use a spotter Level or avoid if needed. |
| | **1b. FALL:** Slip/trip/fall hazards. | 1b Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.<br>1b. Do not climb over stored materials/equipment; walk around. Store equipment at lowest potential energy. |
| **2.** Open/close well. | **2a. EXERTION:** Muscle strain (some wells have large vault covers). | 2a. Keep back straight, lift with legs, keep load close to body, and never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use the buddy system or mechanical means when lifting objects heavier than 50 lbs or when the shape makes the object difficult to lift. |
| | **2b. CAUGHT:** Pinch points associated with removing/replacing manholes and working with hand tools. | 2b. Wear cut-resistant/leather gloves when working with well vault/cover and hand tools. Do not put fingers under well vault/cover.<br>2b. Use ratchet and pry bar for well cover and inspect before use. |
| | **2c. EXPOSURE:** Potentially hazardous vapors. | 2c. No open flames/heat sources.<br>2c. Allow well to vent after opening it and before starting development activities to minimize exposure to vapors. Air monitoring must be performed prior to set up and during the well development activities. Work on upwind side of well. |
| | **2d. CONTACT:** Traffic. | 2d. Wear required PPE including high visibility clothing or reflective vest.<br>2d. Delineate work area with 42" safety cones and/or other barriers. Position vehicle to protect against oncoming traffic.<br>2d. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. |

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[2] A hazard is a potential danger. Break hazards into six types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – Electricity, Pressure, compression, tension, torque.
[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **3.** Develop well (mechanical surging). | **3a. CAUGHT:** Cut hazards and finger pinch points. | 3a See 2b.<br>3a. Use required PPE including leather/cut-resistant gloves when handling development equipment. Identify finger/hand pinch points. Keep hands away from active surge equipment.<br>3a. All non-essential personnel should **maintain an exclusion zone greater than the swing/tip radius of equipment.** |
| | **3b. CONTACT/EXPOSURE:** Contamination (e.g., SPH, contaminated groundwater, vapors). | 3b. See 2c.<br>3b. Wear Nitrile gloves and safety glasses. Insert and remove surge block/plunger and line/cable slowly to avoid splashing at the surface.<br>3b. Use an absorbent pad to clean any spills. |
| | **3c. EXERTION:** Muscle strain from lifting equipment. | 3c. See 2a.<br>3c. Use mechanical device to insert and remove surge block/plunger if greater than 50lb. |
| | **3d. CONTACT:** Injury while handling wench line/cable, or with active surging equipment. | 3d. If using a drill rig, inspect all wench lines/cables for any kinks or if frayed prior to use. Replace any damaged lines/cables. Review **Drill Rig checklist prior to development activities**.<br>3d. See 3a. |
| **4.** Purging well (pumping water to holding tanks/drums/buckets). | **4a. CAUGHT:** Pinch points associated with connecting hose to tank. Pinch points associated with handling pump and hoses. | 4a. See 3a.<br>4a. Ensure that fingers are not placed near coupling when attaching and securing hose(s). Do not place fingers under pump/hoses. Wear leather or cut-resistant gloves when handling pump/hose(s).<br>4a. Keep hands clear from any line-of-fire. |
| | **4b. FALL:** Using side mounted ladder when attaching hose to tank.<br>Slip, trip, fall from lines/hoses | 4b. Inspect ladder steps to make sure steps are not bent/damaged and free of debris/fluid.<br>4b. Use three points of contact always when using a ladder.<br>4b. Use a hoist or other mechanical means to secure and move hoses.<br>4b. Utilize anti-whip cords and secure couplings on all pressurized hoses. Keep hoses and lines coiled and organized out of designated walking paths around the work zone. |
| | **4c. CONTACT:** Contamination (e.g., SPH, contaminated groundwater). | 4c. Secure water hose to holding tanks/drums/buckets with clamp, vice grip, or similar tool.<br>4c. Do not overfill tanks, and purge/transfer liquids in such a manner that they do not splash. (See 3b).<br>4c. Dispose of used materials/PPE in the designated impacted PPE container. |
| | **4d. EXERTION:** Muscle strain from lifting/carrying equipment. | 4d. See 2a. |
| | **4e. FALL:** Spilled purge water. | 4e. Clean up any spills using absorbent pads or spill kits. |
| **5.** Decontaminate equipment | **5a. CONTACT/EXPOSURE:** Contamination (e.g., SPH, contaminated groundwater, vapors). | 5a. See 3b. |
| | **5b. EXPOSURE/CONTACT:** Chemicals in cleaning solution | 5b. Decontaminate equipment in a well-ventilated area. Wear nitrile gloves to avoid skin contact with cleaning solutions. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| JOB SAFETY ANALYSIS | Ctrl. No. GEN-019 | DATE: 4/10/2023 | ☐NEW ☒REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **GENERIC** | **Site Reconnaissance** | **Site Walk and Inspection** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Sara Barrientos | Project Geologist | Brian Hobbs | Corporate Health and Safety Director |
| Tim Unalp | SHSO | Joe Duminuco | Executive Vice President |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES | ☐ GOGGLES<br>☐ FACE SHIELD<br>☒ HEARING PROTECTION: ear plugs as necessary<br>☒ SAFETY SHOES: Steel or composite toed | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: High-visibility vest or high-vis outerwear | ☒ GLOVES: Leather/cut-resistant/chemical resistant<br>☒ OTHER: Tyvek and rubber boots as necessary, dust mask as necessary |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Required Equipment: Site map, emergency contact list, documentation of urgent care/hospital routes and / or guide familiar with Site, operating cell phone or walkie-talkie if Site allows, and bug spray.

**Commitment to Safety** – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

**SITE SECURITY: Prior to site inspection verify appropriate method to address Site Security concerns as it relates to potential criminal activity, homeless population, and/or isolation concerns. Work with the Project Principal and/or Project Manager to address appropriately.**

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Check in with Site contact. | **1a. CONTACT/EXPOSURE/FALL:** Personal injury caused by lack of awareness of site-specific hazards. | 1a. Inquire about hazards and other activities taking place at the Site.<br>1a. Inform Site contact of work scope, timeline and location(s).<br>1a. Discuss emergency evacuation procedures and muster points with Site contact. |
| **2.** Traversing the Site | **2a. CONTACT:** Property damage and personal injury caused by obstructions/vehicles or unauthorized personnel at remote Sites. | 2a. All equipment must be stowed and secured prior to moving.<br>2a. Maintain speed limit as posted on-site.<br>2a. When possible, drive on established roadways.<br>2a. Yield to all pedestrians.<br>2a. Use pull-through spots or back into parking spots.<br>2a. Don high visibility clothing/safety vest. If working at remote Site, add orange accessories during hunting season. |
| | **2b. FALL:** Uneven terrain and weather conditions. Overgrown shrubs and vines. Equipment in the work zone. | 2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.<br>2b. When possible, use established pathways and walk on stable, secure ground.<br>2b. Communicate traversing hazards with others. |
| | **2c. OVEREXERTION:** Muscle strain while carrying equipment. | 2c. When carrying equipment to/from work area, use proper lifting techniques; keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use the buddy system or mechanical means to maneuver items heavier than 50-lb. If necessary, make multiple trips to carry equipment. |
| | **2d. EXPOSURE:** Biological hazards – ticks; bees/wasps; poison ivy; insects; (Ticks are most active any time the temperature is above freezing, typically from March to November.) | 2d. Inspect area to avoid contact with biological hazards.<br>2d. Ticks:<br>• Treat outer clothing including pants, shirts, socks, boots and hats the evening before with Permethrin (allowing at least two hours before use).<br>• Apply DEET to exposed skin before travelling to the Site and reapply after two hours.<br>• Check for ticks during and after work.<br>2d. Bees:<br>• Use bee spray as appropriate to deter/eliminate bees. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| | | |
|---|---|---|
| | **2e. EXPOSURE:**<br>Heat Stress & Cold Stress.<br>Personal injury from working in inclement weather conditions. | • Protect exposed skin with insect repellent.<br>2d. Poison Ivy:<br>• Identify areas of poison ivy and spray with weed killer. Don Tyvek and rubber boots while traversing poison ivy areas.<br>• If skin contacts poison ivy, wash skin thoroughly with soap and water.<br>2e. Wear sunscreen with SPF 15 or greater on exposed skin whenever 30 minutes or more of sun exposure is expected.<br>2e. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.<br>2e. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.<br>2e. Wear appropriate rain gear as needed.<br>2e. Take frequent breaks if tired, wet, or cold/hot. Drink water.<br>2e. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again. |
| **3.** Walking near heavy equipment and machinery. | **3a. CONTACT:**<br>Personal injury from Site and roadway traffic. Personal injury from flying debris<br><br>**3b. OVEREXERTION:**<br>Personal injury from lifting/moving/rotating equipment.<br><br>**3c. EXPOSURE:**<br>Hearing damage from noise generating equipment/processes.<br>Inhalation/exposure to hazardous vapors and or dust.<br><br>**3d. EXPOSURE:**<br>Working in a remote area. | 3a. See 2a.<br>3a. Maintain an exclusion zone of at least 10'-25' feet from all engaged equipment.<br>3a. Keep body parts out of the line-of-fire of pinch points.<br>3a. Wear appropriate PPE always.<br>3b. See 2c.<br>3c. Wear hearing protection if >85 dBA. (i.e. noise levels which require you to raise your voice to communicate)<br>3c. Always wear leather gloves when handling any tools or equipment.<br>3c. Always wear appropriate PPE based off chemicals present.<br>3d. Use the "buddy system" whenever possible. If working alone, contact PM upon arrival/departure, as well as during work activities prior to commencing work if applicable.<br>3d. Always carry a communication device (i.e., cell phone, walkie-talkie) or directional (i.e., map, compass, etc.) when traversing remote areas.<br>3d. If available, follow Lone Worker Protocol/Procedure. |
| **4.** Working in adverse weather conditions. | **4a. EXPOSURE:**<br>Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions. | 4a. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.<br>4a. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.<br>4a. Wear appropriate rain gear as needed.<br>4a. Take frequent breaks if tired, wet, or cold/hot. Drink water.<br>4a. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again. |
| **5.** Departing Site. | **5a. EXPOSURE:**<br>Exposure to unnecessary hazards should personnel believe Roux is on-Site during an emergency and conduct a search. | 5a. Sign out or notify Site contact and Roux Project Manager of your departure. |

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| JOB SAFETYANALYSIS Ctrl. No. GEN-020 | DATE: 04/11/2023 | ☐NEW ☒REVISED | PAGE 1 of 2 |
|---|---|---|---|

| JSA TYPE CATEGORY: | WORK TYPE: | WORK ACTIVITY (Description): | |
|---|---|---|---|
| **GENERIC** | **Gauging & Sampling** | **Soil Sampling** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| MaryBeth Lyons | Project Scientist | Brian Hobbs | CHSD |
| Tim Unalp | SHSO | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES<br>☒ FLAME RESISTANT CLOTHING (as needed) | ☐ GOGGLES<br>☐ FACE SHIELD:<br>☒ HEARING PROTECTION: (as needed)<br>☒ SAFETY SHOES: Composite-toe or steel toe boots | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing | ☒ GLOVES: Leather, Nitrile and cut resistant<br>☒ OTHER: Insect repellant, sunscreen (as needed) |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Recommended Equipment: 42" traffic cones, caution tape, trowel

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Secure location | **1a. CONTACT:** Personnel and vehicular traffic may enter the work area. | 1a. If in an area with foot or vehicle traffic, delineate the work area with 42" traffic cones and/or caution tape to prevent exposure to traffic and inform others of work activity.<br>1a. Wear reflective vest and/or high visibility clothing.<br>1a. Face the direction of any vehicular traffic. Position vehicle to protect worker from traffic.<br>1a. Communicate work activity with adjacent work areas. |
| | **1b. FALL:** Tripping/falling due to uneven terrain or entry/exit from excavations. | 1b. Inspect pathways and work area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions.<br>1b. Use established pathways and walk on stable, secure ground.<br>1b. Stage equipment and tools in a convenient, stable, and orderly manner. Store equipment at lowest potential energy.<br>1b. Roux employees should stay 5 feet from in-progress excavations and trenches. Should entry to an excavation be required (when stabilization is complete), ladders must be employed for steep embankments, excavations, pits, and trenches. |
| | **1c. EXPOSURE:**<br>Exposure to sun and excessive heat, possibly causing sunburn, heat exhaustion or heat stroke.<br>Exposure to cold temperatures possibly causing cold stress.<br>Skin burn as a result of fire, if applicable.<br>Exposure to explosive vapors due to tank farm operations.<br>Exposure to airborne dust due to high wind speeds.<br>Biological hazards - ticks, bees/wasps, poison ivy, thorns, insects, etc. | 1c. Wear sunscreen with an SPF 15 or greater whenever 30 minutes or more of exposure is expected.<br>1c. Use a tent to shade the work area from direct sunlight particularly when warm temperatures are expected.<br>1c. Be aware of the location of all Site personnel.<br>1c. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing).<br>1c. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse).<br>1c. Take breaks for rest and water as necessary. Move to an area that is well shaded or a climate controlled area (i.e., car, site trailer, etc.).<br>1c. No open flames/heat sources.<br>1c. Conduct air monitoring and ensure that harmul vapor concentrations are within the levels detailed in the Site Specific HASP. Follow procedures detailed in HASP for exceedances.<br>1c. Flame retardant clothing must be worn when specified by Site policy.<br>1c. Cell phones should be disabled when specified by Site policy.<br>1c. Pre-treat field clothing with Permethrin prior to site visit to kill ticks and insects.<br>1c. Wear long sleeved shirts and tuck in (or tape) pant legs into socks or boots to prevent ticks from reaching skin.<br>1c. Spray insect repellant containing DEET on exposed skin when working in overgrown areas of the Site.<br>1c. Inspect area to avoid contact with biological hazards.<br>1c. Wear cut-resistant gloves when handling branches, shrubs, etc. that may lie within the walking path.<br>1c. Wear spoggles if the average wind speeds are above 15 mph.<br>1c. Personnel shall examine themselves and co-worker's outer clothing for ticks periodically when onsite.<br>1c. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water. If rash persists after washing, immediately notify your supervisor, the OM and OHSM for possible consultation with a physician at an approved Occupational Health Clinic. |

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| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **2.** Collect Soil Sample | **2a. CONTACT:**<br>Personal injury from pinch points, cuts, and abrasions from sampling equipment tools, and material within soil sample.<br>Personal injury from contact with moving equipment while sampling.<br>Personal injury from contact with glass sample jars. | 2a. Wear cut-resistant (i.e., Kevlar) gloves under chemical-resistant (nitrile) disposable gloves when handling soil samples and sampling jars.<br>2a. Where possible, use trowel or equivalent tool to avoid contact with soil.<br>2a. If sampling from bucket of heavy equipment, ensure all equipment is off and operator utilizes the “show me your hands” policy.<br>2a. See 1a. |
| | **2b. EXPOSURE:**<br>Exposure to contamination (impacted soil) and/or lab preservatives. | 2b. Wear chemical-resistant (nitrile) disposable gloves over cut resistant gloves to protect hands when handling samples; use containment material or plastic sheeting to protect surrounding areas.<br>2b. Wear safety glasses to protect eyes from dust or air-borne contaminants that may results from disturbing the soil.<br>2b. Where possible, remain upgradient from sample location if collecting soil sample from stockpile, drill rig, etc. to avoid breathing contaminant vapors, if they are present.<br>2b. When collecting soil sample from hand auger, put large zip lock bag over entire auger to prevent spillage of soil on to the ground.<br>2b. Open sample jars slowly and fill carefully to avoid contact with preservatives. |
| | **2c. EXERTION:**<br>Exertion due to repetitive motion and ergonomics. | 2c. Utilize a table or raised surface for soil sampling if multiple soil samples are going to be taken to minimize repetitive bending motion. |
| **3.** Decontaminate equipment | **3a. EXPOSURE/CONTACT:**<br>Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated vapors and/or soil).<br>**3b. EXPOSURE:**<br>Chemicals in cleaning solution including ammonia. | 3a. Wear chemical-resistant (nitrile) disposable gloves and safety glasses.<br>3a. Use an absorbent pad to clean spills.<br>3a. Properly dispose of used materials/PPE in provided drums in designated drum storage area.<br>3a. Remain upwind of sample and avoid breathing contaminant vapors, if they are present.<br>3b. Wear chemical-resistant (nitrile) disposable gloves and safety glasses.<br>3b. Work on the upwind side of decontamination area.<br>3b. Use an absorbent pad to clean spills.<br>3b. Properly dispose of used materials/PPE in provided drums in designated drum storage area. Ensure that all drums are properly labeled and secured. |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-021 | DATE: 4/10/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY: | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **GENERIC** | **Gauging and Sampling** | **Soil Vapor Sampling (Permanent Monitoring Points)** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Jeff Wills | Principal Hydrogeologist | Brian Hobbs | CHSD |
| Tim Unalp | SHSO | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ AIR PURIFYING RESPIRATOR | ☒ GLOVES: Cut-resistant & Nitriles |
| ☒ HARD HAT | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☒ OTHER: Bug Spray, Sun Screen, Knee Pads or kneeling pad |
| ☐ LIFELINE / BODY HARNESS | ☐ HEARING PROTECTION | ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing | |
| ☒ SAFETY GLASSES | ☒ SAFETY SHOES: Steel-toe boots | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

9/16" Socket and Wrench, Non-Toxic Clay, Teflon-Lined Tubing, Masterflex Tubing, Air Pump with Low Flow, Dry Cal, Enclosure (Bucket with 2 holes), Helium Gas Canister, Summa Canisters and Flow Controllers, MultiRae Photo Ionization Detector (PID), Helium Detector, Tubing Cutter, 42-inch Safety Cones, Caution Tape or Retractable Cone Bars

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.

**Work Zone (WZ): A 5-foot exclusion zone will be maintained for non-essential personnel.**

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Define and secure work area. | **1a. FALL:** Potential tripping hazards. | 1a. Ensure work area is secure and inform others (third party) of work activity.<br>1a. Remove tripping hazards and inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. |
| | **1b. CONTACT:** Potential contact with moving vehicles or pedestrians. | 1b. If working alongside roads, look both ways before entering roadways, face traffic, and utilize work vehicle to protect employees.<br>1b. Delineate work area (including vehicles) with traffic safety cones and caution tape or retractable cone bars.<br>1b. Maintain a 5-foot exclusion zone.<br>1b. Wear high visibility clothing or reflective safety vest. |
| | **1c. EXERTION:** Muscle strain while lifting and carrying equipment. | 1c. When carrying equipment to/from work area, keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced. Use the buddy system or mechanical means to maneuver loads heavier than 50-lbs. If necessary, make multiple trips to carry equipment. |
| **2.** Remove well cover / close well cover. | **2a. CONTACT/CAUGHT:** Pinch points and scrapes associated with hand tools and well covers. | 2a. Keep hands away from pinch points.<br>2a. Use hand tools with extensions or magnet to remove and replace well covers.<br>2a. Wear cut-resistant gloves.<br>2a. Use knee pads or kneeling pad when repetitive kneeling on rough ground is anticipated. |
| | **2b. FALL:** Potential tripping hazards associated with installing bolts. | 2b. Place security bolts in secure location so not to create tripping hazards. Replace security bolts so that they fit flush with monitoring well covers. |
| | **2c. EXERTION:** Physical exertion to remove bolts that were over torqued or stripped. | 2c. Replace any security bolts that show signs of stripping. Do not over tighten.<br>2c. Use body positioning and bending techniques that minimize muscle strain; keep back straight, bend at the knees.<br>2c. See 2a. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **3.** Screen vapor point with PID. | **3a. FALL:**<br>Potential tripping hazards associated with equipment.<br><br>**3b. EXPOSURE:**<br>Inhalation of soil vapor | 3a. Place equipment in one area close to the sampling location.<br>3a. Identify area where equipment is to be stored within the work area (away from main walking path).<br>3a. Don't leave equipment on the ground. Return equipment to storage area between uses.<br>3b. Replace brass caps immediately upon completion to avoid soil vapors migrating to the surface through sample tubing.<br>3b. Stand upwind of sample point during screening activities. |
| **4.** Remove/replace brass caps at the end of the sample tubing. | **4a. CONTACT:**<br>Pinch points associated with hand tools and brass caps.<br><br>**4b. EXPOSURE:**<br>Potential pathway for vapors to migrate to land surface. | 4a. Use wrench to remove and replace brass caps.<br>4a. Wear cut-resistant gloves to protect against pinch points and scrapes.<br>4b. See 3b.<br>4b. Stand upwind of sample point location. |
| **5.** Set up soil vapor sampling equipment and calibration of meters. | **5a. FALL:**<br>Potential tripping hazards associated with equipment and tubing.5b.<br><br>**5b. CONTACT:**<br>Pinch points associated with handling equipment.<br><br>**5c. EXPOSURE:**<br>Inhalation of calibration gas and helium. | 5a. See 3a.<br>5a. Keep tubing slack to a minimum and locate the summa canister as close to the sampling location as possible.<br>5a. Avoid stepping over equipment and tubing.<br>5b. Do not place fingers/hands under sampling equipment.<br>5b. Make multiple trips when unloading equipment in work area.<br>5b. Wear cut-resistant gloves to protect against pinch points while handling sampling equipment.<br>5c. Review SDS for each type of calibration gas used before calibrating.<br>5c. Calibrate meters in a well-ventilated area and keep air flow regulator away from face.<br>5c. Close valve on canisters after use to avoid inhalation of excess helium or calibration gas.<br>5c. Stand up wind of bucket during helium tracer gas test. |
| **6.** Cleaning Work Area. | **6a. FALL:**<br>Potential tripping hazards associated with equipment and tubing.<br><br>**6b. CONTACT:**<br>Storing and transport of equipment in car. | 6a. See 3a.<br>6a. See 3b.<br>6b. Ensure that equipment is placed securely in the vehicle. Do not stack equipment on top of each other. Secure equipment so that it will not slide while being transported.<br>6b. Wear cut-resistant gloves while handling/loading equipment. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| JOB SAFETY ANALYSIS | Ctrl. No. GEN-023 | DATE: 04/11/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) | |
|---|---|---|---|
| **Generic** | **Construction** | **Spotting Heavy Machinery** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| Levi Curnutte | Senior Scientist | Brian Hobbs | CHSD |
| Tim Unalp | SHSO | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ Particulate Respirator | ☒ GLOVES: Cut resistant / leather |
| ☒ HARD HAT | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☐ OTHER: |
| ☒ LONG SLEEVED SHIRT | ☐ HEARING PROTECTION | ☒ PPE CLOTHING: Fluorescent reflective clothing | |
| ☐ LIFELINE / BODY HARNESS | ☒ SAFETY SHOES: Steel-/Composite-toe boots/shoes | | |
| ☒ SAFETY GLASSES | | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Heavy Machinery (i.e. excavator, payloader, truck, forklift, etc.), two-way radios.

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Prepare for machine activity. | **1a. CONTACT:** Obstructions in the work area may create contact hazards from machinery.<br><br>**1b. Fall :** Slip/Trip/Fall | 1a. Cordon off the work area with safety barrels/cones and a rigid barrier (snow fence, traffic bar, etc.). Communicate that only necessary personnel should be in the work area. Spotter and equipment operator shall enforce the **EZ.** Operator will not operate but shall remain in the hands-off mode while personnel are within the exclusion zone.<br><br>1b. Ensure that work area is flat, level and clear of any obstructions or debris before setting up work zone. |
| **2.** Spotting. | **2a. CONTACT:** Machine or load contact with personnel, property, or machinery. | 2a. Discuss the specifics of the work with the operator and be clear about any hand signals that will be used. Clearly discuss the limits of the assigned work area and the machine's Exclusion Zone. Maintain Exclusion Zone. The Exclusion Zone shall be delineated by using 42-inch traffic cones/barrels and a fixed rigid barrier.<br>2a. The Minimum Heavy Equipment Exclusion zone is greater than the swing/tip radius of equipment.<br><br>2a. Both the spotter and equipment operators shall have 2-way radios/cellular devices on their persons to ensure audible communication in the event any changes or new hazards may arise.<br><br>2a. All workers should stay outside of the Exclusion Zone of all equipment unless operator is stopped and in "Hands Off" mode. **(This includes the spotter unless an exception has been established in the Site-specific JSA).** If the Exclusion Zone must be reduced due to work area restrictions, then the spotter and operator shall enforce the reduced Exclusion Zone.<br><br>2a. Spotters must make eye contact with the machine operator or all movement ceases until visual contact can be reestablished.<br><br>2a. Spotter shall keep an eye out for any issues with the machine the operator may not see and communicate with other work crews and spotters on behalf of the operator.<br><br>2a. If the spotter needs to take a break, he must find a replacement before leaving or have the machine stop operations. **No heavy equipment shall operate without a spotter under any circumstances.**<br><br>2a. Wear fluorescent clothing/safety vest.<br><br>2a. **Do not multitask. Only perform Spotting** |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| | **2b. FALL:**<br>Slip/Trip/Fall | 2b. Look where walking to identify and avoid slip/trip/fall hazards. Avoid icy and/or wet surfaces. Remove obstacles if possible.<br>2b. Use designated walkways during spotting whenever possible.<br>2b. **Do not walk backwards. Always face the direction you are walking towards.** |
| | **2c. CAUGHT:**<br>Caught between machinery and nearby objects. | 2c. **Maintain Exclusion Zone.** Do not stand between large, loose or fixed objects or structures and the machinery while it is in motion. Keep in sight of operator at all times while being aware of surrounding structures. |
| | **2d. EXPOSURE:**<br>Inhalation of exhaust from machinery. | 2d. The spotter will position him/herself upwind of the working machinery, when possible. Spotter will also inform others working within the vicinity of the EZ of proper positioning, if applicable. |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-024 | DATE: 04/11/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) | |
|---|---|---|---|
| **GENERIC** | **Site Maintenance** | **Tree/Brush/Overgrowth/Lawn Maintenance** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| Robert Chimchirian | Principal Engineer | Brian Hobbs | CHSD |
| Scott Wright | Senior Geologist | | |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES: spoggles when using chain saw | ☐ GOGGLES<br>☐ FACE SHIELD<br>☒ HEARING PROTECTION<br>☒ SAFETY SHOES: Steel Toed Boots (Composite Toe are not acceptable for use with chainsaws)<br>☐ KNEE PADS | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: High visibility long- sleeved shirt/Fluorescent reflective vest with long-sleeved shirt | ☒ GLOVES: Cut-Resistant ANSI Level 2 work gloves<br>☒ OTHER: Insect Repellant (DEET/permethrin), sunscreen (as needed), logging helmet, safety glasses, Tyvek (as needed). |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Required Equipment: Brush Hog, Wood Chipper, Lawn Mower, Hand Grabber, Blower, Line Trimmers, Pruning Shears, Chain Saw, Hand Tools,42" Safety Cones, Wheel Chocks, A-Frame ladder.

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Inspect all equipment prior to use. | **1a. FALL:** Uneven terrain and other debris. | 1a. Use designated walk areas. Remove slip, trip and fall hazards from walk areas. |
| | **1b. EXPOSURE:** Biological hazards, and bloodborne pathogens (i.e., insects, poison ivy, snakes, used syringes, contaminated trash, bed bugs, etc.) and sun exposure. | 1b. Equipment inspections should take place in a parking lot or cleared area to avoid exposure to biological hazards (e.g. paved parking lot, stone paved area, etc.). |
| **2.** Prune Brush/Overgrowth Maintenance. | **2a. FALL:** Uneven terrain and other debris. | 2a. Use designated walk areas. Remove slip, trip and fall hazards from walk areas. |
| | **2b. EXPOSURE:** Biological hazards, and bloodborne pathogens (i.e., insects, poison ivy, animals, used syringes, contaminated trash, bed bugs, etc.) and sun exposure. | 2b. Survey work area: Identify biohazards (i.e., bees nest, toxic vegetation, animals).<br>2b. Use bee sprays to remove nests.<br>2b. Avoid contact with toxic vegetation (i.e., poison ivy). If contact cannot be avoided, wear protective gloves or coveralls when handling toxic vegetation. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water.<br>2b. Wear light-colored clothing..<br>2b. Pre-treat field clothing with Permethrin prior to site visit to kill/repel ticks and insects. [Note: clothing treated with Permethrin should be allowed 2 to 4 hours to dry prior to being worn.]<br>2b. Wear long-sleeved shirts and tuck in (or tape) pant legs into socks or boots to prevent ticks from reaching skin.<br>2b. Spray insect repellant containing DEET on exposed skin when working in overgrown areas of the Site.<br>2b. Wear cut resistant gloves when handling branches, shrubs, etc. that may lie within the walking path.<br>2b. Have Tyvek suits onsite in case tick populations in work areas warrant additional PPE.<br>2b. Personnel shall examine themselves and co-worker's outer clothing for ticks periodically when onsite.<br>2b. Wear sunscreen with an SPF of at least 15 whenever 30 minutes or more of exposure is expected.<br>2b. Use grabber to pick up trash and sharp objects.<br>2b. Place sharps (syringes) in a hard shelled container and dispose of at a designated facility.<br>2b. Use mechanical methods when possible to lift and load abandoned mattresses and sofas to avoid contact with bed bugs. |
| | **2c. CONTACT:** Falling debris or overhead hazards. Contaminated soils. Personal injury from contact with hand tools/equipment. | 2c. Wear safety glasses and hardhat.<br>2c. Prune in a manner so that cuttings are propelled away from the operator and bystanders.<br>2c. Stay clear from line-of-fire of overhead branches when cutting, as well as check branches for tension prior to pruning.<br>2c. Wear coveralls and nitrile gloves over cut-resistant gloves to protect against exposure to potentially contaminated soils.<br>2c. Check handle of chainsaw for proper position (tool should be balanced at handle) adjust and tighten as needed.<br>2c. Check integrity of blade edge; sharpen as necessary to avoid slippage while cutting. |
| | **2d. FALL:** Pruned branches. | 2d. Place in back of truck branches cut from shrubs and trees to minimize trip hazards and to make it easier to identify any additional trip hazards (i.e., branches, roots, depressions). |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **3.** Branch/Tree Removal using chain saw. | **3a. OVEREXERTION**: Back strain when cutting, lifting and reaching. | 3a. Use correct body positioning while handling saw, bend at the knees, keep back straight and saw forward and away from body. Be aware of foot and leg placement in relation to saw blade.<br>3a. Use an A-Frame ladder to cut hard-to-reach branches.<br>3a. Use a buddy to stabilize ladder if the terrain is uneven.<br>3a. Use the buddy system to lift branches that are heavier than 50 lbs. |
| | **3b. CONTACT:** Deep cut and amputation hazard while operating chainsaw. | 3b. Ensure chain guard is on chain saw.<br>3b. Cut away from body.<br>3b. Turn off chain saw when it is not in use.<br>3b. Wear protective chaps over legs. |
| | **3c. FALL:** Uneven terrain and debris. | 3c. Use three points of contact when exiting/entering truck.<br>3c. Inspect walking path for uneven terrain, weather-related hazards (i.e., tree debris, puddles, ice, etc.), and obstructions prior to accessing work area.<br>3c. Use established pathways and walk on stable, secure ground.<br>3c. Place tools and equipment in designated area and maintain good housekeeping.<br>3c. Wear boots with a minimum of ¼" treads and steel toes. |
| | **3d. EXPOSURE:** Biological hazards, animals, and loud noise from equipment. | 3d. See 2b.<br>3d. Survey your surroundings for potential hazards.<br>3d. Wear logging helmet equipped with hearing protection to prevent exposure to loud engine noise.<br>3d. Inspect area for insect nests and toxic vegetation and remove as necessary, or stay away until sprayed.<br>3d. Wear hearing protection while using the chain saw. |
| | **3e. CONTACT:** Flying debris. Potential contact with chainsaw blade or hot surface and fence. | 3e. Determine areas where tree or branches are to be felled (cut so branches fall away) and plan escape route accordingly; delineate area and identify obstructions.<br>3e. Wear logging helmet equipped with screen and always wear spoggles.<br>3e. Provide advanced warning when tree will be coming down.<br>3e. Other personnel should maintain a distance of 100 feet away from large tree cutting activities. |
| **4.** Branch/Tree Consolidation. | **4a. CONTACT:** Downed branches and tree. Loading of debris from tree into truck. | 4a. Wear cut-resistant gloves and ensure arms are fully covered by long sleeve shirt while handling trees.<br>4a. Do not stand under branches that are being cut. |
| | **4b. OVEREXERTION:** Back strain when cutting, lifting, consolidating. | 4b. See 3a. above.<br>4b. Cut downed trees into pieces that are less than 50 lbs. Use assistance for loads heavier than 50 pounds. |
| | **4c. EXPOSURE:** Biological hazards, animals and noise. | 4c. See 3b. above. |
| **5.** Cut Lawn Area/ and sweep/blow away grass cuttings. | **5a. CONTACT:** Obstacles and large debris. Flying debris. | 5a. Inspect work area and identify hazards before starting the work. Remove small obstacles when possible and avoid large obstacles that cannot be removed. |
| | **5b. EXPOSURE:** Loud noise from the mower and dust while blowing. | 5b. **Maintain 10' exclusion zone** around mower and a **30' exclusion zone** around mower discharge.<br>5b. Wear hearing protection while using the mower.<br>5b. Wear dust masks and blow downwind when possible. |
| **6.** Load Equipment and Leave work site. | **6a. CONTACT:** Sharp edges of equipment. Faulty equipment. | 6a. Inspect tools before loading them.<br>6a. Carry equipment by the handles. Check handle for proper position (tool should be balanced at handle), adjust and tighten as needed. Keep working end of tool facing away from body to prevent contact.<br>6a. Wear leather gloves. |
| | **6b. EXPOSURE:** Biological hazards. | 6b. Conduct tick check. Inspect any areas of body that were exposed, all clothing and other potential entry points such as the ankle and neck areas should be examined closely.<br>6b. Wash any areas of exposed skin. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-025 | DATE: 04/11/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 1 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **Generic** | **General** | **Trucking** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Lauren Dolginko | Project Geologist | Brian Hobbs | CHSD |
| Tim Unalp | SHSO | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ AIR PURIFYING RESPIRATOR | ☒ GLOVES: Leather or cut resistant |
| ☒ HARD HAT | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☐ OTHER |
| ☐ LONG SLEEVED SHIRT | ☐ HEARING PROTECTION | ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility long sleeved clothing | |
| ☐ LIFELINE / BODY HARNESS | ☒ SAFETY SHOES: Steel-toe boots | | |
| ☒ SAFETY GLASSES | | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Heavy equipment (i.e. trucks)

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in Hazard recognition and mitigation throughout the day by verbalizing SPSAs.

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Set up work zone. | **1a. CONTACT:** Personal injury/property damage caused by obstruction/vehicle. | 1a. Establish work zone for manifesting/paperwork by communicating with workers before task begins. Maintain a minimum **Exclusion Zone (EZ)** around all heavy equipment. |
| **2.** Loading of truck. | **2a. CONTACT:** Rolling Vehicle could cause bodily harm. | 2a. All commercial vehicles without an operator must have their engines off and wheels chocked. Truck and loading area should be on level and stable ground. |
| | **2b. CONTACT:** Machine or load may crush personnel, property or machinery. | 2b. All machines (Excavator, Lull, Backhoe) must have a spotter. Spotter must communicate contact hazards such as other personnel in the work area, objects in the machine's blind spot, and overhead lines to the operator. Spotter and operator should have 2-way radios or established hand signals to communicate when needed.<br>2b. Loads must not be swung over other vehicles or personnel.<br>2b. Maintain **EZ** around all equipment. |
| | **2c. CONTACT:** Load shifting during travel. | 2c. Secure all loads prior to moving the truck with chains or straps or cribbing.<br>2c. Any loose soil or debris should be cleaned off truck sides prior to truck mobilization.<br>2c. All truck beds must be secured prior to traveling. |
| **3.** Dumping loads. | **3a. CONTACT:** Truck may flip sideways or backwards. | 3a. All workers must stay behind and away from the side of trucks that are dumping to avoid contact with flying debris and the truck potentially tipping sideways or backwards. EZ must be maintained equal to the height of bed while lifted. |
| **4.** Exchanging paperwork with truck driver. | **4a. CONTACT/CAUGHT:** Broken bones from contact by vehicle. | 4a. Truck driver should exit truck with proper PPE, using the three-point stance, and enter the established work zone to complete paperwork. If Site-specific safety prohibits drivers from exiting the truck, wait until truck is finished loading, with engine turned off, before approaching truck.<br>4a. Always establish eye contact with driver prior to approaching truck.<br>4a. Confirm sides of truck have been cleaned/brushed off prior to approaching truck. |
| | **4b. FALL:** Slip, Trip or Fall may cause muscle strains or tears, abrasions or lacerations, or broken bones. | 4b. Survey walking route to identify slip/trip/fall hazards. Avoid icy/wet surfaces. Remove slip/trip/fall hazards if present.<br>4b. Communicate with driver and spotter prior to approaching truck. Maintain **EZ** around all heavy equipment. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

| JOB SAFETY ANALYSIS | Ctrl. No. GEN-026 | DATE: 04/11/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **GENERIC** | **O&M** | **Vac Truck Product Pump Out of ASTs and Drums** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Alfredo Fernandez | Staff Scientist | Brian Hobbs | CHSD |
| Tim Unalp | SHSO | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ AIR PURIFYING RESPIRATOR | ☒ GLOVES: Cut Restant / Leather / Nitrile / Chemical resistant |
| ☒ HARD HAT | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☐ OTHER |
| ☒ LIFELINE / BODY HARNESS | ☒ HEARING PROTECTION | ☒ PPE CLOTHING: High Visibility clothing, Tyvek suit (if needed), fire retardant suit | |
| ☒ SAFETY GLASSES | ☒ SAFETY SHOES: Steel or composite toed | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Required Equipment: vac hoses, 5-gas meter (multi-gas meter), 20 lb. Type ABC fire extinguishers, safety cones, rigid barriers
Recommended: sunscreen/bug repellent (as needed)

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.

**EXCLUSION ZONE (EZ): Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.**

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Calibrate multi-gas meter | **1a. EXPOSURE:** Calibration gas. | 1a. Outside of work area calibrate the multi-gas meter while wearing nitrile gloves and safety glasses.<br>1a. Ensure calibration gas is contained. Avoid inhalation of the gas. |
| **2.** Perform Vac Truck Inspection | **2b. CONTACT:** With personnel and structures | 2a. Don appropriate PPE including high visibility clothing.<br>2a. Prior to moving truck, perform a visual check of the critical parts with the driver and complete appropriate checklist. |
| **3.** Setup Vac Truck and Work area | **3a. CONTACT:** With personnel and structures. | 3a. Don high visibility clothing.<br>3a. Prior to moving truck, review where truck is to be positioned and secure work area with 42" traffic cones and rigid barrier/snow fence.<br>3a. Review hand signals with driver prior to backing and use a spotter at all times while moving the vehicle.<br>3a. Chock wheels once in place. |
| | **3b. CAUGHT:** In the line of fire of vac truck while backing.<br>Caught in pinch points while making hose connections. | 3b. Back up spotter must position self to "leave an out". Stay out of the line-of-fire of the truck.<br>3b. Keep hands clear of potential pinch points while making hose connections (i.e., cam fittings); wear cut-resistant gloves. |
| | **3c. SLIP/TRIP/FALL:** Hazards from any debris in the immediate area. | 3c. Inspect work area for slip, trip or fall hazards and remove or delineate. Designate a walking path free of debris.<br>3c. Stage tools and equipment out of walking surfaces to prevent slip/trip/falls. Maintain good housekeeping.<br>3c. Minimize vac hose/bond wire lengths and setup outside of walking paths. |
| | **3d. EXPOSURE:** Biological hazards.<br>Contaminants in or on vac hose<br>Loud noise from truck. | 3d. Inspect work area for signs of biological inhabitation (insect nests or activity, animal signs).<br>3d. Use permethrin and DEET when working in grassy locations to prevent tick and insect exposure.<br>3d. Wear light clothing when possible and conduct a tick/insect check routinely.<br>3d. Wear nitrile gloves and keep hose clean with absorbent pads.<br>3d. Minimize duration or work around loud equipment if possible. Don hearing protection when noise levels exceed 85 dBA. |
| | **3e. ERGONOMICS:** From setting up work area and vac hoses. | 3e. Utilize correct body positioning (i.e., knees bent, back straight, shoulders square).<br>3e. Do not reach more than an arm's length away to obtain an item.<br>3e. Use the buddy system to maneuver loads heavier than 50lbs. |
| | **3f. ENERGY:** Static electricity. | 3f. Verify truck is bonded to vessel that is being vacuumed and that the truck is grounded. |

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.
[2] A hazard is a potential danger. Break hazards into six types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.
[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **4.** Perform Vac Activities. | **4a. SLIP/TRIP/FALL:** Hazards from any debris in the immediate area. | 4a. Maintain distance of 10 feet from vac hose/truck while operating.<br>4a. Ensure vac truck wheels are chocked. |
| | **4b. CAUGHT:** In crush/pinch points associated with vac truck valve handles. | 4b. Keep hands clear of potential pinch points while making hose connections (i.e., cam fittings); wear cut-resistant gloves. |
| | **4c. TRIP/SLIP/FALL:** Hazards from any debris in the immediate area. | 4c. See 3c. |
| | **4d. EXPOSURE:** Liquids, noise, and vapors. | 4d. Secure hose connections prior to beginning vac activities (cam-lock couplings fully latched and locking pins in place).<br>4d. Upon completing vac activities, wipe down equipment with absorbent pads, as necessary.<br>4d. Don nitrile gloves while handling impacted equipment.<br>4d. Monitor breathing zone with multi-gas meter.<br>4d. Minimize duration or work around loud equipment if possible. Don hearing protection if noise exceeds 85 dBA. |
| **4.** Obtain tank level measurement / Pack truck for departure. | **5a. SLIP/TRIP/FALL:** From tools and equipment in the work area.<br><br>Climbing fixed ladder to gauge truck. | 5a. See 3c.<br>5a. Prior to ascending truck ladder, verify that it is secure and in good condition (i.e., all steps intact, no signs of rot, no missing hardware). Use three points of contact at all times.<br>5a. If vac truck is equipped with a catwalk and guardrails, verify that they are structurally sound.<br>5a. Don harness and attach lanyard to anchor point if truck is not equipped with catwalk around hatch of truck. Inspect harness and lanyard for tears prior to use. |
| | **5b. ERGONOMICS:** Opening vac truck hatch. | 5b. See 3e. |
| | **5c. EXPOSURE:** Petroleum-impacted materials. | 5c. Wipe down gauge stick over hatch so as not to drip liquids on truck or ground.<br>5c. See 4d. |
| | **5d. CAUGHT:** Pinch points when closing hatch, storage boxes. | 5d. See 4b. |

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| JOB SAFETY ANALYSIS | Cntrl. No. GEN-027 | DATE: 04/11/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) |
|---|---|---|
| **GENERIC** | **Drilling** | **Pre-Drilling Clearance, Vactron and Air Knife** |

| DEVELOPMENT TEAM | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE |
|---|---|---|---|
| Courtney Rempfer | Project Scientist | Joseph Midwig | Senior Engineer |
| Sara Redding | Senior Hydrogeologist | Brian Hobbs | CHSD |
| | | | |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST<br>☒ HARD HAT<br>☐ LIFELINE / BODY HARNESS<br>☒ SAFETY GLASSES | ☐ GOGGLES<br>☒ FACE SHIELD (While Air Knifing)<br>☒ HEARING PROTECTION (As needed)<br>☒ SAFETY SHOES: Composite toe or steel toe boots | ☐ AIR PURIFYING RESPIRATOR<br>☐ SUPPLIED RESPIRATOR<br>☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing; long-sleeve shirt | ☒ GLOVES: Leather, Nitrile, cut-resistant<br>☒ OTHER: Dusk mask, insect repellant, sunscreen (as needed) |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Vac-Truck or Vac Drum, Compressor, Jack Hammer, Air Knife. Circular Saw, Hand Tools, Dust Mask, Photoionization Detector, Multi Gas Meter, 42 inch safety cones and flags, Retractable Cone Bars, Caution Tape, 20 lb. Fire Extinguisher, "Work Area" Signs, Pressurized Water Sprayer

**Commitment to Safety – All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs**

**EXCLUSION ZONE: All non-essential personnel will maintain a distance of 10 feet from drilling equipment while equipment is moving/engaged**

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| 1. Verify pre-clearance protocol | **1a. CONTACT:** Underground utility damage; property damage; personal injury. | 1a. Confirm that (if applicable) "Call Before You Dig" and local utility companies were contacted prior to starting work in order to confirm utility mark outs. Must have a case # before digging.<br>1a Walk the Site to evaluate utility markings and review maps (see Site Walk Inspection JSA - GEN-019). Utilities are not always properly marked out, ensure use of observational skills through the pre-clearing checklist.<br>1a. Review pre-clearing checklist form and sub-surface clearance form. Pre-clearing protocol indicates that clearance must be conducted to a minimum of 5 vertical feet below ground surface or 10 vertical feet below ground surface in the critical zone using hand tools. |
| | **1b. ENERGY SOURCE/CONTACT:** Property damage; Pressurized water mains may cause lacerations or broken bones. Pressurized gas mains may explode causing serious injury, or death. Underground electric may cause severe burns, shock, or death. | 1b. Pre-clearing of each soil boring/monitoring well location must be conducted to a minimum of 5 vertical feet below the ground surface (10 feet minimum for Critical Zone) using hand tools (shovel and non-metallic dig bar and hand auger) prior to drilling. Supervisor should be contacted to discuss appropriate pre-clearing depth.<br>1b. MUST Complete subsurface clearance checklist prior to pre-clearance. |
| | **1c. FALL:** Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones. | 1c. Be aware of the conditions when walking or loading equipment and working. Walk within established pathway avoiding uneven surfaces. Remove potential slip/trip/fall hazards. |
| 2. Mobilize/demobilize and establish work area | **2a. SEE MOBILIZATION / DEMOBILIZATION JSA – GEN-015** | 2a. See Mobilization / Demobilization JSA. |
| 3. Concrete saw cutting, jack hammer and hand clearance with hand tools, air knife | **3a. CONTACT:** Flying debris striking face or body | 3a Maintain 10' minimum exclusion zone. Use the required PPE (i.e., leather/cut proof gloves, safety glasses/face shield).<br>3a. Use anti-whip devices on compressor hoses. Ensure hose couplings are secure.<br>3a Wear a face shield to protect face from flying debris when using air knife.<br>3a. Utilize a traffic cone, cage or physical barriers over the hole during air knife activities to keep flying debris close to ground. |
| | **3b. EXPOSURE:** Inhalation/exposure to hazardous vapors and/or concrete dust, noise exposure | 3b. Monitor breathing zone with a calibrated PID and/or multi-gas meter. If meters sustain readings greater than recommeneded in the HASP for the specific contaminant of concerns (COCs) the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings. Contact PM.<br>3b. Wet concrete while using saw to minimize dust and wear dust mask to prevent inhalation.<br>3b. Stand upwind and keep body behind saw. Observers and helpers should avoid line-of-fire for saw blade. Always cut away from body.<br>3b. No open flames/heat sources. |

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

| | | |
|---|---|---|
| | **3c. ENERGYSOURCE/CONTACT:** Property damage; Pressurized water mains may cause lacerations or broken bones. Pressurized gas mains may explode causing serious injury, or death. Underground electric may cause severe burns, shock, or death. | 3b. Wear hearing protection when saw, jackhammer or air compressor are in operation. Otherwise, if sound levels exceed 85 dbA, put on hearing protection.<br>3c. For air knifing, ensure extention/lance tip reaches the full 5 feet bgs. Air knife should be advanced **AT A MINIMUM** in all four corners of the expected boring location to find any possible arrangement of utilities.<br>3c. Ensure diameter of soil preclearance hole is at a **MINIMUM 2x** the diameter of any drilling or hard dig equipment that will be entering the hole.<br>3c. See Complete subsurface clearance protocol for information provided above. |
| | **3d. ERGONOMICS/EXERTION:** Muscle strain due to poor body positioning when handling equipment and materials | 3d. Use body positioning and lifting techniques that minimizes muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load.<br>3d. Ensure that loads are balanced to reduce the potential for muscle strain.<br>3d. Two people or a mechanical lifting aid are required when lifting objects over 50 lbs. or when the shape makes the object difficult to lift. |
| | **3e. FALL:**Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site | 3e. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. Mob/Demob JSA.<br>3e. Do not climb over stored materials/equipment; walk around. Practice good housekeeping.<br>3e. Use established pathways and walk on stable, secure ground.<br>3e. Equipment and tools will be stored at the lowest point of potential energy and out of the walkway and immediate work area (i.e. tools should not be propped against walls or nearby equipment or vehicles).<br>3e. Equipment and tools that are not anticipated to be used will be returned to a storage area that is out of the immediate work area.<br>3e. Ensure power cords and compressed air lines are grouped when used within the work area.<br>3e. Pre-cleared location will be finished flush to grade as to prevent a slip/trip hazard or coned and taped off. |
| | **3f. CAUGHT:**Amputation points associated with the equipment and vacuum hose | 3f. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools.<br>3f. Inspect the equipment prior to use for potential pinch points.<br>3f. Test all emergency shutdown devices prior to using equipment.<br>3f. Inspect saw blade for worn surface or missing teeth; switch blade if damaged or blunt.<br>3f. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.<br>3f. All non-essential personnel shall maintain a 10 foot exclusion zone; position body out of the line-of-fire of equipment.<br>3f. Drillers and helpers will understand and use the “Show Me Your Hands Policy”. |
| 4. Move drum to staging area using drum cart | **4a. EXPOSURE/CONTACT:** Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil) | 4a. Wear Nitrile chemical-resistant gloves under leather or cut proof gloves.<br>4a. Do not overfill drums. Ensure that the drum lids are attached securely.<br>4a. All drums will be staged in the designated storage area. |
| | **4b. EXERTION:** Muscle strain while maneuvering drums with drum cart/lift gate | 4b. See 3d. Do not overfill drums. Use lift gate on back of truck to load and unload drums. Use drum dolly to move drum. |
| | **4c. CAUGHT: Pinch points associated with handling drum lid** | 4c. Ensure that fingers are not placed under the lid of the drum. Wear leather gloves or cut proof gloves. Use appropriate ratchet while sealing drum lid. |
| **5.** Decontaminate equipment. | **5a. EXPOSURE/CONTACT**: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors). | 5a. Wear chemical-resistant disposable gloves and safety glasses.<br>5a. Contain decontamination water so that it does not spill.<br>5a. Use an absorbent pad to clean spills, if necessary.<br>5a. Spray equipment from side angle, not straight on, to avoid backsplash.<br>5a. See 3b. |
| | **5b. EXPOSURE:** To chemicals in cleaning solution. | 5b. See 4a. Review SDS to ensure appropriate precautions are taken and understood. |

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| JOB SAFETY ANALYSIS | Ctrl. No. GEN-029 | DATE: 4/11/2023 | ☐ NEW ☒ REVISED | PAGE 1 of 2 |
|---|---|---|---|---|

| JSA TYPE CATEGORY | WORK TYPE | WORK ACTIVITY (Description) | |
|---|---|---|---|
| **GENERIC** | **Preclearing/Sampling** | **Hand Augering** | |
| **DEVELOPMENT TEAM** | **POSITION / TITLE** | **REVIEWED BY:** | **POSITION / TITLE** |
| Sean Owens | Senior Health & Safety Specialist | Brian Hobbs | Corporate Health & Safety Director |

**REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| | | | |
|---|---|---|---|
| ☐ LIFE VEST | ☐ GOGGLES | ☐ AIR PURIFYING RESPIRATOR | ☒ GLOVES: Cut Resistant / Leather / Nitrile / Chemical resistant |
| ☒ HARD HAT | ☐ FACE SHIELD | ☐ SUPPLIED RESPIRATOR | ☐ OTHER |
| ☐ LIFELINE / BODY HARNESS | ☐ HEARING PROTECTION | ☒ PPE CLOTHING: Long sleeve high visibility clothing | |
| ☒ SAFETY GLASSES | ☒ SAFETY SHOES: Steel or composite toed | | |

**REQUIRED AND / OR RECOMMENDED EQUIPMENT**

Hand Auger Tools (buckets, rods), 5-gallon buckets, hand tools (hammer, etc)

**COMMITMENT TO SAFETY-** All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.

| Assess [1]JOB STEPS | Analyze [2]POTENTIAL HAZARDS | Act [3]CRITICAL ACTIONS |
|---|---|---|
| **1.** Drive/walk to hand clearing/hand augering location | **1a. CONTACT:** Property damage and personal injury caused by obstructions/vehicles | 1a. Maintain speed limit on-site.<br>1a. All equipment must be stowed and secured prior to moving.<br>1a. Drive on established roadways.<br>1a. Do not back up vehicle without spotter where visibility is limited; use pull-through spots or back into parking spots; use an audible signal (horn/back-up alarm) when backing up vehicles.1c. |
| | **1b. FALL:** Personal injury from tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at portions of the Site | 1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.<br>1b. Do not climb over stored materials/equipment; walk around. Use established pathways and walk on stable, secure ground.<br>1b. Use established ramp when descending into/ascending from impoundment areas.<br>1b. Keep tools and equipment in a designated area. When not in use, tools and equipment must be returned to their proper storage location. Keep work area clear of obstructions. |
| | **1c. EXERTION:** Muscle strain/exhaustion while carrying equipment (i.e., hand auger, post-hole digger, shovel, pry bar) | 1c. When carrying equipment to/from work area, use proper lifting techniques; keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use mechanical assistance or make multiple trips to carry equipment. |
| | **1d. EXPOSURE:** Exposure to sun, possibly causing sunburn Biological hazards - bees/wasps, poison oak, thorns, insects, etc. | 1d. Wear sunscreen with an SPF of at least 15 whenever 30 minutes or more of exposure is expected.<br>1d. Inspect area to avoid contact with biological hazards.<br>1d. Wear cut resistant gloves when handling branches, shrubs, etc. that may lie within the walking path.<br>1d. Avoid any areas onsite that have poison oak. |
| **2.** Secure location | **2a. CONTACT:** Personnel and vehicular traffic may enter the work area. | 2a. Delineate the work area with traffic cones and/or caution tape to prevent exposure to traffic and inform others of work activity.<br>2a. Wear reflective vest and/or fluorescent clothing.<br>2a. Face the direction of vehicular traffic. Position vehicle to protect worker from traffic.<br>2a. Communicate work activity with adjacent work areas. |
| | **2b. FALL:** Tripping/falling due to uneven terrain, and materials /equipment stored within the work area | 2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment to the impoundments.<br>2b. Equipment and tools will be staged in a convenient, stable, and orderly manner.<br>2b. Equipment and tools will be stored at the lowest point of potential energy and out of the walkway and immediate work area (i.e. tools should not be propped against walls or nearby equipment or vehicles).<br>2b. Equipment and tools that are not anticipated to be used will be returned to an appropriate storage area that is out of the immediate work area. |

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| Assess<br>[1]JOB STEPS | Analyze<br>[2]POTENTIAL HAZARDS | Act<br>[3]CRITICAL ACTIONS |
|---|---|---|
| **3.** Verify pre-clearance protocol; review completed Subsurface Utility Checklist and utility verification site walkthrough. | **3a. ENERGY SOURCE:** Underground utility damage; property damage; personal injury | 3a. Confirm that "Call Before You Dig" and local utility companies were contacted prior to hand augering.<br>3a. Walk the Site to evaluate utility markings and review maps. |
| **4.** Augering/advancing borehole | **4a. EXPOSURE:** Contaminated soil/water/vapor<br><br>**4b. EXERTION:** Muscle strain from lifting, bending, repetitive motion.<br><br>**4c. CAUGHT:** Personal injury as a result of jewelry/loose clothing caught on equipment, well covers, machinery, hand auger, pry bar etc..<br><br>**4d. CONTACT/CAUGHT:** Pinch points, abrasions | 4a. Monitor breathing zone with a PID when VOCs area concern. If vapors sustain > 5 ppm, upgrade PPE as per HASP.<br>4a. Wear chemical-resistant disposable gloves and safety glasses when handling impacted materials.<br>4a. Place excavated soil on plastic sheeting and store soil waste in designated area.<br>4a. Work on the upwind side of the boring.<br>4b. Body positioning and rotating with the auger to reduce strain. Don't twist back.<br><br>4c. No form of jewelry should be worn while on-site.<br>4c. Clothing must be appropriately sized so it is not loose fitting.<br><br>4d. Keep head and upper body clear when lifting hand auger, pry bar/post-hole digger. Ensure to not be overly aggressive when using pry bar.<br>4d. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. |
| **5.** Lithologic observation and soil sampling | **5a. EXPOSURE:** Contact with contamination (impacted soil and/or lab preservatives) | 5a. Wear chemical-resistant disposable gloves to protect hands when handling samples; wear safety glasses when handling any preservatives; use containment material or plastic sheeting to protect surrounding areas.<br>5a. When collecting soil sample from hand auger, put large zip lock bag over entire auger to prevent spillage of soil on to the ground.<br>5a. Open sample jars slowly and fill carefully to avoid contact with preservatives. |
| **6.** Decontaminate equipment | **6a. EXPOSURE:** Contact with contamination (impacted soil and/or lab preservatives, decontamination solution)<br><br>**6b. CONTACT/CAUGHT:** pinch points and cuts/abrasions | 6a. Wear chemical-resistant disposable gloves and safety glasses.<br>6a. Use an absorbent pad to clean spills.<br>6a. Properly dispose of used materials/PPE trash bags.<br><br>6b. Keep fingers/hands out of pinch points when dis-assembling hand auger during decontamination. |

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# APPENDIX B

SDSs for Chemicals Used

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*CLEANING SUPPLIES*

1. SDS - Alconox
2. SDS - CaviCide Liquid
3. SDS - CaviWipes
4. SDS - Clorox Disinfecting Bathroom Cleaner
5. SDS - Clorox®-Regular-Bleach
6. SDS - Dawn Dishwashing Liquid
7. SDS - EN-US Simple Green All Purpose Cleaner
8. SDS - Hydrogen Peroxide 3% Solution
9. SDS - Isopropyl Alcohol Wipes
10. SDS - Lysol Disinfectant Spray All Scents
11. SDS - Windex Original Formula

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*FIELD EQUIPMENT*

1. SDS - Banana Boat® Sport Performance CoolZone SPF 30
2. SDS - CO2_Fire Extinguisher
3. SDS - Dust-Off compressed gas duster
4. SDS - Gel Ice Pack
5. SDS - Generic ALCOHOL HAND SANITIZER
6. SDS - Hand Warmer Air Activated Packet
7. SDS - Kidde Multipurpose ABC Fire Extinguisher
8. SDS - OFF! - Deep Woods Bug Spray
9. SDS - PB Blaster-Penetrating-Catalyst
10. SDS - Permethrin Insect Repellent (Clothing and Gear)
11. SDS - Rust-Oleum Inverted Marking Paint - Fluorescent Orange
12. SDS - Salinaxx Eye Wash
13. SDS - Sharpie Permanant Marker
14. SDS - Spray Adhesive Glue
15. SDS - Sunblock Lotion


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*FUELS AND LUBRICANTS*

1. SDS - Base Oil and Additives Mobil 2 Stroke Oil
2. SDS - Diesel Fuel
3. SDS - Four-Stroke Small Engine Oil
4. SDS - Gasoline with Ethanol
5. SDS - Liquid Propane Canister
6. SDS - Universal Bar Chain Oil
7. SDS - Vaseline Petroleum Jelly
8. SDS - WD-40-multi-use-product-aerosol

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*LAB PRESERVATIVES*

1. Ammonium Chloride MSDS
2. Ammonium Phosphate Dibasic MSDS
3. Ascorbic Acid MSDS
4. Hydrochloric Acid MSDS (1)
5. Methanol MSDS
6. Nitric Acid MSDS
7. Sodium Bisulfate MSDS
8. Sodium Hydroxide MSDS
9. Sodium Thiosulfate 1.0M MSDS
10. Sulfuric Acid MSDS
11. Trizma MSDS
12. Zinc Acetate MSDS


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*RENTAL EQUIPMENT*

1. Air SDS
2. Carbon Dioxide SDS
3. Carbon Monoxide in Air SDS
4. Conductivity Solution MSDS
5. Helium SDS
6. Hydrogen SDS
7. Hydrogen Sulfide Mix with Pentane SDS
8. Hydrogen Sulfide in Nitrogen SDS
9. Hydrogen Sulfide Mix with Methane SDS
10. Isobutylene Air SDS
11. Methane in Air SDS
12. Nitrogen SDS
13. Pentane in Air SDS
14. SDS Buffer Solution pH 4.00
15. SDS Buffer Solution pH 7.00
16. SDS Buffer Solution pH 10.00
17. SDS Dissolved-Oxygen-Solution
18. SDS Helium Compressed Gas
19. SDS peracetic-acid 35 with-h2so4
20. SDS Zorbell's Solution and ORP Standard 200mV

## ATTACHMENTS

1. SDS - Alconox
2. SDS - CaviCide Liquid
3. SDS - CaviWipes
4. SDS - Clorox Disinfecting Bathroom Cleaner
5. SDS - Clorox®-Regular-Bleach
6. SDS - Dawn Dishwashing Liquid
7. SDS - EN-US Simple Green All Purpose Cleaner
8. SDS - Hydrogen Peroxide 3% Solution
9. SDS - Isopropyl Alcohol Wipes
10. SDS - Lysol Disinfectant Spray All Scents
11. SDS - Windex Original Formula

# ATTACHMENT 1

SDS - Alconox

# Safety Data Sheet

**Effective date**: 11 May 2020 **Revision**: 11 May 2020
**Trade Name: Alconox®**

## 1 Identification of the substance/mixture and of the supplier

### 1.1 GHS Product identifier

**Trade Name:** Alconox®
**Product number:** 1101, 1103, 1104, 1104-1, 1112, 1112-1, 1125, 1150

### 1.2 Application of the substance / the mixture: Cleaning material/Detergent

**1.2.1 Recommended dilution ratio:** 1 – 2% in water

### 1.3 Details of the supplier of the Safety Data Sheet

**Manufacturer:**
Alconox Inc.
30 Glenn St
White Plains, NY 10603
(914) 948-4040

**Supplier:**

**Emergency telephone number:**
**ChemTel Inc**
North America: 1-888-255-3924
International: +1 813-248-0573

## 2 Hazards identification

### 2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272, 29CFR1910/1200 and GHS requirements.

**Hazard-determining components of labeling:**
Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

### 2.2 Label elements:

Eye damage, category 1.

Skin irritation, category 2.

**Product at recommended dilution:**
Eye irritation, category 2B

**Hazard pictograms:**

**Signal word**: Danger

**Hazard statements:**
H315 Causes skin irritation.
H318 Causes serious eye damage.

**Precautionary statements:**
P264 Wash skin thoroughly after handling.

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P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

**Hazardous Elements at Use Dilution:**

Hazard Pictograms:

**Signal Word:** Warning
**Hazard Statements:**
H320 Causes eye irritation

**Precautionary statements:**
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P501 Dispose of contents and container as instructed in Section 13

**Additional information:** None.

**Hazard description**
**Hazards Not Otherwise Classified (HNOC):** May cause surfaces to become slippery if wet. Use caution in areas of foot traffic if on floors.

**Information concerning particular hazards for humans and environment:**
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

**Classification system:**
The classification is according to EC regulation No. 1272, 29CFR1910/1200 and GHS Requirements, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists and is supplemented by information from technical literature and by information provided by the company.

## 3 Composition/information on ingredients

**3.1 Chemical characterization**: Not determined or not available.

**3.2 Description**: None
**3.3 Hazardous components (percentages by weight)**

| Identification | Chemical Name | Classification | Wt. % |
|---|---|---|---|
| **CAS number:** 7758-29-4 | Sodium tripolyphosphate | Skin Irrit. 2; H315<br>Eye Irrit. 2; H319 | 12-28 |
| **CAS number:** 68081-81-2 or 68411-30-3 | Sodium Alkylbenzene Sulfonate | Acute Tox. 4; H303<br>Skin Irrit. 2; H315<br>Eye Dam. 1; H318 | 8-22 |
| **CAS number:** 7722-88-5 | Tetrasodium Pyrophosphate | Skin Irrit. 2; H315<br>Eye Irrit. 2; H319 | 2-16 |

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Hazardous components at use dilution (percentages by weight):

| Identification | Chemical Name | Classification | Wt. % |
|---|---|---|---|
| **CAS number:** 7758-29-4 | Sodium tripolyphosphate | Eye Irrit. 2; H319 | 0.12 - 0.28 |
| **CAS number:** 68081-81-2 or 68411-30-3 | Sodium Alkylbenzene Sulfonate | Eye Irrit. 2; H319 | 0.08 – 0.22 |
| **CAS number:** 7722-88-5 | Tetrasodium Pyrophosphate | Eye Irrit. 2; H319 | 0.02 – 0.16 |

**3.4 Additional Information**: None.

## 4 First aid measures

### 4.1 Description of first aid measures

**General information:** None.

**After inhalation:**

Maintain an unobstructed airway.
Loosen clothing as necessary and position individual in a comfortable position.

**After skin contact:**

Wash affected area with soap and water.
Seek medical attention if symptoms develop or persist.

**After eye contact:**

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.
Remove contact lens(es) if able to do so during rinsing.
Seek medical attention if irritation persists or if concerned.

**After swallowing:**

Rinse mouth thoroughly.
Seek medical attention if irritation, discomfort, or vomiting persists.

### 4.2 Most important symptoms and effects, both acute and delayed

None

### 4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

**First aid measure at recommended dilution:**

**General information:** None.

**After inhalation:**

Maintain an unobstructed airway.
Loosen clothing as necessary and position individual in a comfortable position.

**After skin contact:**

Wash affected area with soap and water.

**After eye contact:**

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.
Remove contact lens(es) if able to do so during rinsing.

**After swallowing:**

Rinse mouth thoroughly. Seek medical attention if irritation, discomfort, or vomiting develops.

## 5 Firefighting measures

**Effective date**: 11 May 2020 **Revision**: 11 May 2020
**Trade Name: Alconox®**

### 5.1 Extinguishing media

**Suitable extinguishing agents:**

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

**For safety reasons unsuitable extinguishing agents**: None

### 5.2 Special hazards arising from the substance or mixture:

Thermal decomposition can lead to release of irritating gases and vapors.

### 5.3 Advice for firefighters

**Protective equipment:**

Wear protective eye wear, gloves and clothing.
Refer to Section 8.

### 5.4 Additional information:

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.

## 6 Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures:

Ensure adequate ventilation.
Ensure air handling systems are operational.

### 6.2 Environmental precautions:

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

### 6.3 Methods and material for containment and cleaning up:

Wear protective eye wear, gloves and clothing.

### 6.4 Reference to other sections: None

## 7 Handling and storage

### 7.1 Precautions for safe handling:

No expected hazards under normal use condition.

Avoid breathing mist or vapor if aerosolized.
Do not eat, drink, smoke or use personal products when handling chemical substances.

### 7.2 Conditions for safe storage, including any incompatibilities:

Store in a cool, well-ventilated area.

### 7.3 Specific end use(s):

No additional information.

# Safety Data Sheet

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**Trade Name: Alconox®**

## 8 Exposure controls/personal protection

**8.1 Control parameters**:

a) 7722-88-5, Tetrasodium Pyrophosphate, ACGIH TWA 10 mg/m3
b) 7758-29-4, Sodium Tripolyphosphate, ACGIH TWA 10 mg/m3
c) Dusts, non-specific OEL, Irish Code of Practice
   (i) Total inhalable 10 mg/m3 (8hr)
   (ii) Respirable 4 mg/m3 (8hr)
   (iii) Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3, (8hr)

**8.2 Exposure controls**

**Appropriate engineering controls:**

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

**Respiratory protection:**

Not needed under normal use conditions.

**Protection of skin:**

Select glove material impermeable and resistant to the substance.

**Eye protection:**

Safety goggles or glasses, or appropriate eye protection. Recommended to comply with ANSI Z87.1 and/or EN 166.

**General hygienic measures:**

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

**Exposure Control and Personal Protective Equipment at recommended dilution:**

Under normal use and operational conditions, no special personal protective equipment or engineering controls will be necessary. Handle with care.

## 9 Physical and chemical properties

| | | | |
|---|---|---|---|
| **Appearance (physical state, color):** | White and cream colored flakes - powder | **Explosion limit lower**: **Explosion limit upper**: | Not determined or notavailable. Not determined or notavailable. |
| **Odor**: | Not determined or not available. | **Vapor pressure at 20°C**: | Not determined or notavailable. |
| **Odor threshold**: | Not determined or not available. | **Vapor density**: | Not determined or notavailable. |
| **pH-value**: | 9.5 (1% aqueous solution) | **Relative density**: | Not determined or notavailable. |

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**Trade Name: Alconox®**

| | | | |
|---|---|---|---|
| **Melting/Freezing point**: | Not determined or not available. | **Solubilities**: | Not determined or notavailable. |
| **Boiling point/Boiling range**: | Not determined or not available. | **Partition coefficient (n-octanol/water)**: | Not determined or notavailable. |
| **Flash point (closed cup)**: | Not determined or not available. | **Auto/Self-ignition temperature**: | Not determined or notavailable. |
| **Evaporation rate**: | Not determined or not available. | **Decomposition temperature**: | Not determined or notavailable. |

| | | | |
|---|---|---|---|
| **Flammability (solid, gaseous)**: | Not determined or not available. | **Viscosity**: | a. Kinematic: Not determined or not available.<br>b. Dynamic: Not determined or not available. |
| **Density at 20°C**: | Not determined or not available. | | |

## 10 Stability and reactivity

**10.1 Reactivity**: Not determined or not available.
**10.2 Chemical stability**: Not determined or not available.
**10.3 Possibility hazardous reactions:** Not determined or not available.
**10.4 Conditions to avoid**: Not determined or not available.
**10.5 Incompatible materials**: Not determined or not available.
**10.6 Hazardous decomposition products**: Not determined or not available.

## 11 Toxicological information

**11.1 Information on toxicological effects**:

**Acute Toxicity:**

**Oral**:

: LD50 > 5000 mg/kg oral rat - Product.

**Chronic Toxicity:** No additional information.

**Skin corrosion/irritation:**

Sodium Alkylbenzene Sulfonate: Causes skin irritation.

**Serious eye damage/irritation:**

Sodium Alkylbenzene Sulfonate: Causes serious eye damage.

Tetrasodium Pyrophosphate: Risk of serious damage to eyes.

**Product information at recommended dilution:**

Eye irritation may occur upon direct contact with eyes. No specific hazards for skin contact, inhalation, or chronic exposure are expected within normal use parameters.

**Respiratory or skin sensitization:** No additional information.

**Carcinogenicity:** No additional information.

**IARC (International Agency for Research on Cancer):** None of the ingredients are listed.

**NTP (National Toxicology Program):** None of the ingredients are listed.

**Germ cell mutagenicity:** No additional information.

**Reproductive toxicity:** No additional information.

**STOT-single and repeated exposure:** No additional information.

**Additional toxicological information:** No additional information.

## 12 Ecological information

### 12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.9 mg/l, 48 hours.
Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.
Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

**12.2 Persistence and degradability:** No additional information.

**12.3 Bioaccumulative potential:** No additional information.

**12.4 Mobility in soil:** No additional information.

**General notes:** No additional information.

### 12.5 Results of PBT and vPvB assessment:

**PBT:** No additional information.

**vPvB:** No additional information.

**12.6 Other adverse effects:** No additional information.

## 13 Disposal considerations

### 13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

**Relevant Information:**

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

## 14 Transport information

| | |
|---|---|
| **14.1 UN Number:**<br>ADR, ADN, DOT, IMDG, IATA | None |
| **14.2 UN Proper shipping name:**<br>ADR, ADN, DOT, IMDG, IATA | None |
| **14.3 Transport hazard classes:**<br>ADR, ADN, DOT, IMDG, IATA | **Class:** None<br>**Label:** None<br>**LTD. QTY:** None |

**US DOT**
**Limited Quantity Exception:** None

**Bulk:**
**RQ (if applicable):** None
**Proper shipping Name:** None
**Hazard Class:** None
**Packing Group:** None
**Marine Pollutant (if applicable):** No additional information.

**Non Bulk:**
**RQ (if applicable):** None
**Proper shipping Name:** None
**Hazard Class:** None
**Packing Group:** None
**Marine Pollutant (if applicable):** No additional information.

| | |
|---|---|
| **Comments:** None | **Comments:** None |
| **14.4 Packing group:** ADR, ADN, DOT, IMDG, IATA | None |
| **14.5 Environmental hazards**: | None |
| **14.6 Special precautions for user:** | None |
| **Danger code (Kemler):** | None |
| **EMS number:** | None |
| **Segregation groups:** | None |

**14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:** Not applicable.

**14.8 Transport/Additional information:**

| | |
|---|---|
| **Transport category:** | None |
| **Tunnel restriction code:** | None |
| **UN "Model Regulation":** | None |

## 15 Regulatory information

**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.**

### North American

**SARA**

**Section 313 (specific toxic chemical listings)**: None of the ingredients are listed.
**Section 302 (extremely hazardous substances)**: None of the ingredients are listed.

**CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable**

**Spill Quantity**: None of the ingredients are listed.

**TSCA (Toxic Substances Control Act):**

**Inventory**: All ingredients are listed as active.
**Rules and Orders**: Not applicable.

**Proposition 65 (California):**

**Chemicals known to cause cancer**: None of the ingredients are listed.

**Chemicals known to cause reproductive toxicity for females**: None of the ingredients are listed.

**Chemicals known to cause reproductive toxicity for males**: None of the ingredients are listed.

**Chemicals known to cause developmental toxicity**: None of the ingredients are listed.

**Canadian**

**Canadian Domestic Substances List (DSL)**:
All ingredients are listed.

### EU

**REACH Article 57 (SVHC)**: None of the ingredients are listed.

**Germany MAK**: Not classified.
**EC 648/2004** – This is an industrial detergent. Contains >30% phosphate, 15-30% anionic surfactant, <5% EDTA salts
**EC 551/2009** – This is not a laundry or dishwasher detergent
**EC 907/2006** – Contains no enzymes, optical brighteners, perfumes, allergenic fragrances, or preservative agents

### Asia Pacific

**Australia**

**Australian Inventory of Chemical Substances (AICS)**: All ingredients are listed.

**China**

**Inventory of Existing Chemical Substances in China (IECSC)**: All ingredients are listed.

**Japan**

**Inventory of Existing and New Chemical Substances (ENCS)**: All ingredients are listed.

**Korea**

**Existing Chemicals List (ECL)**: All ingredients are listed.

**New Zealand**

**New Zealand Inventory of Chemicals (NZOIC)**: All ingredients are listed.

**Philippines**

**Philippine Inventory of Chemicals and Chemical Substances (PICCS)**: All ingredients are listed.

**Taiwan**

**Taiwan Chemical Substance Inventory (TSCI)**: All ingredients are listed.

## 16 Other information

**Abbreviations and Acronyms:** None

**Summary of Phrases**

**Hazard statements:**
H315 Causes skin irritation.
H318 Causes serious eye damage.

**NFPA:** 1-0-0
**HMIS:** 1-0-0

**At recommended dilution:**
**NFPA:** 1-0-0
**HMIS:** 1-0-0

**Precautionary statements:**
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

**Manufacturer Statement:**

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

## ATTACHMENT 2

SDS - CaviCide Liquid

# MATERIAL SAFETY DATA SHEET

## 1. Product And Company Identification

**Product Name**: **CaviCide™**

**Manufacturer**: METREX™ RESEARCH
1717 W. Collins Ave.
Orange, CA 92867
U.S.A.

Imported by: Sybron Canada LP
Brampton, Ontario L6W 4T5

**Information Phone Number**: 1-800-841-1428 (Customer Service)

**Chemical Emergency Phone Number** (Chemical Spills, Leaks, Fire, Exposure or Accident only):
CHEMTREC 1-800-424-9300 (in the US) 1-703-527-3887 (Outside the US)

**MSDS Date Of Preparation/Revision**: 7/14/2015
**Product Use**: Hard surface cleaner and disinfectant.
**DIN**: 02161656

## 2. Hazards Identification

Clear liquid with an alcohol odor.

### EMERGENCY OVERVIEW

Flammable liquid and vapor. Causes moderate eye irritation. May cause mild skin irritation. Harmful if absorbed through the skin. Inhalation of concentrated vapors may cause irritation of the eyes, nose and throat and dizziness and drowsiness. Prolonged overexposure to ethylene glycol monobutyl ether may affect liver, kidneys, blood, lymphatic system or central nervous system.

## 3. Composition/Information On Ingredients

| Component | CAS No. | Amount |
|---|---|---|
| Isopropanol | 67-63-0 | 17.2% |
| Ethylene Glycol Monobutyl Ether (2-Butoxyethanol) | 111-76-2 | 1-5% |
| Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride | 121-54-0 | 0.28% |
| Water | 7732-18-5 | 70-80% |

## 4. First Aid Measures

**Inhalation**: Move to fresh air if effects occur and seek medical attention if effects persist.

**Skin Contact**: Remove contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.

**Eye Contact**: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center or doctor for treatment advice.

**Ingestion**: If swallowed, get medical advice by calling a Poison Control Center or hospital emergency room. If advice is not available, take victim and product container to the nearest emergency treatment center or hospital. Do not attempt to give anything by mouth to an unconscious person.

## 5. Fire Fighting Measures

**Extinguishing Media**: Use water spray or fog, alcohol-resistant foam, carbon dioxide or dry chemical. Cool fire exposed containers with water.

**Special Fire Fighting Procedures**: Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing for fires in areas where chemicals are used or stored.

**Unusual Fire Hazards**: Flammable liquid and vapor. May form explosive mixtures in air at temperatures at or above the flashpoint. Flammable vapors may collect in confined areas. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flashback. Fire exposed containers may rupture explosively.

**Hazardous Combustion Products**: Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides, amines, chlorine and hydrogen chloride.

## 6: Accidental Release Measures

Eliminate all ignition sources. Ventilate area. Use explosion-proof equipment if large amounts are released. Stop leak if it is safe to do so and move containers from the spill area. Wear appropriate protective clothing and equipment (See Section 8). Collect material with an inert absorbent material and place in appropriate, labeled container for disposal. Refer to Section 13 for disposal advice.

## 7. Handling and Storage

Do not get in eyes or on clothing. Wear appropriate eye protection when handling (see Section 8). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

Flammable liquid and vapor. Keep away from heat, sparks, open flames and all other sources of ignition. Do not smoke in storage or use areas. Keep containers closed when not in use. Do not reuse empty containers.

Store in a cool, well-ventilated area away from heat, oxidizers and all sources of ignition. Do not contaminate water, food or feed by storage.
Empty containers retain product residues and may be hazardous. Do not flame cut, drill, weld, etc. on or near empty containers, even empty.

## 8. Exposure Controls / Personal Protection

**Exposure Limits**

| Chemical | Exposure Limit |
|---|---|
| Isopropanol | 200 ppm TWA, 400 ppm STEL (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Labrador, Nova Scotia, Prince Edward Island, Saskatchewan, Ontario<br>400 ppm TWA, 500 ppm STEL skin Nunavut, Northwest Territories, Yukon, Quebec |
| Ethylene Glycol Monobutyl Ether (2-Butoxyethanol) | 20 ppm TWA (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Labrador, Nova Scotia, Prince Edward Island, Ontario, Quebec<br>20 ppm TWA, 30 ppm STEL Saskatchewan<br>25 ppm TWA, 75 ppm STEL Nunavut, Northwest Territories<br>50 ppm TWA, 150 ppm STEL skin Yukon |
| Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride | None Established |

**Ventilation:** General ventilation should be adequate for normal use. For operations where the exposure limits may be exceeded, mechanical ventilation such as local exhaust may be needed to minimize exposure.

**Respiratory Protection**: None under normal use conditions with adequate ventilation. For operations where the occupational exposure limits are exceeded, a NIOSH/MSHA approved respirator with an organic vapor cartridges or supplied air respirator is recommended. Equipment selection depends on contaminant type and concentration. Select in accordance with applicable regulations and good industrial hygiene practice. For firefighting, use self-contained breathing apparatus.

**Gloves**: Impervious gloves such as butyl rubber or nitrile are recommended for operations which may result in prolonged or repeated skin contact.

**Eye Protection**: Splash proof goggles, face shield, or safety glasses are recommended to prevent eye contact.

**Other Protective Equipment/Clothing**: Wear protective clothing if needed to avoid prolonged/ repeated skin contact. Suitable washing and eye flushing facilities should be available in the work area. Contaminated clothing should be removed and laundered before re-use.

## 9. Physical and Chemical Properties

**Appearance And Odor**: Clear liquid with an alcohol odor.

| | | | |
|---|---|---|---|
| Boiling Point: | Not Determined | Specific Gravity: | 0.972 |
| Solubility in Water: | Complete | pH: | 11.0 -12.49 |
| Vapor Pressure: | 43.3 mmHg @ 20°C (isopropanol) | Vapor Density: | 2.1 (isopropanol) |
| Percent Volatile: | >95% | Melting/Freezing Point: | Not Determined |
| Coefficient of Water/Oil Distribution: | Not Determined | | |
| Flash Point: | 28.3°C (83°F) | Flammable Limits: | LEL: 2% UEL: 12.7% |

## 10. Stability and Reactivity

**Stability**: Stable
**Conditions To Avoid**: Heat, sparks, flames and all other sources of ignition.
**Incompatibility**: Strong oxidizing agents, acids and strong reducing agents.
**Hazardous Decomposition Products**: Thermal decomposition will produce carbon monoxide, carbon dioxide, nitrogen oxides, amines, chlorine and hydrogen chloride.
**Hazardous Polymerization**: Will not occur.

## 11. Toxicological Information

**Potential Health Effects:**

**Acute Hazards:**
**Inhalation**: May cause irritation of the nose, throat and upper respiratory tract. High vapor concentrations may produce nausea, vomiting, headache, dizziness, drowsiness, weakness, fatigue, narcosis and possible unconsciousness. Not acutely toxic in rats.

**Skin Contact**: Prolonged or repeated exposure may cause mild irritation. No signs of toxicity or irritation were observed in a dermal toxicity study in rabbits. Non-irritating in a primary irritation study with rabbits. Negative in a skin sensitization study with guinea pigs.

**Eye Contact**: May cause irritation with tearing, redness and pain. Moderate irritant in an eye irritation study with rabbits. Effects reversed in 7 days.

**Ingestion**: Ingestion may cause gastrointestinal disturbances and central nervous system effects such as headache, dizziness, drowsiness and nausea. Not acutely toxic in rats.

**Chronic Hazards**: Prolonged overexposure to ethylene glycol monobutyl ether may affect liver, kidneys, blood, lymphatic system or central nervous system.

**Medical Conditions Aggravated By Exposure**: Due to its defatting properties, isopropyl alcohol may aggravate an existing skin condition.

**Carcinogen**: None of the components is listed as a carcinogen or potential carcinogen by IARC, NTP, ACGIH, or OSHA.

**Acute Toxicity Values for CaviCide:**
LD50 Oral Rat >5000 mg/kg
LD50 Dermal Rabbit >2000 mg/kg
LC50 inhalation LC50 rat >2.08 mg/L

## 12. Ecological Information

This product is not classified as aquatically toxic based on the GHS criteria for aquatic toxicity.

**Toxicity:**

Isopropanol: LC50 fathead minnows 11,130 mg/L/48 hr; LC50 brown shrimp 1400 mg/L/48 hr Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride**:** LC50 pimephales promelas 1.6 mg/L/96 hr, LC50 lepomis macrochirus 1.4 mg/L/96 hr.

**Persistence and degradability:** Isopropanol and 2-butoxyethanol are readily biodegradable in screening tests. Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride is not readily biodegradable.

**Bioaccumulative Potential:** Isopropanol has an estimated BCF of 3 suggesting that the potential for bioaccumulation is low.

**Mobility in Soil:** Isopropanol is expected to have very high mobility in soil.

## 13. Disposal Considerations

Do not contaminate water, food, or feed by storage and disposal.
**Solution Disposal:** Dilute with water. Dispose of in ordinary sanitary sewer.
**CONTAINER DISPOSAL:** Triple rinse. Offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by provincial and local authorities, by burning. If burned, keep out of smoke.

## 14. Transport Information

**U.S. DOT Hazard Classification**
Proper Shipping Name: Not Regulated per alcohol exception (49CFR 173.150(e))
Technical Name: N/A
UN Number: N/A
Hazard Class/Packing Group: N/A
Labels Required: N/A

DOT MARINE POLLUTANTS: This product does not contain Marine Pollutants as defined in 49 CFR 171.8.

**Canada TDG**
Proper Shipping Name: Not regulated per aqueous solution of alcohol exception (1.36)
Technical Name: N/A
UN Number: N/A
Hazard Class/Packing Group: N/A
Labels Required: N/A

**IMDG Code Shipping Classification**
Proper Shipping Name: Alcohols, n.o.s. (Isopropanol)
UN Number: UN1987
Hazard Class: 3
Packing Group: III
Labels Required: Flammable Liquid (Class 3)
Placards Required: Class 3
Not classified as a marine pollutant

**ICAO Air Transport Classification**
Proper Shipping Name: Alcohols, n.o.s. (Isopropanol)
ID Number: UN1987
Hazard Class: 3
Packing Group: III
Labels Required: Class 3

## 15. Regulatory Information

**National Pollutant Release Inventory (NPRI)**: This Product Contains the Following Chemicals Subject to Annual Release Reporting Requirements NPRI:

| | |
|---|---|
| Isopropanol | 17.2% |
| Ethylene Glycol Monobutyl Ether | 1-5% |

**CEPA Chemical Inventory**: All of the components of this material are listed on the DSL or exempt.

WHMIS Classification: Class B-2, Class D-2-B
This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the MSDS contains all the information required by the *Controlled Products Regulations*.

## 16. Other Information

NFPA Rating: Fire: 3 Health: 2 Instability: 0

The information and recommendations set forth herein are taken from sources believed to be accurate as of the date of preparation, however, METREX™ RESEARCH makes no warranty with respect to the accuracy or suitability of the recommendations, and assumes no liability to any use thereof.

# ATTACHMENT 3

CaviWipes

# MATERIAL SAFETY DATA SHEET

## 1. Product And Company Identification

**Product Name**: **CaviWipes™**

**Manufacturer**: METREX™ RESEARCH
1717 W. Collins Ave.
Orange, CA 92867
U.S.A.

Imported by: Sybron Canada LP
Brampton, Ontario L6W 4T5

**Information Phone Number**: 1-800-841-1428 (Customer Service)

**Chemical Emergency Phone Number** (Chemical Spills, Leaks, Fire, Exposure or Accident only):
CHEMTREC 1-800-424-9300 (in the US) 1-703-527-3887 (Outside the US)

**MSDS Date Of Preparation/Revision**: 7/14/2015
**Product Use**: Hard surface cleaner and disinfectant wipe.
**DIN**: 02242209

## 2. Hazards Identification

Clear liquid with an alcohol odor on a white towelette.

### EMERGENCY OVERVIEW

Liquid saturant is a flammable liquid and vapor. Causes moderate eye irritation. May cause mild skin irritation. Harmful if absorbed through the skin. Inhalation of concentrated vapors may cause irritation of the eyes, nose and throat and dizziness and drowsiness. Prolonged overexposure to ethylene glycol monobutyl ether may affect liver, kidneys, blood, lymphatic system or central nervous system.

## 3. Composition/Information On Ingredients

The following composition refers to the liquid saturant

| Component | CAS No. | Amount |
|---|---|---|
| Isopropanol | 67-63-0 | 17.2% |
| Ethylene Glycol Monobutyl Ether (2-Butoxyethanol) | 111-76-2 | 1-5% |
| Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride | 121-54-0 | 0.28% |
| Water | 7732-18-5 | 70-80% |

## 4. First Aid Measures

**Inhalation**: Move to fresh air if effects occur and seek medical attention if effects persist.

**Skin Contact**: Remove contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.

**Eye Contact**: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center or doctor for treatment advice.

**Ingestion**: If liquid is swallowed, get medical advice by calling a Poison Control Center or hospital emergency room. If advice is not available, take victim and product container to the nearest emergency treatment center or hospital. Do not induce vomiting. Do not attempt to give anything by mouth to an unconscious person.

## 5. Fire Fighting Measures

**Extinguishing Media**: Use water spray or fog, alcohol-resistant foam, carbon dioxide or dry chemical. Cool fire exposed containers with water.

**Special Fire Fighting Procedures**: Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing for fires in areas where chemicals are used or stored.

**Unusual Fire Hazards**: Liquid saturant is a flammable liquid and vapor. Flammable vapors may collect in confined areas if large amounts are used.

**Hazardous Combustion Products**: Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides, amines, chlorine and hydrogen chloride.

## 6: Accidental Release Measures

Eliminate all ignition sources. Ventilate area. Use explosion-proof equipment if large amounts are released. Wear appropriate protective clothing and equipment (See Section 8). Collect spilled liquid material with an inert absorbent material and collect spilled wipes and place in appropriate, labeled container for disposal. Do not reuse towelette. Refer to Section 13 for disposal advice.

## 7. Handling and Storage

Avoid contact with eyes. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

Liquid saturant is a flammable liquid and vapor. Keep away from heat, sparks, open flames and all other sources of ignition. Keep containers closed when not in use. Do not reuse towelette. Avoid contamination of food.

Store at room temperature area away from heat, oxidizers and all sources of ignition.

## 8. Exposure Controls / Personal Protection

**Exposure Limits**

| Chemical | Exposure Limit |
|---|---|
| Isopropanol | 200 ppm TWA, 400 ppm STEL (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Labrador, Nova Scotia, Prince Edward Island, Saskatchewan, Ontario<br>400 ppm TWA, 500 ppm STEL skin Nunavut, Northwest Territories, Yukon, Quebec |
| Ethylene Glycol Monobutyl Ether (2-Butoxyethanol) | 20 ppm TWA (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Labrador, Nova Scotia, Prince Edward Island, Ontario, Quebec<br>20 ppm TWA, 30 ppm STEL Saskatchewan<br>25 ppm TWA, 75 ppm STEL Nunavut, Northwest Territories<br>50 ppm TWA, 150 ppm STEL skin Yukon |
| Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride | None Established |

**Ventilation:** General ventilation should be adequate for normal use. For operations where the exposure limits may be exceeded, mechanical ventilation such as local exhaust may be needed to minimize exposure.

**Respiratory Protection**: None under normal use conditions with adequate ventilation. For operations where the occupational exposure limits are exceeded, a NIOSH/MSHA approved respirator with an organic vapor cartridges or supplied air respirator is recommended. Equipment selection depends on contaminant type and concentration. Select in accordance with applicable regulations and good industrial hygiene practice. For firefighting, use self-contained breathing apparatus.

**Gloves**: Impervious gloves such as butyl rubber or nitrile are recommended for operations which may result in prolonged or repeated skin contact.

**E**
**ye Protection**: None required for normal use. If liquid splashing is possible, wear splash proof goggles to prevent eye contact.

**Other Protective Equipment/Clothing**: None required for normal use. Wear protective clothing if needed to avoid prolonged/repeated skin contact. Suitable washing and eye flushing facilities should be available in the work area. Contaminated clothing should be removed and laundered before re-use.

## 9. Physical and Chemical Properties

**Appearance And Odor**: Clear liquid with an alcohol odor on a white towelette.
The following data applies to the liquid saturant.

| | | | |
|---|---|---|---|
| Boiling Point: | Not Determined | Specific Gravity: | 0.972 |
| Solubility in Water: | Complete | pH: | 11.0 -12.49 |
| Vapor Pressure: | 43.3 mmHg @ 20°C (isopropanol) | Vapor Density: | 2.1 (isopropanol) |
| Percent Volatile: | >95% | Melting/Freezing Point: | Not Determined |
| Coefficient of Water/Oil Distribution: | Not Determined | | |
| Flash Point: | 28.3°C (83°F) | Flammable Limits: | LEL: 2% UEL: 12.7% |

## 10. Stability and Reactivity

**Stability**: Stable
**Conditions To Avoid**: Heat, sparks, flames and all other sources of ignition.
**Incompatibility**: Strong oxidizing agents, acids and strong alkalis.
**Hazardous Decomposition Products**: Thermal decomposition will produce carbon monoxide, carbon dioxide, nitrogen oxides, amines, chlorine and hydrogen chloride.
**Hazardous Polymerization**: Will not occur.

## 11. Toxicological Information

**Potential Health Effects:**
**The following applies to the liquid saturant. The towelette is not hazardous.**
**Acute Hazards:**
**Inhalation**: May cause irritation of the nose, throat and upper respiratory tract. High vapor concentrations may produce nausea, vomiting, headache, dizziness, drowsiness, weakness, fatigue, narcosis and possible unconsciousness. Not acutely toxic in rats.

**Skin Contact**: Prolonged or repeated exposure may cause mild irritation. No signs of toxicity or irritation were observed in a dermal toxicity study in rabbits. Non-irritating in a primary irritation study with rabbits. Negative in a skin sensitization study with guinea pigs.

**Eye Contact**: May cause irritation with tearing, redness and pain. Moderate irritant in an eye irritation study with rabbits. Effects reversed in 7 days.

**Ingestion**: Ingestion may cause gastrointestinal disturbances and central nervous system effects such as headache, dizziness, drowsiness and nausea. Not acutely toxic in rats.

**Chronic Hazards**: Prolonged overexposure to ethylene glycol monobutyl ether may affect liver, kidneys, blood, lymphatic system or central nervous system.

**Medical Conditions Aggravated By Exposure**: Due to its defatting properties, isopropyl alcohol may aggravate an existing skin condition.

**Carcinogen**: None of the components is listed as a carcinogen or potential carcinogen by IARC, NTP, ACGIH, or OSHA.

**Acute Toxicity Values for CaviWipes:**
LD50 Oral Rat >5000 mg/kg
LD50 Dermal Rabbit >2000 mg/kg
LC50 inhalation LC50 rat >2.08 mg/L

## 12. Ecological Information

This product is not classified as aquatically toxic based on the GHS criteria for aquatic toxicity.

**Toxicity:**

Isopropanol: LC50 fathead minnows 11,130 mg/L/48 hr; LC50 brown shrimp 1400 mg/L/48 hr
Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride**:** LC50 pimephales promelas 1.6 mg/L/96 hr, LC50 lepomis macrochirus 1.4 mg/L/96 hr.

**Persistence and degradability:** Isopropanol and 2-butoxyethanol are readily biodegradable in screening tests. Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride is not readily biodegradable.

**Bioaccumulative Potential:** Isopropanol has an estimated BCF of 3 suggesting that the potential for bioaccumulation is low.

**Mobility in Soil:** Isopropanol is expected to have very high mobility in soil.

## 13. Disposal Considerations

Do not contaminate water, food, or feed by storage and disposal.
**Container Disposal:** Do not reuse empty container. Wrap container and discard in trash.
**Towelette Disposal**: Do not reuse towelette. Dispose of used towelette in trash. Do not flush wipes down toilet.

## 14. Transport Information

**U.S. DOT Hazard Classification**
Proper Shipping Name: Not Regulated per alcohol exception (49CFR 173.150(e))
Technical Name: N/A
UN Number: N/A
Hazard Class/Packing Group: N/A
Labels Required: N/A

DOT MARINE POLLUTANTS: This product does not contain Marine Pollutants as defined in 49 CFR 171.8.

**Canada TDG**
Proper Shipping Name: Not regulated per aqueous solution of alcohol exception (1.36)
Technical Name: N/A
UN Number: N/A
Hazard Class/Packing Group: N/A
Labels Required: N/A

**IMDG Code Shipping Classification**
Proper Shipping Name: Alcohols, n.o.s. (Isopropanol)
UN Number: UN1987
Hazard Class: 3
Packing Group: III
Labels Required: Flammable Liquid (Class 3)
Placards Required: Class 3
Not classified as a marine pollutant

**ICAO Air Transport Classification**
Proper Shipping Name: Alcohols, n.o.s. (Isopropanol)
ID Number: UN1987
Hazard Class: 3
Packing Group: III
Labels Required: Class 3

## 15. Regulatory Information

**National Pollutant Release Inventory (NPRI)**: This Product Contains the Following Chemicals Subject to Annual Release Reporting Requirements NPRI:

| | |
|---|---|
| Isopropanol | 17.2% |
| Ethylene Glycol Monobutyl Ether | 1-5% |

**CEPA Chemical Inventory**: All of the components of this material are listed on the DSL or exempt.

WHMIS Classification: Class B-2, Class D-2-B
This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the MSDS contains all the information required by the *Controlled Products Regulations*.

## 16. Other Information

NFPA Rating: Fire: 3 Health: 2 Instability: 0

The information and recommendations set forth herein are taken from sources believed to be accurate as of the date of preparation, however, METREX™ RESEARCH makes no warranty with respect to the accuracy or suitability of the recommendations, and assumes no liability to any use thereof.

## ATTACHMENT 4

SDS - Clorox Disinfecting Bathroom Cleaner

# SAFETY DATA SHEET

**Issuing Date** January 5, 2015 **Revision Date** New **Revision Number** 0

## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

**Product identifier**

**Product Name** **Clorox® Disinfecting Bathroom Cleaner**

**Other means of identification**

**EPA Registration Number** 5813-40

**Recommended use of the chemical and restrictions on use**

**Recommended Use** Disinfecting bathroom spray cleaner

**Uses advised against** No information available

**Details of the supplier of the safety data sheet**

**Supplier Address**
The Clorox Company
1221 Broadway
Oakland, CA 94612
USA
Phone: 1-510-271-7000

**Emergency telephone number**

**Emergency Phone Numbers** For Medical Emergencies, call: 1-800-446-1014
For Transportation Emergencies, call Chemtrec: 1-800-424-9300

## 2. HAZARDS IDENTIFICATION

**Classification**

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

| | |
|---|---|
| Serious eye damage/eye irritation | Category 2A |

**GHS label elements, including precautionary statements**

**Emergency Overview**

**Signal word** **Warning**

**Hazard statements**
Causes serious eye irritation

**Appearance** Clear, colorless **Physical State** Thin liquid **Odor** Citrus, green, solvent

**Precautionary Statements - Prevention**
Wash hands and any exposed skin thoroughly after handling.
Wear eye protection/face protection such as safety glasses.

**Precautionary Statements - Response**
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

**Precautionary Statements - Storage**
None

**Precautionary Statements - Disposal**
None

**Hazards not otherwise classified (HNOC)**
Not Applicable

**Unknown Toxicity**
2.155% of the mixture consists of ingredient(s) of unknown toxicity

**Other information**
No information available.

**Interactions with Other Chemicals**
Do not use or mix with bleach-containing products. To do so may release small amounts of formaldehyde gas.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

| Chemical Name | CAS-No | Weight % | Trade Secret |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Diethylene glycol monobutyl ether | 112-34-5 | 1 - 5 | * |
| Tetrapotassium ethylenediamine tetraacetate (EDTA) | 5964-35-2 | 1 - 5 | * |
| n-Alkyl (68% C12, 32% C14) dimethyl ethylbenzyl ammonium chloride | 85409-23-0 | 0.1 - 0.3 | * |
| n-Alkyl (5% C12, 60% C14, 30% C16, 5% C18) dimethyl benzyl ammonium chloride | 53516-76-0 | 0.1 - 0.3 | * |

* The exact percentage (concentration) of composition has been withheld as a trade secret

## 4. FIRST AID MEASURES

**First aid measures**

**General Advice** Show this safety data sheet to the doctor in attendance.

**Eye Contact** Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Keep eye wide open while rinsing. Do not rub affected area. Get medical attention immediately if irritation persists.

**Skin Contact** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. If irritation develops, call a doctor.

**Inhalation** Move to fresh air. If breathing is affected, call a doctor.

**Ingestion** Call a poison control center or doctor immediately. Have person sip a glassful of water if able to swallow. DO NOT induce vomiting unless told to do so by a poison control center or doctor.

**Protection of First-aiders** Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wear personal protective clothing (see section 8).

**Most important symptoms and effects, both acute and delayed**

**Most Important Symptoms/Effects** Stinging and irritation of eyes.

**Indication of any immediate medical attention and special treatment needed**

**Notes to Physician** Treat symptomatically.

## 5. FIRE-FIGHTING MEASURES

**Suitable Extinguishing Media**
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Unsuitable Extinguishing Media**
CAUTION: Use of water spray when fighting fire may be inefficient.

**Specific Hazards Arising from the Chemical**
No information available

**Explosion Data**

**Sensitivity to Mechanical Impact** None

**Sensitivity to Static Discharge** None

**Protective Equipment and Precautions for Firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**

**Personal Precautions** Avoid contact with eyes. Use personal protective equipment as required.

**Other Information** Refer to protective measures listed in Sections 7 and 8.

**Environmental precautions**

**Environmental Precautions** See Section 12 for additional ecological information.

**Methods and material for containment and cleaning up**

**Methods for Containment** Prevent further leakage or spillage if safe to do so.

**Methods for Cleaning Up** Absorb and containerize. Wash residual down to sanitary sewer. Contact the sanitary treatment facility in advance to assure ability to process washed-down material.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**

**Handling** Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Do not eat, drink or smoke when using this product.

**Conditions for safe storage, including any incompatibilities**

**Storage** Keep containers tightly closed in a dry, cool and well-ventilated place.

**Incompatible Products** Products containing bleach.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**

**Exposure Guidelines**

| Chemical Name | ACGIH TLV | OSHA PEL | NIOSH IDLH |
|---|---|---|---|
| Diethylene glycol monobutyl ether<br>1310-73-2 | 10 ppm TWA<br>Inhalable fraction and vapor | - | - |

*ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. NIOSH IDLH: Immediately Dangerous to Life or Health.*

**Appropriate engineering controls**

**Engineering Measures** Showers
Eyewash stations
Ventilation systems

**Individual protection measures, such as personal protective equipment**

| | |
|---|---|
| **Eye/Face Protection** | If splashes are likely to occur, wear safety glasses with side-shields. None required for consumer use. |
| **Skin and Body Protection** | Wear rubber or neoprene gloves if there is the potential for repeated or prolonged skin contact. |
| **Respiratory Protection** | If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations. |
| **Hygiene Measures** | Remove and wash contaminated clothing before re-use. Avoid contact with skin, eyes and clothing. Do not eat, drink or smoke when using this product. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Physical and Chemical Properties**

| | | | |
|---|---|---|---|
| **Physical State** | Liquid | | |
| **Appearance** | Clear | **Odor** | Citrus, green, solvent |
| **Color** | Colorless | **Odor Threshold** | No information available |

| **Property** | **Values** | **Remarks/ Method** |
|---|---|---|
| **pH** | 11 - 12.5 | None known |
| **Melting/freezing point** | No data available | None known |
| **Boiling point / boiling range** | No data available | None known |
| **Flash Point** | Not flammable | None known |
| **Evaporation rate** | No data available | None known |
| **Flammability (solid, gas)** | No data available | None known |
| **Flammability Limits in Air** | | |
| **Upper flammability limit** | No data available | None known |
| **Lower flammability limit** | No data available | None known |
| **Vapor pressure** | No data available | None known |
| **Vapor density** | No data available | None known |
| **Specific Gravity** | ~1.0 | None known |
| **Water Solubility** | Soluble in water | None known |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|---|---|---|
| **Solubility in other solvents** | No data available | None known |
| **Partition coefficient: n-octanol/water** | No data available | None known |
| **Autoignition temperature** | No data available | None known |
| **Decomposition temperature** | No data available | None known |
| **Kinematic viscosity** | No data available | None known |
| **Dynamic viscosity** | No data available | None known |
| **Explosive Properties** | Not explosive | |
| **Oxidizing Properties** | No data available | |

**Other Information**

| | |
|---|---|
| **Softening Point** | No data available |
| **VOC Content (%)** | No data available |
| **Particle Size** | No data available |
| **Particle Size Distribution** | No data available |

## 10. STABILITY AND REACTIVITY

**Reactivity**
Do not use or mix with bleach-containing products. To do so may release small amounts of formaldehyde gas.

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of Hazardous Reactions**
None under normal processing.

**Conditions to avoid**
None known based on information supplied.

**Incompatible materials**
Products containing bleach.

**Hazardous Decomposition Products**
None known based on information supplied.

## 11. TOXICOLOGICAL INFORMATION

**Information on likely routes of exposure**

**Product Information**

**Inhalation** Exposure to vapor or mist may irritate respiratory tract.

**Eye Contact** May cause eye irritation.

**Skin Contact** Prolonged contact may cause irritation.

**Ingestion** Ingestion may cause irritation to mucous membranes and gastrointestinal irritation, nausea, vomiting, and diarrhea.

**Component Information**

| Chemical Name | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|
| Diethylene glycol monobutyl ether 112-34-5 | 3384 mg/kg (Rat) | 2700 mg/kg (Rabbit) | - |

**Information on toxicological effects**

**Symptoms** May cause redness and tearing of the eyes.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Sensitization** No information available.

**Mutagenic Effects** No information available.

**Carcinogenicity** Contains no ingredient listed as a carcinogen.

**Reproductive Toxicity** No information available

**STOT - single exposure** No information available.

**STOT - repeated exposure** No information available.
**Chronic Toxicity** Carcinogenic potential is unknown

**Target Organ Effects** Respiratory system, eyes, skin, gastrointestinal tract (GI).

**Aspiration Hazard** No information available.

**Numerical measures of toxicity Product Information**

**The following values are calculated based on chapter 3.1 of the GHS document**
Not applicable

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**
Harmful to aquatic life

**Persistence and Degradability**
No information available.

**Bioaccumulation**
No information available.

**Other Adverse Effects**
No information available.

## 13. DISPOSAL CONSIDERATIONS

**Disposal methods**
Dispose of in accordance with all applicable federal, state, and local regulations.

**Contaminated Packaging**
Do not reuse empty containers. Dispose of in accordance with all applicable federal, state, and local regulations.

## 14. TRANSPORT INFORMATION

**DOT** Not regulated

**TDG** Not regulated

**ICAO** Not regulated

**IATA** Not regulated

**IMDG/IMO** Not regulated

## 15. REGULATORY INFORMATION

**Chemical Inventories**

| | |
|---|---|
| **TSCA** | All components of this product are either on the TSCA 8(b) Inventory or otherwise exempt from listing. |
| **DSL/NDSL** | All components are on the DSL or NDSL. |

**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory
**DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List

## U.S. Federal Regulations

**SARA 313**
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains the following chemical which is subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

| Chemical Name | CAS-No | Weight % | SARA 313 - Threshold Values % |
|---|---|---|---|
| Diethylene glycol monobutyl ether (Glycol ethers category) | 112-34-5 | 1 - 5 | 1.0 |

**SARA 311/312 Hazard Categories**

| | |
|---|---|
| **Acute Health Hazard** | Yes |
| **Chronic Health Hazard** | No |
| **Fire Hazard** | No |
| **Sudden Release of Pressure Hazard** | No |
| **Reactive Hazard** | No |

**Clean Water Act**
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

**CERCLA**
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

**EPA Statement**
This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

> **WARNING:** Causes substantial but temporary eye injury. Harmful if absorbed through skin. Avoid breathing spray mist. Do not get in eyes, on skin or on clothing. Wear safety glasses or goggles. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

## U.S. State Regulations

**California Proposition 65**
This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

| Chemical Name | New Jersey | Massachusetts | Pennsylvania | Rhode Island | Illinois |
|---|---|---|---|---|---|
| Diethylene glycol monobutyl ether (Glycol ethers category) 112-34-5 | X | | X | | |

## International Regulations

**Canada**
**WHMIS Hazard Class**
D2B Toxic materials

## 16. OTHER INFORMATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **NFPA** | **Health Hazard** | 2 | **Flammability** | 0 | **Instability** | 0 | **Physical and Chemical Hazards** - |
| **HMIS** | **Health Hazard** | 2 | **Flammability** | 0 | **Physical Hazard** | 0 | **Personal Protection** B |

**Prepared By**

Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

**Revision Date** New

**Revision Note** New

**Reference** 1067476-C/51589001.003/1067459

**General Disclaimer**

**The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text**

**End of Safety Data Sheet**

## ATTACHMENT 5

SDS - Clorox®-Regular-Bleach

# SAFETY DATA SHEET

**Issuing Date** January 5, 2015 **Revision Date** February 13, 2019 **Revision Number** 2

## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

**Product identifier**

**Product Name** **Clorox® Regular-Bleach$_1$**

**Other means of identification**

**EPA Registration Number** 5813-100

**Recommended use of the chemical and restrictions on use**

**Recommended use** Household disinfecting, sanitizing, and laundry bleach

**Uses advised against** No information available

**Details of the supplier of the safety data sheet**

**Supplier Address**
The Clorox Company
1221 Broadway
Oakland, CA 94612

Phone: 1-510-271-7000

**Emergency telephone number**

**Emergency Phone Numbers** For Medical Emergencies, call: 1-800-446-1014
For Transportation Emergencies, call Chemtrec: 1-800-424-9300

## 2. HAZARDS IDENTIFICATION

**Classification**

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

| | |
|---|---|
| Skin corrosion/irritation | Category 1 |
| Serious eye damage/eye irritation | Category 1 |

**GHS Label elements, including precautionary statements**

**Emergency Overview**

**Signal word** **Danger**

**Hazard Statements**
Causes severe skin burns and eye damage
Causes serious eye damage

**Appearance** Clear, pale yellow **Physical State** Thin liquid **Odor** Bleach

**Precautionary Statements - Prevention**
Wash face, hands and any exposed skin thoroughly after handling.
Wear protective gloves, protective clothing, face protection, and eye protection such as safety glasses.

**Precautionary Statements - Response**
Immediately call a poison center or doctor.
If swallowed: Rinse mouth. Do NOT induce vomiting.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
Wash contaminated clothing before reuse.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Specific treatment (see supplemental first aid instructions on this label).
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**Precautionary Statements - Storage**
Store locked up.

**Precautionary Statements - Disposal**
Dispose of contents in accordance with all applicable federal, state, and local regulations.

**Hazards not otherwise classified (HNOC)**
Although not expected, heart conditions or chronic respiratory problems such as asthma, chronic bronchitis, or obstructive lung disease may be aggravated by exposure to high concentrations of vapor or mist.

Product contains a strong oxidizer. Always flush drains before and after use.

**Unknown Toxicity**
Not applicable.

**Other information**
Very toxic to aquatic life with long lasting effects.

**Interactions with Other Chemicals**
Reacts with other household chemicals such as toilet bowl cleaners, rust removers, acids, or products containing ammonia to produce hazardous irritating gases, such as chlorine and other chlorinated compounds.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

| Chemical Name | CAS-No | Weight % | Trade Secret |
|---|---|---|---|
| Sodium hypochlorite | 7681-52-9 | 5 - 10 | * |

* The exact percentage (concentration) of composition has been withheld as a trade secret.

## 4. FIRST AID MEASURES

**First aid measures**

**General Advice** Call a poison control center or doctor immediately for treatment advice. Show this safety data sheet to the doctor in attendance.

**Eye Contact** Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

**Skin Contact** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

**Inhalation** Move to fresh air. If breathing is affected, call a doctor.

**Ingestion** Have person sip a glassful of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person. Call a poison control center or doctor immediately for treatment advice.

**Protection of First-aiders** Avoid contact with skin, eyes, and clothing. Use personal protective equipment as required. Wear personal protective clothing (see section 8).

**Most important symptoms and effects, both acute and delayed**

**Most Important Symptoms and Effects** Burning of eyes and skin.

**Indication of any immediate medical attention and special treatment needed**

**Notes to Physician** Treat symptomatically. Probable mucosal damage may contraindicate the use of gastric lavage.

## 5. FIRE-FIGHTING MEASURES

**Suitable Extinguishing Media**
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Unsuitable Extinguishing Media**
CAUTION: Use of water spray when fighting fire may be inefficient.

**Specific Hazards Arising from the Chemical**
This product causes burns to eyes, skin, and mucous membranes. Thermal decomposition can release sodium chlorate and irritating gases and vapors.

**Explosion Data**

**Sensitivity to Mechanical Impact** None.

**Sensitivity to Static Discharge** None.

**Protective equipment and precautions for firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**

**Personal Precautions** Avoid contact with eyes, skin, and clothing. Ensure adequate ventilation. Use personal protective equipment as required. For spills of multiple products, responders should evaluate the SDSs of the products for incompatibility with sodium hypochlorite. Breathing protection should be worn in enclosed and/or poorly-ventilated areas until hazard assessment is complete.

**Other Information** Refer to protective measures listed in Sections 7 and 8.

**Environmental precautions**

**Environmental Precautions** This product is toxic to fish, aquatic invertebrates, oysters, and shrimp. Do not allow product to enter storm drains, lakes, or streams. See Section 12 for ecological Information.

**Methods and material for containment and cleaning up**

**Methods for Containment** Prevent further leakage or spillage if safe to do so.

**Methods for Cleaning Up** Absorb and containerize. Wash residual down to sanitary sewer. Contact the sanitary treatment facility in advance to assure ability to process washed-down material.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**

**Handling** Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes, and clothing. Do not eat, drink, or smoke when using this product.

**Conditions for safe storage, including any incompatibilities**

**Storage** Store away from children. Reclose cap tightly after each use. Store this product upright in a cool, dry area, away from direct sunlight and heat to avoid deterioration. Do not contaminate food or feed by storage of this product.

**Incompatible Products** Toilet bowl cleaners, rust removers, acids, and products containing ammonia.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**

**Exposure Guidelines**

| Chemical Name | ACGIH TLV | OSHA PEL | NIOSH IDLH |
|---|---|---|---|
| Sodium hypochlorite<br>7681-52-9 | None | None | None |

*ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. NIOSH IDLH: Immediately Dangerous to Life or Health.*

**Appropriate engineering controls**

**Engineering Measures** Showers
Eyewash stations
Ventilation systems

**Individual protection measures, such as personal protective equipment**

**Eye/Face Protection** If splashes are likely to occur: Wear safety glasses with side shields (or goggles) or face shield.

**Skin and Body Protection** Wear rubber or neoprene gloves and protective clothing such as long-sleeved shirt.

**Respiratory Protection** If irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

**Hygiene Measures** Handle in accordance with good industrial hygiene and safety practice. Wash hands after direct contact. Do not wear product-contaminated clothing for prolonged periods. Remove and wash contaminated clothing before re-use. Do not eat, drink, or smoke when using this product.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Physical and Chemical Properties**

| | | | |
|---|---|---|---|
| **Physical State** | Thin liquid | | |
| **Appearance** | Clear | **Odor** | Bleach |
| **Color** | Pale yellow | **Odor Threshold** | No information available |

| **Property** | **Values** | **Remarks/ Method** |
|---|---|---|
| **pH** | ~12 | None known |
| **Melting/freezing point** | No data available | None known |
| **Boiling point / boiling range** | No data available | None known |
| **Flash Point** | Not flammable | None known |
| **Evaporation rate** | No data available | None known |
| **Flammability (solid, gas)** | No data available | None known |
| **Flammability Limits in Air** | | |
| **Upper flammability limit** | No data available | None known |
| **Lower flammability limit** | No data available | None known |
| **Vapor pressure** | No data available | None known |
| **Vapor density** | No data available | None known |
| **Specific Gravity** | ~1.1 | None known |
| **Water Solubility** | Soluble | None known |
| **Solubility in other solvents** | No data available | None known |
| **Partition coefficient: n-octanol/water** | No data available | None known |
| **Autoignition temperature** | No data available | None known |
| **Decomposition temperature** | No data available | None known |
| **Kinematic viscosity** | No data available | None known |
| **Dynamic viscosity** | No data available | None known |
| **Explosive Properties** | Not explosive | |
| **Oxidizing Properties** | No data available | |

**Other Information**

| | |
|---|---|
| **Softening Point** | No data available |
| **VOC Content (%)** | No data available |
| **Particle Size** | No data available |
| **Particle Size Distribution** | No data available |

## 10. STABILITY AND REACTIVITY

**Reactivity**
Reacts with other household chemicals such as toilet bowl cleaners, rust removers, acids, or products containing ammonia to produce hazardous irritating gases, such as chlorine and other chlorinated compounds.

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of Hazardous Reactions**
None under normal processing.

**Conditions to avoid**
None known based on information supplied.

**Incompatible materials**
Toilet bowl cleaners, rust removers, acids, and products containing ammonia.

**Hazardous Decomposition Products**
None known based on information supplied.

## 11. TOXICOLOGICAL INFORMATION

**Information on likely routes of exposure**

**Product Information** .

**Inhalation** Exposure to vapor or mist may irritate respiratory tract and cause coughing. Inhalation of high concentrations may cause pulmonary edema.

**Eye Contact** Corrosive. May cause severe damage to eyes.

**Skin Contact** May cause severe irritation to skin. Prolonged contact may cause burns to skin.

**Ingestion** Ingestion may cause burns to gastrointestinal tract and respiratory tract, nausea, vomiting, and diarrhea.

**Component Information**

| Chemical Name | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|
| Sodium hypochlorite<br>7681-52-9 | 8200 mg/kg (Rat) | >10000 mg/kg (Rabbit) | - |

**Information on toxicological effects**

**Symptoms** May cause redness and tearing of the eyes. May cause burns to eyes. May cause redness or burns to skin. Inhalation may cause coughing.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Sensitization** No information available.

**Mutagenic Effects** No information available.

**Carcinogenicity** The table below indicates whether each agency has listed any ingredient as a carcinogen.

| Chemical Name | ACGIH | IARC | NTP | OSHA |
|---|---|---|---|---|
| Sodium hypochlorite<br>7681-52-9 | - | Group 3 | - | - |

***IARC (International Agency for Research on Cancer)***
*Group 3 - Not Classifiable as to Carcinogenicity in Humans*

**Reproductive Toxicity** No information available.

**STOT - single exposure** No information available.

**STOT - repeated exposure** No information available.
**Chronic Toxicity** Carcinogenic potential is unknown.
**Target Organ Effects** Respiratory system, eyes, skin, gastrointestinal tract (GI).

**Aspiration Hazard** No information available.

**Numerical measures of toxicity - Product Information**

**The following values are calculated based on chapter 3.1 of the GHS document**

**ATEmix (oral)**
54 g/kg
**ATEmix (inhalation-dust/mist)**
58 mg/L

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**
Very toxic to aquatic life with long lasting effects.

This product is toxic to fish, aquatic invertebrates, oysters, and shrimp. Do not allow product to enter storm drains, lakes, or streams.

**Persistence and Degradability**
No information available.

**Bioaccumulation**
No information available.

**Other adverse effects**
No information available.

## 13. DISPOSAL CONSIDERATIONS

**Disposal methods**
Dispose of in accordance with all applicable federal, state, and local regulations. Do not contaminate food or feed by disposal of this product.

**Contaminated Packaging**
Do not reuse empty containers. Dispose of in accordance with all applicable federal, state, and local regulations.

## 14. TRANSPORT INFORMATION

| | |
|---|---|
| **DOT** | Not restricted. |
| **TDG** | Not restricted for road or rail. |
| **ICAO** | Not restricted, as per Special Provision A197, Environmentally Hazardous Substance exception. |
| **IATA** | Not restricted, as per Special Provision A197, Environmentally Hazardous Substance exception. |
| **IMDG/IMO** | Not restricted, as per IMDG Code 2.10.2.7, Marine Pollutant exception. |

## 15. REGULATORY INFORMATION

### Chemical Inventories

| | |
|---|---|
| **TSCA** | All components of this product are either on the TSCA 8(b) Inventory or otherwise exempt from listing. |
| **DSL/NDSL** | All components are on the DSL or NDSL. |

**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory
**DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List

### U.S. Federal Regulations

**SARA 313**
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

**SARA 311/312 Hazard Categories**

| | |
|---|---|
| **Acute Health Hazard** | Yes |
| **Chronic Health Hazard** | No |
| **Fire Hazard** | No |
| **Sudden Release of Pressure Hazard** | No |
| **Reactive Hazard** | No |

**Clean Water Act**
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

| Chemical Name | CWA - Reportable Quantities | CWA - Toxic Pollutants | CWA - Priority Pollutants | CWA - Hazardous Substances |
|---|---|---|---|---|
| Sodium hypochlorite 7681-52-9 | 100 lb | | | X |

**CERCLA**
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

| Chemical Name | Hazardous Substances RQs | Extremely Hazardous Substances RQs | RQ |
|---|---|---|---|
| Sodium hypochlorite 7681-52-9 | 100 lb | – | RQ 100 lb final RQ<br>RQ 45.4 kg final RQ |

**EPA Statement**
This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

> **DANGER: CORROSIVE.** Causes irreversible eye damage and skin burns. Harmful if swallowed. Do not get in eyes, on skin, or on clothing. Wear protective eyewear and rubber gloves when handling this product. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the restroom. Avoid breathing vapors and use only in a well-ventilated area.

## US State Regulations

**California Proposition 65**
This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

| Chemical Name | New Jersey | Massachusetts | Pennsylvania | Rhode Island | Illinois |
|---|---|---|---|---|---|
| Sodium hypochlorite<br>7681-52-9 | X | X | X | X | |
| Sodium chlorate<br>7775-09-9 | X | X | X | | |

## International Regulations

**Canada**
**WHMIS Hazard Class**
E - Corrosive material

## 16. OTHER INFORMATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **NFPA** | **Health Hazard** | 3 | **Flammability** 0 | **Instability** 0 | **Physical and Chemical Hazards** | - |
| **HMIS** | **Health Hazard** | 3 | **Flammability** 0 | **Physical Hazard** 0 | **Personal Protection** | B |

**Prepared By**
Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

**Revision Date** February 13, 2019

**Revision Note** Updated date.

**Reference** 1096036/164964.159

**General Disclaimer**
**The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal, and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.**

**End of Safety Data Sheet**

# Ficha de datos de seguridad

**Fecha de publicación** 13-may.-2013 **Fecha de revisión** 16-mar.-2018 **Número de Revisión** 2

## 1. Identificación de la sustancia o preparado y de la sociedad o la empresa

**Identificación del producto**
**Nombre del producto** **Clorox Regular-Bleach1 (concentrated) (EPA 5813-100)**

**Otros medios de identificación**
**Sinónimos** Ninguno/a

**Uso recomendado del producto químico y restricciones de uso**
**Uso recomendado** Cleaning Supplies Lejía
**Usos desaconsejados** No hay información disponible

**Datos del proveedor de la ficha de datos de seguridad**
**Proveedor** The Clorox Company

**Dirección** 1221 Broadway
Oakland
CA
94612
US

**Teléfono** 1-510-271-7000

**Teléfono de emergencia**
**Teléfono de emergencia** For Medical Emergencies call: 1-800-446-1014. Transportation Emergencies, call Chemtrec: 1-800-424-9300

## 2. Identificación de los peligros

**Clasificación**
Este producto químico se considera peligroso de acuerdo con la Norma de comunicación de peligros OSHA de 2012 (29 CFR 1910.1200).

| | |
|---|---|
| Corrosión o irritación cutáneas | Categoría 1 Subcategoría B |
| Lesiones oculares graves o irritación ocular | Categoría 1 |
| Corrosivo para los metales | Categoría 1 |

**Elementos de la etiqueta según el SGA, incluidos consejos de prudencia**

**RESUMEN PARA EMERGENCIAS**

**Palabras de advertencia** **¡PELIGRO**

**indicaciones de peligro**
Provoca quemaduras graves en la piel y lesiones oculares graves
PUEDE SER CORROSIVO PARA LOS METALES

**aspecto** Clear, pale yellow **Estado físico** Líquido **Olor** Lejía

**Consejos de prudencia - Prevención**
No respirar el polvo/el humo/el gas/la niebla/los vapores/el aerosol
Lavarse concienzudamente la cara, las manos y las áreas de la piel expuestas tras su manipulación
Llevar guantes/prendas/gafas/máscara de protección
Conservar únicamente en el recipiente original

**Consejos de prudencia - Respuesta**
Llamar inmediatamente a un CENTRO DE INFORMACION TOXICOLOGICA o a un médico
Se necesita un tratamiento específico (ver las instrucciones adicionales de primeros auxilios en esta etiqueta)

**OJOS**
EN CASO DE CONTACTO CON LOS OJOS: Aclarar cuidadosamente con agua durante varios minutos. Quitar las lentes de contacto, si lleva y resulta fácil. Seguir aclarando
Llamar inmediatamente a un CENTRO DE INFORMACION TOXICOLOGICA o a un médico

**piel**
EN CASO DE CONTACTO CON LA PIEL (o el pelo): Quitarse inmediatamente las prendas contaminadas. Aclararse la piel con agua o ducharse
Lavar las prendas contaminadas antes de volver a usarlas

**INHALACIÓN**
EN CASO DE INHALACIÓN: Transportar a la víctima al exterior y mantenerla en reposo en una posición confortable para respirar
Llamar inmediatamente a un CENTRO DE INFORMACION TOXICOLOGICA o a un médico

**INGESTIÓN**
EN CASO DE INGESTIÓN: Enjuagarse la boca. NO provocar el vómito

**Derrame**
Absorber el vertido para que no dañe otros materiales

**Consejos de prudencia - Almacenamiento**
Guardar bajo llave
Almacenar en un recipiente resistente a la corrosión/ .? con revestimiento interior resistente

**Consejos de prudencia - Eliminación**
Eliminar el contenido/el recipiente en una planta de eliminación de residuos autorizada

**Peligros no clasificados de otra manera (HNOC)**
No es aplicable

**OTRA INFORMACIÓN**
Muy tóxico para los organismos acuáticos, con efectos nocivos duraderos

**Interacciones con otras sustancias químicas**
No hay información disponible.

## 3. Composición/información sobre los componentes

.

**Sinónimos** Ninguno/a.

| Nombre químico | CAS-No | Percent | Secreto comercial |
|---|---|---|---|
| Sodium hypochlorite | 7681-52-9 | 1-10 | * |
| Sodium Chloride | 7647-14-5 | 1.86 | * |
| Polyquaternium-6 | 26062-79-3 | 0.054 | * |

*El porcentaje exacto (concentración) de la composición se ha retenido como secreto comercial

## 4. FIRST AID MEASURES

**PRIMEROS AUXILIOS**

**Consejo general** Se necesita atención médica inmediata. Mostrar esta ficha de datos de seguridad al médico de servicio.

**contacto con los ojos** Enjuagar inmediatamente con abundante agua, también bajo los párpados, durante al menos 15 minutos. Mantener el ojo bien abierto durante el enjuague. No frotar la zona afectada. Buscar inmediatamente atención médica. Quitar las lentes de contacto, si lleva y resulta fácil. Seguir aclarando.

**Contacto con la piel** Lavar la piel con agua y jabón. Se necesita atención médica inmediata. Lavar inmediatamente con jabón y abundante agua y quitarse la ropa y el calzado contaminados.

**INHALACIÓN** Transportar a la víctima al exterior. Si persisten los síntomas, llamar a un médico. Si ha dejado de respirar, administrar respiración artificial. Consultar a un médico inmediatamente. Si no respira, realizar técnicas de respiración artificial. Evitar el contacto directo con la piel. Utilizar medios de barrera para practicar la reanimación boca a boca. Si respira con dificultad, (personal formado para ello debería) administrar oxígeno. Puede producirse un edema pulmonar retardado. Consultar a un médico inmediatamente si se producen síntomas.

**INGESTIÓN** NO provocar el vómito. Clean mouth with water and afterwards drink plenty of water. Nunca dar nada por boca a una persona inconsciente. Llamar inmediatamente a un médico o a un centro de información toxicológica.

**Equipo de protección para el personal de primeros auxilios** Asegurarse de que el personal médico sea consciente de los materiales implicados, tomando precauciones para protegerse a sí mismos y para evitar extender la contaminación. Evitar el contacto con la piel, los ojos o la ropa. Evitar el contacto directo con la piel. Utilizar medios de barrera para practicar la reanimación boca a boca. Utilizar el equipo de protección individual obligatorio. Utilizar ropa de protección personal (ver la sección 8).

**Principales síntomas y efectos, agudos y retardados**

**Síntomas y efectos más importantes** Ardor.

**Indicación de toda atención médica y de los tratamientos especiales que deban dispensarse inmediatamente**

**Notas para el médico** Tratar los síntomas. El producto es un material corrosivo. El lavado gástrico o los vómitos están contraindicados. Debe investigarse una posible perforación del estómago o el esófago. No suministrar antídotos químicos. Puede producirse asfixia por edema de glotis. Puede producirse un marcado descenso de la presión sanguínea con estertores húmedos, esputo espumoso y presión arterial elevada.

## 5. FIRE-FIGHTING MEASURES

**Medios de extinción apropiados**

Utilizar medidas de extinción adecuadas a las circunstancias locales y al entorno

**Medios de extinción no apropiados**
PRECAUCIÓN: El uso de agua pulverizada para luchar contra el incendio puede ser inefectivo.

**Peligros específicos que presenta el producto químico**
El producto provoca quemaduras en los ojos, la piel y las membranas mucosas. Su descomposición térmica puede dar lugar a la liberación de vapores y gases irritantes.

| | |
|---|---|
| **Código uniforme de incendios (Uniform Fire Code)** | CORROSIVO: BASE-LÍQUIDO<br>Corrosivo: Base-Sólido |

**Productos de combustión peligrosos**
Óxidos de carbono.

**Datos de explosión**
**Sensibilidad a impactos mecánicos** NO.

**Sensibilidad a descargas estáticas** NO.

**Equipo de protección y medidas de precaución para el personal de lucha contra incendios**
Como en cualquier incendio, llevar un aparato de respiración autónomo de presión a demanda MSHA/NIOSH (aprobado o equivalente) y todo el equipo de protección necesario.

## 6. Medidas en caso de vertido accidental

**Precauciones personales, equipo de protección y procedimientos de emergencia**

| | |
|---|---|
| **Precauciones personales** | Evítese el contacto con los ojos. Attention! Corrosive material. Evitar el contacto con la piel, los ojos o la ropa. Asegurar una ventilación adecuada. Utilizar el equipo de protección individual obligatorio. Evacuar al personal a zonas seguras. Mantener alejadas a las personas y en dirección contraria al viento en una fuga o vertido. |
| **OTRA INFORMACIÓN** | Consultar las medidas de protección que se recogen en las secciones 7 y 8. |

**Precauciones relativas al medio ambiente**

| | |
|---|---|
| **Precauciones relativas al medio ambiente** | Consultar las medidas de protección que se recogen en las secciones 7 y 8. Prevenir más fugas o vertidos si se puede hacer de forma segura. No debe liberarse en el medio ambiente. No permitir que se introduzca en el suelo o el subsuelo. Prevenir la penetración del producto en desagües. No arrojar a las aguas superficiales ni al sistema de alcantarillado. |

**Métodos y material de contención y de limpieza**

| | |
|---|---|
| **Métodos de contención** | Prevenir más fugas o vertidos si se puede hacer de forma segura. |
| **Métodos de limpieza** | Recoger y transferir a contenedores etiquetados de forma apropiada. |

## 7. Manipulación y almacenamiento

**Precauciones para una manipulación segura**

| | |
|---|---|
| **Manipulación** | Manipular respetando las buenas prácticas de higiene industrial y seguridad. Evitar el contacto con la piel, los ojos o la ropa. En caso de ventilación insuficiente, úsese equipo respiratorio adecuado. Utilizar únicamente con ventilación adecuada y en sistemas cerrados. No comer, beber ni fumar durante su utilización. Quitar las prendas contaminadas y lavarlas antes de volver a usarlas. |

**Condiciones de almacenamiento seguro, incluidas posibles incompatibilidades**

| | |
|---|---|
| **Almacenamiento** | Mantener los contenedores perfectamente cerrados en un lugar fresco, seco y bien ventilado. Proteger de la humedad. Guardar bajo llave. Manténgase fuera del alcance de los niños. Almacenar alejado de otros materiales. |
| **Productos incompatibles** | Ninguno conocido, en base a la información facilitada. |

## 8. CONTROLES DE EXPOSICIÓN/PROTECCIÓN INDIVIDUAL

**Parámetros de control**

**Pautas relativas a la exposición** Este producto, tal y como se ha suministrado, no contiene ningún material peligroso con límites de exposición laboral establecidos por las organismos reguladores específicos de la región

| Nombre químico | ACGIH TLV | OSHA PEL | NIOSH IDLH |
|---|---|---|---|
| Sodium hypochlorite<br>7681-52-9 | None | None | None |
| Sodium Chloride<br>7647-14-5 | None | None | None |

**Controles técnicos apropiados**

**Medidas técnicas** Duchas
Estaciones de lavado de ojos
Sistemas de ventilación

**Medidas de protección individual, tales como equipo de protección personal**

**Protección ocular y de la cara** Escudo de protección facial.

**Protección de la piel y el cuerpo** Llevar guantes y prendas de protección. Ropa de manga larga. Delantal resistente a productos químicos. Guantes impermeables.

**Protección respiratoria** En las condiciones normales de uso no se requieren equipos de protección Si se exceden los límites de exposición o se experimenta irritación, puede ser necesario ventilar y evacuar.

**Medidas higiénicas** Manipular respetando las buenas prácticas de higiene industrial y seguridad. Quitar las prendas contaminadas y lavarlas antes de volver a usarlas. Evitar el contacto con la piel, los ojos o la ropa. Úsense guantes adecuados y protección para los ojos/la cara. No comer, beber ni fumar durante su utilización. Las prendas de trabajo contaminadas no podrán sacarse del lugar de trabajo. Se recomienda realizar una limpieza periódica de los equipos así como la zona y la indumentaria de trabajo. Lavarse las manos antes de los descansos e inmediatamente después de manipular el producto. For environmental protection, remove and wash all contaminated protective equipment before re-use.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Propiedades físicas y químicas**

| | | | |
|---|---|---|---|
| **Estado físico** | Líquido | | |
| **aspecto** | Clear, pale yellow | **Olor** | Lejía |
| **color** | No hay información disponible | **umbral olfativo** | No hay información disponible |

| Propiedad | VALORES | Comentarios Método |
|---|---|---|
| **pH** | 12.1 | Ninguno conocido |
| **Punto de fusión / congelación** | sin datos disponibles | Ninguno conocido |
| **Punto de ebullición / intervalo de ebullición** | sin datos disponibles | Ninguno conocido |
| **punto de inflamación** | sin datos disponibles | Ninguno conocido |
| **tasa de evaporación** | sin datos disponibles | Ninguno conocido |
| **inflamabilidad (sólido, gas)** | sin datos disponibles | Ninguno conocido |
| **Límite de inflamabilidad con el aire** | | |
| **Límite superior de inflamabilidad** | sin datos disponibles | |
| **Límite inferior de inflamabilidad** | sin datos disponibles | |
| **presión de vapor** | sin datos disponibles | Ninguno conocido |
| **densidad de vapor** | sin datos disponibles | Ninguno conocido |
| **gravedad específica** | No data available | Ninguno conocido |

| | | |
|---|---|---|
| **Solubilidad en el agua** | Soluble en agua | Ninguno conocido |
| **Solubilidad en otros disolventes** | sin datos disponibles | Ninguno conocido |
| **Coeficiente de partición: n-octanol/agua** | 0 | Ninguno conocido |
| **Temperatura de autoignición** | sin datos disponibles | Ninguno conocido |
| **temperatura de descomposición** | sin datos disponibles | Ninguno conocido |
| **Viscosidad cinemática** | sin datos disponibles | Ninguno conocido |
| **Viscosidad dinámica** | sin datos disponibles | Ninguno conocido |
| **Propiedades explosivas** | sin datos disponibles | |
| **Propiedades comburentes** | sin datos disponibles | |

**OTRA INFORMACIÓN**

| | |
|---|---|
| **punto de reblandecimiento** | No data available |
| **VOC Content (%)** | sin datos disponibles |
| **tamaño de partícula** | sin datos disponibles |
| **distribución de tamaños de partícula** | No data available |

## 10. Estabilidad y reactividad

**Reactividad**
sin datos disponibles

**Estabilidad química**
Estable en las condiciones de almacenamiento recomendadas.

**Posibilidad de reacciones peligrosas**
Ninguno durante un proceso normal.

**polimerización peligrosa**
No se produce ninguna polimerización peligrosa.

**Condiciones que deben evitarse**
Exposición al aire o a la humedad durante largos periodos.

**materiales incompatibles**
Ácidos fuertes Bases fuertes Ácidos Bases Agente comburente Agentes oxidantes fuertes

**Productos de descomposición peligrosos**
Óxidos de carbono.

## 11. TOXICOLOGICAL INFORMATION

**Información sobre posibles vías de exposición**
**Información del producto** .

**INHALACIÓN** No hay disponibles datos de ensayo específicos sobre la sustancia o la mezcla. Corrosivo por inhalación. (basada en los componentes). Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate. Las sustancias corrosivas inhaladas pueden producir un edema pulmonar tóxico. El edema pulmonar puede ser mortal. Puede provocar irritación del tracto respiratorio.

**contacto con los ojos** No hay disponibles datos de ensayo específicos sobre la sustancia o la mezcla. Provoca quemaduras. (basada en los componentes). Corrosivo para los ojos y puede provocar lesiones graves, como ceguera. Severamente irritante para los ojos. Provoca lesiones oculares graves. Puede producir quemaduras. Puede provocar daños irreversibles en los ojos.

**Contacto con la piel** No hay disponibles datos de ensayo específicos sobre la sustancia o la mezcla. corrosivo. (basada en los componentes). Provoca quemaduras. Puede provocar irritación. El contacto prolongado puede provocar enrojecimiento e irritación.

**INGESTIÓN** No hay disponibles datos de ensayo específicos sobre la sustancia o la mezcla. Provoca quemaduras. (basada en los componentes). La ingestión provoca quemaduras en el tubo digestivo superior y en las vías aéreas. Puede producir ardores graves en la boca y el estómago, con vómitos y diarrea de sangre oscura. Puede producirse una disminución de la presión arterial. Pueden observarse manchas parduzcas o amarillentas alrededor de la boca. La hinchazón de la garganta puede ocasionar disnea y asfixia. Puede provocar daño pulmonar en caso de ingestión. Puede ser mortal en caso de ingestión y penetración en las vías respiratorias. La ingestión puede irritar las membranas mucosas. La ingestión puede causar irritación gastrointestinal, náuseas, vómitos y diarrea.

**Información sobre los componentes**

| Nombre químico | Oral LD50 | Dermal LD50 | CL50 por inhalación |
|---|---|---|---|
| Sodium hypochlorite 7681-52-9 | = 8200 mg/kg ( Rat ) | >10000 mg/kg (Rabbit) | _ |
| Sodium Chloride 7647-14-5 | = 3 g/kg ( Rat ) | _ | >42 g/m³ (Rat, 1 h) |

**Información sobre los efectos toxicológicos**

**Síntomas** Eritema (enrojecimiento de la piel). Ardor. PUEDE PROVOCAR CEGUERA. Tos y/o estertores.

**Efectos retardados e inmediatos, así como efectos crónicos producidos por una exposición a corto y largo plazo**

**sensibilización** No hay información disponible.

**EFECTOS MUTAGÉNICOS** No hay información disponible.

**carcinogenicidad** La tabla siguiente indica si cada agencia ha incluido alguno de los componentes en su lista de carcinógenos.

| Component | ACGIH | IARC | NTP | OSHA |
|---|---|---|---|---|
| Sodium hypochlorite 7681-52-9 ( 1-10 ) | - | Group 3 | - | - |

*IARC (Agencia Internacional para la Investigación del Cáncer, International Agency for Research on Cancer)*
*Grupo 3 - No clasificable en cuanto a su carcinogenicidad para los seres humanos*

**toxicidad para la reproducción** No hay información disponible.

**STOT - exposición única** No hay información disponible.

**STOT - exposición repetida** No hay información disponible.

**Toxicidad crónica** Ningún efecto conocido en base a la información facilitada. La exposición crónica a humo o gases corrosivos puede provocar desgaste dental, seguida por necrosis mandibular. Es frecuente la irritación bronquial con tos crónica y los ataques de neumonía. También pueden observarse molestias digestivas. Effects from this product caused by acute exposure may cause permanent damage to target organs and/or may cause chronic conditions. Se desconoce su potencial carcinogénico.

**Efectos en órganos diana** Sistema respiratorio. OJOS. piel. Tracto gastrointestinal (GI).

**Peligro por aspiración** No hay información disponible.

**Medidas numéricas de toxicidad Información del producto**

**Los siguientes valores se han calculado basándose en el capítulo 3.1 del documento de GHS**

**ETAmezcla (oral)**
53,480.00 mg/kg
**ATEmix (inhalación-polvo/niebla)**
58.30 mg/l

## 12. ECOLOGICAL INFORMATION

**ecotoxicidad**
Nocivo para los organismos acuáticos. Muy tóxico para los organismos acuáticos, con efectos nocivos duraderos.

**Persistencia y degradabilidad**
No hay información disponible.

**Bioacumulación**
No hay información disponible

**Otros efectos adversos**
No hay información disponible.

## 13. Consideraciones relativas a la eliminación

**Métodos para el tratamiento de residuos**

**Métodos de eliminación** Este material, tal y como se suministra, no es un residuo peligroso según el reglamento federal (40 CFR 261). Este material podría convertirse en un residuo peligroso si se mezcla con o entra en contacto con un residuo peligroso, si se le añaden sustancias químicas o si se le procesa o altera de algún otro modo. Consulte la lista del reglamento 40 CFR 261 para determinar si el material alterado es un residuo peligroso. Consulte las normativas estatales, regionales o locales apropiadas para saber si debe cumplir otros requisitos.

**Embalaje contaminado** Eliminar el contenido/recipiente conforme a las normativas locales.

**California Hazardous Waste Codes** 561 232

Este producto contiene una o más sustancias incluidas en la lista de residuos peligrosos del Estado de California.

| Nombre químico | California Hazardous Waste |
|---|---|
| Sodium hypochlorite<br>7681-52-9 | Toxic Ignitable Reactive |

## 14. Información relativa al transporte

**DOT** No regulado

**TDG** No regulado

**ICAO** No regulado

**IATA** No regulado

**IMDG/IMO** No regulado

## 15. Información reglamentaria

**Inventarios internacionales**

| | |
|---|---|
| TSCA | Cumple |
| DSL | Todos los componentes aparecen recogidos bien en la DSL o en la NDSL |

**TSCA** - Ley de control de sustancias tóxicas (Toxic Substances Control Act) estadounidense, apartado 8(b), Inventario
**DSL/NDSL** - Lista de sustancias domésticas/no domésticas de Canadá

## Normativas federales de EE.UU

### SARA 313

Sección 313 del título III de la Ley de enmiendas y reautorización del superfondo de 1986 (SARA). Este producto no contiene ninguna sustancia química sujeta a los requisitos de creación de informes de la ley y del título 40 del Código de regulaciones federales, parte 372

### Categorías de riesgos SARA 311/312

| | |
|---|---|
| **Peligro agudo para la salud** | sí |
| **Peligro crónico para la salud** | NO |
| **Peligro de incendio** | NO |
| **Peligro de liberación repentina de presión** | NO |
| **Riesgo de reacción** | NO |

### CWA (Ley del agua limpia, Clean Water Act)

Este producto contiene las siguientes sustancias que son contaminantes regulados en virtud de la Ley de Agua Limpia (40 CFR 122.21 y 40 CFR 122.42)

| Nombre químico | CWA - Cantidades notificables | CWA - Contaminantes tóxicos | CWA - Contaminantes prioritarios | CWA - Sustancias peligrosas |
|---|---|---|---|---|
| Sodium hypochlorite 7681-52-9 | 100 lb | | | X |

### CERCLA

Este material, tal como se suministra, contiene una o más sustancias reguladas como sustancias peligrosas bajo la Ley de Responsabilidad, Compensación y Recuperación Ambiental (CERCLA) (40 CFR 302)

| Nombre químico | Cantidades notificables (RQ) de sustancias peligrosas | Cantidades notificables (RQ) de sustancias peligrosas | RQ |
|---|---|---|---|
| Sodium hypochlorite 7681-52-9 | 100 lb | - | RQ 100 lb final RQRQ 45.4 kg final RQ |

## Normativas estatales de EE.UU

### Proposición 65 de California

Este producto no contiene ninguna sustancia química de la Proposición 65.

### Normativas estatales de derecho a la información de los EE.UU

.

| Nombre químico | Nueva Jersey | Massachusetts | Pennsylvania | Rhode Island | Illinois |
|---|---|---|---|---|---|
| Sodium hydroxide 1310-73-2 | X | X | X | X | |

**Declaración de la EPA**

Este producto químico es un pesticida registrado por la agencia estadounidense para la protección del medio ambiente (EPA) y está sujeto a determinados requisitos de etiquetado en el marco de la ley federal relativa a pesticidas. Tales requisitos difieren de los criterios de clasificación e información sobre peligros de inclusión necesaria en las fichas de datos de seguridad y en las etiquetas para uso en el lugar de trabajo de productos químicos no pesticidas. A continuación se indica la información sobre peligros de inclusión necesaria en la etiqueta del pesticida:

## Normativas internacionales

**México**

**CANADÁ**

**Clase de peligro WHMIS**

D2B - Materiales tóxicos

## 16. Otra información

| | | | |
|---|---|---|---|
| **NFPA** | **Peligros para la salud** 3 **inflamabilidad** 0 | **Inestabilidad** 0 | **Riesgos físicos y químicos** - |
| **HMIS** | **Peligros para la salud** 3 **inflamabilidad** 0 | **peligro físico** 0 | **PROTECCIÓN INDIVIDUAL** X |

| | |
|---|---|
| **Preparada por** | Product Stewardship<br>23 British American Blvd.<br>Latham, NY 12110<br>1-800-572-6501 |
| **Fecha de publicación** | 13-may.-2013 |
| **Fecha de revisión** | 16-mar.-2018 |
| **Nota de revisión** | No hay información disponible |

**Descargo de responsabilidad**

La información facilitada en esta Ficha de Datos de Seguridad es correcta, a nuestro leal saber y entender, en la fecha de su publicación. Dicha información está concebida únicamente como guía para la seguridad en la manipulación, el uso, el procesamiento, el almacenamiento, el transporte, la eliminación y la liberación, no debiendo tomarse como garantía o especificación de calidades. La información se refiere únicamente al material específico mencionado y puede no ser válida para tal material usado en combinación con cualesquiera otros materiales o en cualquier proceso salvo que se especifique expresamente en el texto

**Fin de la ficha de datos de seguridad**

## ATTACHMENT 6

SDS - Dawn Dishwashing Liquid

# SAFETY DATA SHEET

**Issuing Date:** 05-Oct-2015 **Revision Date:** 05-Oct-2015 **Version** 1

## 1. IDENTIFICATION

| | |
|---|---|
| **Product Name** | Dawn Ultra Dishwashing Liquid, Original Scent |
| **Product ID:** | 97591965_RET_NG |
| **Product Type:** | Finished Product - Consumer (Retail) Use Only |
| **Recommended use** | Dish Care |
| **Restrictions on Use** | Use only as directed on label. |
| **Synonyms** | Dawn Ultra Dishwashing Liquid, Pomegranate Awakening (97591967_RET_NG)<br>Dawn Ultra Dishwashing Liquid, Apple Orchard Harvest (97591968_RET_NG) |
| **Manufacturer** | PROCTER & GAMBLE - Fabric and Home Care Division<br>Ivorydale Technical Centre<br>5289 Spring Grove Avenue<br>Cincinnati, Ohio 45217-1087 USA<br><br>Procter & Gamble Inc.<br>P.O. Box 355, Station A<br>Toronto, ON M5W 1C5<br>1-800-331-3774 |
| **E-mail Address** | pgsds.im@pg.com |
| **Emergency Telephone** | Transportation (24 HR)<br>CHEMTREC - 1-800-424-9300<br>(U.S./ Canada) or 1-703-527-3887<br>Mexico toll free in country: 800-681-9531 |

## 2. HAZARD IDENTIFICATION

"Consumer Products", as defined by the US Consumer Product Safety Act and which are used as intended (typical consumer duration and frequency), are exempt from the OSHA Hazard Communication Standard (29 CFR 1910.1200). This SDS is being provided as a courtesy to help assist in the safe handling and proper use of the product.

**This product is classifed under 29CFR 1910.1200(d) and the Canadian Hazardous Products Regulation as follows:.**

| **Hazard Category** | |
|---|---|
| **Eye Damage / Irritation** | Category 2B |
| **Signal Word** | WARNING |
| **Hazard Statements** | Causes eye irritation |
| **Hazard pictograms** | None |

**Precautionary Statements - Prevention** Wash hands thoroughly after handling

**Precautionary Statements - Response** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
IF SWALLOWED:
Drink 1 or 2 glasses of water

**Precautionary Statements - Storage** None

**Precautionary Statements - Disposal** None

**Hazards not otherwise classified (HNOC)** None

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Ingredients are listed according to 29CFR 1910.1200 Appendix D and the Canadian Hazardous Products Regulation**

| Chemical Name | Synonyms | Trade Secret | CAS-No | Weight % |
|---|---|---|---|---|
| Sulfuric acid, mono-C10-16-alkyl esters, sodium salts | Sulfuric acid, mono-C10-16-alkyl esters, sodium salts | No | 68585-47-7 | 15 - 20 |
| Poly(oxy-1,2-ethanediyl), alpha-sulfo-omega-hydroxy-, C10-16-alkyl ethers, sodium salts | Poly(oxy-1,2-ethanediyl), alpha-sulfo-omega-hydroxy-, C10-16-alkyl ethers, sodium salts | No | 68585-34-2 | 5 - 10 |
| Amine oxides, C10-16-alkyldimethyl | Amine oxides, C10-16-alkyldimethyl | No | 70592-80-2 | 5 - 10 |
| Ethanol | Ethanol | No | 64-17-5 | 1 - 5 |

## 4. FIRST AID MEASURES

**First aid measures for different exposure routes**

**Eye contact** Rinse with plenty of water. Get medical attention immediately if irritation persists.

**Skin contact** Rinse with plenty of water. Get medical attention if irritation develops and persists.

**Ingestion** Drink 1 or 2 glasses of water. Do NOT induce vomiting. Get medical attention immediately if symptoms occur.

**Inhalation** Move to fresh air. If symptoms persist, call a physician.

**Most important symptoms/effects, acute and delayed** None under normal use conditions.

**Indication of immediate medical attention and special treatment needed, if necessary**

**Notes to Physician** Treat symptomatically.

## 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media** Dry chemical, $CO_2$, alcohol-resistant foam or water spray.

**Unsuitable Extinguishing Media** None.

**Special hazard** None known.

**Special protective equipment for fire-fighters** As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**Specific hazards arising from the chemical** None.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**

**Personal precautions** Use personal protective equipment. Do not get in eyes, on skin, or on clothing.

**Advice for emergency responders** Use personal protective equipment as required.

**Methods and materials for containment and cleaning up**

**Methods for containment** Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.

**Methods for cleaning up** Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

## 7. HANDLING AND STORAGE

**Precautions for safe handling**

**Advice on safe handling** Use personal protective equipment as required. Keep container closed when not in use. Never return spills in original containers for re-use. Keep out of the reach of children.

**Conditions for safe storage, including any incompatibilities**

**Storage Conditions** Keep containers tightly closed in a dry, cool and well-ventilated place.

**Incompatible products** None known.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**

**Exposure Guidelines** .

| Chemical Name | CAS-No | ACGIH TLV | OSHA PEL | Mexico PEL |
|---|---|---|---|---|
| Ethanol | 64-17-5 | STEL: 1000 ppm | TWA: 1000 ppm<br>TWA: 1900 mg/m$^3$<br>(vacated) TWA: 1000 ppm<br>(vacated) TWA: 1900 mg/m$^3$ | Mexico: TWA 1000 ppm<br>Mexico: TWA 1900 mg/m$^3$ |

| Chemical Name | CAS-No | Alberta | Quebec | Ontario TWAEV | British Columbia |
|---|---|---|---|---|---|
| Ethanol | 64-17-5 | TWA: 1000 ppm<br>TWA: 1880 mg/m$^3$ | TWA: 1000 ppm<br>TWA: 1880 mg/m$^3$ | STEL: 1000 ppm | STEL: 1000 ppm |

No relevant exposure guidelines for other ingredients

**Exposure controls**

**Engineering Measures**

**Distribution, Workplace and Household Settings:**
Ensure adequate ventilation

**Product Manufacturing Plant (needed at Product-Producing Plant ONLY):**
Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction

**Personal Protective Equipment**

**Eye Protection**

**Distribution, Workplace and Household Settings:**
No special protective equipment required

**Product Manufacturing Plant (needed at Product-Producing Plant ONLY):**
Use appropriate eye protection

**Hand Protection**

**Distribution, Workplace and Household Settings:**
No special protective equipment required

**Product Manufacturing Plant (needed at Product-Producing Plant ONLY):**
Protective gloves

**Skin and Body Protection**

**Distribution, Workplace and Household Settings:**
No special protective equipment required

**Product Manufacturing Plant (needed at Product-Producing Plant ONLY):**
Wear suitable protective clothing

**Respiratory Protection**

**Distribution, Workplace and Household Settings:**
No special protective equipment required

**Product Manufacturing Plant (needed at Product-Producing Plant ONLY):**
In case of insufficient ventilation wear suitable respiratory equipment

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Physical State @20°C** | liquid |
| **Appearance** | Various color by product |
| **Odor** | Scented |
| **Odor threshold** | No information available |

| Property | Values | Note |
|---|---|---|
| **pH value** | 9.0 - 9.2 | 10% aqueous solution |
| **Melting/freezing point** | No information available | |
| **Boiling point/boiling range** | 100 - 104 °C / 212 - 219 °F | |
| **Flash point** | No Flash to Boiling (NFTB) | |
| **Evaporation rate** | No information available | |
| **Flammability (solid, gas)** | No information available | |
| **Flammability Limits in Air** | | |
| **Upper flammability limit** | No information available | |
| **Lower Flammability Limit** | No information available | |
| **Vapor pressure** | No information available | |
| **Vapor density** | No information available | |
| **Relative density** | 1.04 | |
| **Water solubility** | 100% | |
| **Solubility in other solvents** | No information available | |
| **Partition coefficient: n-octanol/water** | No information available | |
| **Autoignition temperature** | No information available | . |
| **Decomposition temperature** | No information available | . |

**Viscosity of Product** No information available
**VOC Content (%)** Products comply with US state and federal regulations for VOC content in consumer products.

## 10. STABILITY AND REACTIVITY

**Reactivity** None under normal use conditions.

**Stability** Stable under normal conditions.

**Hazardous polymerization** Hazardous polymerization does not occur.

**Hazardous Reactions** None under normal processing.

**Conditions to Avoid** None under normal processing.

**Materials to avoid** None in particular.

**Hazardous Decomposition Products** None under normal use.

## 11. TOXICOLOGICAL INFORMATION

**Product Information**
**Information on likely routes of exposure**

**Inhalation** No known effect.
**Skin contact** No known effect.
**Ingestion** No known effect.
**Eye contact** Irritating to eyes.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Acute toxicity** No known effect.
**Skin corrosion/irritation** No known effect.
**Serious eye damage/eye irritation** Irritating to eyes.
**Skin sensitization** No known effect.
**Respiratory sensitization** No known effect.
**Germ cell mutagenicity** No known effect.
**Neurological Effects** No known effect.
**Reproductive toxicity** No known effect.
**Developmental toxicity** No known effect.
**Teratogenicity** No known effect.
**STOT - single exposure** No known effect.
**STOT - repeated exposure** No known effect.
**Target Organ Effects** No known effect.
**Aspiration hazard** No known effect.
**Carcinogenicity** No known effect.

**Component Information**

| Chemical Name | CAS-No | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|---|
| Poly(oxy-1,2-ethanediyl), alpha-sulfo-omega-hydroxy-, C10-16-alkyl ethers, sodium salts | 68585-34-2 | >2001 mg/kg | - | - |

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

The product is not expected to be hazardous to the environment.

**Persistence and degradability** No information available.

**Bioaccumulative potential** No information available.

**Mobility** No information available.

**Other adverse effects** No information available.

## 13. DISPOSAL CONSIDERATIONS

**Waste treatment**

**Waste from Residues / Unused Products** Disposal should be in accordance with applicable regional, national and local laws and regulations.

**Contaminated packaging** Disposal should be in accordance with applicable regional, national and local laws and regulations.

**California Hazardous Waste Codes (non-household setting)** 331

## 14. TRANSPORT INFORMATION

**DOT** Not regulated

**IMDG** Not regulated

**IATA** Not regulated

## 15. REGULATORY INFORMATION

**U.S. Federal Regulations**

**SARA 313**
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

**CERCLA**
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302):

| Chemical Name | CAS-No | Hazardous Substances RQs | Extremely Hazardous Substances RQs | CERCLA/SARA 302 TPQ |
|---|---|---|---|---|
| Sodium hydroxide | 1310-73-2 | 1000 lb | - | |

**Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)**
This product contains the following substance(s) which are either listed as hazardous air pollutants (HAPS) or VOC's per the Clean Air Act:

| Chemical Name | CAS-No | CAA (Clean Air Act) - 1990 Hazardous Air Pollutants |
|---|---|---|
| Phenoxyethanol | 122-99-6 | X |

**Clean Water Act**
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

| Chemical Name | CAS-No | CWA - Reportable Quantities | CWA - Toxic Pollutants | CWA - Priority Pollutants | CWA - Hazardous Substances |
|---|---|---|---|---|---|
| Sodium hydroxide | 1310-73-2 | 1000 lb | - | - | X |

**California Proposition 65**

This product is not subject to warning labeling under California Proposition 65.

**U.S. State Regulations (RTK)**

| Chemical Name | CAS-No | New Jersey |
|---|---|---|
| Ethanol | 64-17-5 | X |

| Chemical Name | CAS-No | Massachusetts |
|---|---|---|
| Ethanol | 64-17-5 | X |

| Chemical Name | CAS-No | Pennsylvania |
|---|---|---|
| Ethanol | 64-17-5 | X |
| Sodium hydroxide | 1310-73-2 | X |
| Phenoxyethanol | 122-99-6 | X |

## International Inventories

**United States**
All intentionally-added components of this product(s) are listed on the US TSCA Inventory.

**Canada**
This product is in compliance with CEPA for import by P&G.

**Legend**
**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory
**CEPA** - Canadian Environmental Protection Act

## 16. OTHER INFORMATION

**Issuing Date:** 05-Oct-2015
**Revision Date:** 05-Oct-2015
**Disclaimer**
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

**End of SDS**

## ATTACHMENT 7

SDS - EN-US Simple Green All Purpose Cleaner

## Section 1: IDENTIFICATION

**Product Name:** Simple Green® All-Purpose Cleaner
**Additional Names:**

**Manufacturer's Part Number:** **Please refer to Section 16*

**Recommended Use:** Cleaner & Degreaser for water tolerant surfaces.
**Restrictions on Use:** Do not use on non-rinsable surfaces.

**Company:** Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Beach, CA 92649 USA
**Telephone:** 800-228-0709 ● 562-795-6000 *Mon – Fri, 8am – 5pm PST*
**Fax:** 562-592-3830
**Email:** info@simplegreen.com
**Emergency Phone:** Chem-Tel 24-Hour Emergency Service: 800-255-3924

## Section 2: HAZARDS IDENTIFICATION

**This product has been assessed in accordance to 2012 OSHA Hazard Communication Standards (29 CFR 1910.1200) and has been determined to not be classifiable as hazardous.**

*OSHA HCS 2012*
*Label Elements*
**Signal Word:** None **Hazard Symbol(s)/Pictogram(s):** None required

**Hazard Statements:** None
**Precautionary Statements:** None
**Hazards Not Otherwise Classified (HNOC):** None
**Other Information:** None Known

## Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

| Ingredient | CAS Number | Percent Range |
|---|---|---|
| Water | 7732-18-5 | > 84.8%* |
| C9-11 Alcohols Ethoxylated | 68439-46-3 | < 5%* |
| Sodium Citrate | 68-04-2 | < 5%* |
| Sodium Carbonate | 497-19-8 | < 1%* |
| Tetrasodium Glutamate Diacetate | 51981-21-6 | < 1%* |
| Citric Acid | 77-92-9 | < 1%* |
| Methylchloroisothiazolinone | 26172-55-4 | < 0.002%* |
| Methylisothiazolinone | 2682-20-4 | < 0.001%* |
| Fragrance | Proprietary Mixture | < 1%* |
| Liquitint Colorant | Proprietary Mixture | < 1%* |

**specific percentages of composition are being withheld as a trade secret*

## Section 4: FIRST-AID MEASURES

**Inhalation:** Not expected to cause respiratory irritation. If adverse effect occurs, move to fresh air.
**Skin Contact:** Not expected to cause skin irritation. If adverse effect occurs, rinse skin with water.
**Eye Contact:** Not expected to cause eye irritation. If adverse effect occurs, flush eyes with water.
**Ingestion:** May cause upset stomach. Drink plenty of water to dilute. See section 11.

**Most Important Symptoms/Effects, Acute and Delayed:** None known.

**Indication of Immediate Medical Attention and Special Treatment Needed, if necessary:** Treat symptomatically

## Section 5: FIRE-FIGHTING MEASURES

**Suitable & Unsuitable Extinguishing Media:** Use Dry chemical, CO2, water spray or "alcohol" foam. Avoid high volume jet water.
**Specific Hazards Arising from Chemical:** In event of fire, fire created carbon oxides may be formed.
**Special Protective Actions for Fire-Fighters:** Wear positive pressure self-contained breathing apparatus; Wear full protective clothing.

*This product is non-flammable. See Section 9 for Physical Properties.*

## Section 6: ACCIDENTAL RELEASE MEASURES

**Personal Precautions, Protective Equipment and Emergency Procedures:** *For non-emergency and emergency personnel:* See section 8 – personal protection. Avoid eye contact. Safety goggles suggested.

**Environmental Precautions:** Do not allow into open waterways and ground water systems.

**Methods and Materials for Containment and Clean Up:** Dike or soak up with inert absorbent material. See section 13 for disposal considerations.

## Section 7: HANDLING AND STORAGE

**Precautions for Safe Handling:** Ensure adequate ventilation. Keep out of reach of children. Keep away from heat, sparks, open flame and direct sunlight. Do not pierce any part of the container. Do not mix or contaminate with any other chemical. Do not eat, drink or smoke while using this product.

**Conditions for Safe Storage including Incompatibilities:** Keep container tightly closed. Keep in cool dry area. Avoid prolonged exposure to sunlight. Do not store at temperatures above 109°F (42.7°C). If separation occurs, mix the product for reconstitution.

## Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

**Exposure Limit Values:** No components listed with TWA or STEL values under OSHA or ACGIH.

**Appropriate Engineering Controls:** Showers, eyewash stations, ventilation systems

**Individual Protection Measures / Personal Protective Equipment (PPE)**
Eye Contact: Use protective glasses or safety goggles if splashing or spray-back is likely.
Respiratory: Use in well ventilated areas or local exhaust ventilations when cleaning small spaces.
Skin Contact: Use protective gloves (any material) when used for prolonged periods or dermally sensitive.
General Hygiene Considerations: Wash thoroughly after handling and before eating or drinking.

## Section 9: PHYSICAL AND CHEMICAL PROPERTIES

| | | | |
|---|---|---|---|
| **Appearance:** | Green Liquid | **Partition Coefficient: n-octanol/water:** | Not determined |
| **Odor:** | Added sassafras odor | **Autoignition Temperature:** | Non-flammable |
| **Odor Threshold:** | Not determined | **Decomposition Temperature:** | 42.7°C (109°F) |
| **pH** ASTM D-1293**:** | 8.5 – 9.2 | **Viscosity:** | Like water |
| **Freezing Point** ASTM D-1177**:** | 0-3.33°C (32-38°F) | **Specific Gravity** ASTM D-891**:** | 1.01 – 1.03 |
| **Boiling Point & Range** ASTM D-1120**:** | 101°C (213.8°F) | **VOCs:** | ***Water & fragrance exemption in calculation** |
| **Flash Point** ASTM D-93**:** | > 212°F | SCAQMD 304-91 / EPA 24: | 0 g/L \| 0 lb/gal \| 0% |
| **Evaporation Rate** ASTM D-1901**:** | ½ Butyl Acetate @ 25°C | CARB Method 310**: | 2.5 g/L \| 0.021 lb/gal \| 0.25% |
| **Flammability (solid, gas):** | Not applicable | SCAQMD Method 313: | Not tested |
| **Upper/Lower Flammability or Explosive Limits:** | Not applicable | **VOC Composite Partial Pressure:** | Not determined |
| **Vapor Pressure** ASTM D-323**:** | 0.60 PSI @77°F, 2.05 PSI @100°F | **Relative Density** ASTM D-4017**:** | 8.42 – 8.59 lb/gal |
| **Vapor Density:** | Not determined | **Solubility:** | 100% in water |

## Section 10: STABILITY AND REACTIVITY

**Reactivity:** Non-reactive.
**Chemical Stability:** Stable under normal conditions 70°F (21°C) and 14.7 psig (760 mmHg).
**Possibility of Hazardous Reactions:** None known.
**Conditions to Avoid:** Excessive heat or cold.
**Incompatible Materials:** Do not mix with oxidizers, acids, bathroom cleaners, or disinfecting agents.
**Hazardous Decomposition Products:** Normal products of combustion - CO, CO2.

## Section 11: TOXICOLOGICAL INFORMATION

**Likely Routes of Exposure:**
Inhalation - Overexposure may cause headache.
Skin Contact - Not expected to cause irritation, repeated contact may cause dry skin.
Eye Contact - Not expected to cause irritation.
Ingestion - May cause upset stomach.

*Symptoms related to the physical, chemical and toxicological characteristics:* no symptoms expected under typical use conditions.
*Delayed and immediate effects and or chronic effects from short term exposure:* no symptoms expected under typical use conditions.
*Delayed and immediate effects and or chronic effects from long term exposure:* headache, dry skin, or skin irritation may occur.
*Interactive effects:* Not known.

Numerical Measures of Toxicity

**Acute Toxicity:**
Oral $LD_{50}$ (rat) > 5 g/kg body weight
Dermal $LD_{50}$ (rabbit) > 5 g/kg body weight
*Calculated via OSHA HCS 2012 / Globally Harmonized System of Classification and Labelling of Chemicals*

**Skin Corrosion/Irritation:** Non-irritant per Dermal Irritection® assay modeling. No animal testing performed.
**Eye Damage/Irritation:** Non/Minimal irritant per Ocular Irritection® assay modeling. No animal testing performed.
**Germ Cell Mutagenicity:** Mixture does not classify under this category.
**Carcinogenicity:** Mixture does not classify under this category.
**Reproductive Toxicity:** Mixture does not classify under this category.
**STOT-Single Exposure:** Mixture does not classify under this category.
**STOT-Repeated Exposure:** Mixture does not classify under this category.
**Aspiration Hazard:** Mixture does not classify under this category.

## Section 12: ECOLOGICAL INFORMATION

**Ecotoxicity:** Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
**Aquatic:** Aquatic Toxicity - Low, based on OECD 201, 202, 203 + Microtox: $EC_{50}$ & $IC_{50}$ ≥100 mg/L. Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
**Terrestrial:** Not tested on finished formulation.

**Persistence and Degradability:** Readily Biodegradable per OCED 301D, Closed Bottle Test. Reaches 100% biodegradability within 1 year or less.
**Bioaccumulative Potential:** No data available.
**Mobility in Soil:** No data available.
**Other Adverse Effects:** No data available.

## Section 13: DISPOSAL CONSIDERATIONS

**Unused or Used Liquid:** May be considered hazardous in your area depending on usage and tonnage of disposal – check with local, regional, and or national regulations for appropriate methods of disposal.

**Empty Containers:** May be offered for recycling.

Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

## Section 14: TRANSPORT INFORMATION

**U.N. Number:** Not applicable
**U.N. Proper Shipping Name:** Cleaning Compound, Liquid NOI
**Transport Hazard Class(es):** Not applicable
**Packing Group:** Not applicable
**Environmental Hazards:** Marine Pollutant - NO
**Transport in Bulk (according to Annex II of MARPOL 73/78 and IBC Code):** Unknown.
**Special precautions which user needs to be aware of/comply with, in connection with transport or conveyance either within or outside their premises:** None known.

**U.S. (DOT) / Canadian TDG:** Not Regulated for shipping.
**IMO / IDMG:** Not classified as Hazardous
**ICAO/ IATA:** Not classified as Hazardous
**ADR/RID:** Not classified as Hazardous

## Section 15: REGULATORY INFORMATION

**All components are listed on:** TSCA and DSL Inventory.

**SARA Title III:** Sections 311/312 Hazard Categories – Not applicable.
Sections 313 Superfunds Amendments and Reauthorizations Act of 1986 – Not applicable.
Sections 302 – Not applicable.

**Clean Air Act (CAA):** Not applicable
**Clean Water Act (CWA):** Not applicable

**State Right To Know Lists:** No ingredients listed
**California Proposition 65:** No ingredients listed
**Texas ESL:**

| | | | |
|---|---|---|---|
| Ethoxylated Alcohol | 68439-46-3 | 60 µg/m³ long term | 600 µg/m³ short term |
| Sodium Citrate | 68-04-2 | 5 µg/m³ long term | 50 µg/m³ short term |
| Sodium Carbonate | 497-19-8 | 5 µg/m³ long term | 50 µg/m³ short term |
| Citric Acid | 77-92-9 | 10 µg/m³ long term | 100 µg/m³ short term |

This product has been classified as "not classifiable as hazardous" in accordance with Consumer Product Safety Commission (16 CFR Chapter 2), and labelled and packaged accordingly.

## Section 16: OTHER INFORMATION

| Size | UPC | Size | UPC |
|---|---|---|---|
| 2 fl. oz. | 043318131035 | 67.6 fl. oz. | 043318130144 |
| 4 fl. oz. | 043318130014 | 67.6 fl. oz. | 043318000393 |
| 16 fl. oz. | 043318130021 | 1 gallon | 043318000799 |
| 22 fl. oz. | 043318130229 | 1 gallon | 043318130052 |
| 24 fl. oz. | 043318130137 | 1 gallon | 043318004957 |
| 32 fl. oz. | 043318002557 | 1 gallon w/ dilution bottle | 043318480492 |
| 32 fl. oz. | 043318130335 | 140 fl. oz. w/ dilution bottle | 043318001468 |
| 32 fl. oz. | 043318000652 | 2.5 gallon | 043318004889 |

*USA items listed only. Not all items listed. USA items may not be valid for international sale.*

## Section 16: OTHER INFORMATION - continued

**NFPA:**

Health – None
Flammability – Non-flammable
Stability – Stable
Special - None

**Acronyms**

| | | | |
|---|---|---|---|
| NTP | National Toxicology Program | IARC | International Agency for Research on Cancer |
| OSHA | Occupational Safety and Health Administration | CPSC | Consumer Product Safety Commission |
| TSCA | Toxic Substances Control Act | DSL | Domestic Substances List |

**Prepared / Revised By:** Sunshine Makers, Inc., Regulatory Department.
**This SDS has been revised in the following sections:** Clarification on hazards in section 2, expanded transparency in section 3, revised layout in section 9, 14 & 16, added statement in section 15.

**DISCLAIMER**: The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

## ATTACHMENT 8

SDS - Hydrogen Peroxide 3% Solution

# Hydrogen Peroxide 3%

## SECTION 1 : Identification of the substance/mixture and of the supplier

**Product name** : **Hydrogen Peroxide 3%**

**Manufacturer/Supplier Trade name**:

**Manufacturer/Supplier Article number**: **S25359**

**Recommended uses of the product and uses restrictions on use**:

**Manufacturer Details**:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

**Supplier Details**:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

**Emergency telephone number**:

Fisher Science Education Emergency Telephone No.: 800-535-5053

## SECTION 2 : Hazards identification

**Classification of the substance or mixture**:

**Oxidizing**

**Corrosive**

**Irritant**

Oxidizer
Skin Sens. 1A
AcTox Oral 4
Aq Ac-Ch Tox (fish)
Aq Ac-Ch Tox (Crustacea)
Aq Ac-Ch Tox (Algae)

**Signal word** :Danger

**Hazard statements**:
May cause fire or explosion; strong oxidizer
Harmful if swallowed
Causes severe skin burns and eye damage
Harmful if inhaled

**Precautionary statements**:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use

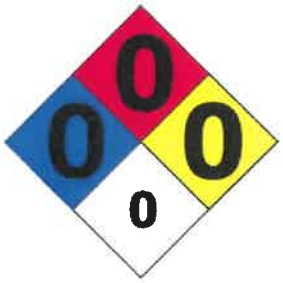
Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep/Store away from clothing/.../combustible materials
Take any precaution to avoid mixing with combustibles
Wash ... thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid release to the environment
Wear protective gloves/protective clothing/eye protection/face protection
Wear fire/flame resistant/retardant clothing
Do not eat, drink or smoke when using this product
Store locked up
Dispose of contents/container to ...

**Other Non-GHS Classification**:

**WHMIS**

C D2B

**NFPA/HMIS**




NFPA SCALE (0-4)

HMIS RATINGS (0-4)

## SECTION 3 : Composition/information on ingredients

| **Ingredients:** | | |
|---|---|---|
| CAS 7722-84-1 | Hydrogen Peroxide 3% | 100 % |
| | | Percentages are by weight |

## SECTION 4 : First aid measures

**Description of first aid measures**

**After inhalation:** Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.Seek medical advice if discomfort or irritation persists.

**After skin contact:** Flush with water for 15 minutes. Get medical assistance if irritation develops.Wash affected area with soap and water. Rinse thoroughly. Seek medical attention if irritation, discomfort or vomiting persists.

**After eye contact:** Immediately flush eyes with water for at least 15 minutes. Immediately get medical assistance.Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove

contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

**After swallowing:** DO NOT induce vomiting. Dilute with water or milk. Get medical assistance.Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.

**Most important symptoms and effects, both acute and delayed:**

Irritation, Nausea,Headache, Shortness of breath.;

**Indication of any immediate medical attention and special treatment needed:**

If seeking medical attention, provide SDS document to physician.

## SECTION 5 : Firefighting measures

**Extinguishing media**

**Suitable extinguishing agents:** If in laboratory setting, follow laboratory fire suppression procedures. Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition

**For safety reasons unsuitable extinguishing agents:**

**Special hazards arising from the substance or mixture:**

Combustion products may include carbon oxides or other toxic vapors.

**Advice for firefighters:**

**Protective equipment:**

**Additional information (precautions):** Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.

## SECTION 6 : Accidental release measures

**Personal precautions, protective equipment and emergency procedures:**

Wear protective equipment. Use respiratory protective device against the effects of fumes/dust/aerosol. Keep unprotected persons away. Ensure adequate ventilation.Keep away from ignition sources. Protect from heat.Stop the spill, if possible. Contain spilled material by diking or using inert absorbent. Transfer to a disposal or recovery container.

**Environmental precautions:**

Should not be released into the environment .Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13

**Methods and material for containment and cleaning up:**

Soak up with an inert absorbent material and containerize for disposal.If in a laboratory setting, follow Chemical Hygiene Plan procedures.Collect liquids using vacuum or by use of absorbents. Place into properly labeled containers for recovery or disposal. If necessary, use trained response staff/contractor.

**Reference to other sections:**

## SECTION 7 : Handling and storage

**Precautions for safe handling:**

Wash hands after handling. Avoid contact with skin and eyes. Contact with metal, dust, or organic material may accelerate decomposition..Prevent formation of aerosols. Follow good hygiene procedures when handling chemical materials. Do not eat, drink, smoke, or use personal products when handling chemical substances. If in a laboratory setting, follow Chemical Hygiene Plan.Use only in well ventilated areas.Avoid splashes or spray in enclosed areas.

**Conditions for safe storage, including any incompatibilities:**

Keep from contact with oxidizing materials. Store in a cool, dry, well - ventilated area away from incompatible

substances. Keep containers tightly closed..Store in a cool location. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store away from foodstuffs. Store away from oxidizing agents.Store in cool, dry conditions in well sealed containers. Keep container tightly sealed.

## SECTION 8 : Exposure controls/personal protection

**Control Parameters:** 7722-84-1, Hydrogen Peroxide Solution, OSHA PEL: 1 .4 mg/m3
7722-84-1, Hydrogen Peroxide Solution, ACGIH TLV: 1 .4 mg/m3

**Appropriate Engineering controls:** Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.

**Respiratory protection:** Not required under normal conditions of use. Use suitable respiratory protective device when high concentrations are present. Use suitable respiratory protective device when aerosol or mist is formed. For spills, respiratory protection may be advisable.

**Protection of skin:** The glove material has to be impermeable and resistant to the product/ the substance/ the preparation being used/handled.Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

**Eye protection:** Safety glasses with side shields or goggles.

**General hygienic measures:** The usual precautionary measures are to be adhered to when handling chemicals. Keep away from food, beverages and feed sources. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Do not inhale gases/fumes/dust/mist/vapor/aerosols. Avoid contact with the eyes and skin.

## SECTION 9 : Physical and chemical properties

| | | | |
|---|---|---|---|
| **Appearance (physical state,color)**: | clear liquid | **Explosion limit lower**:<br>**Explosion limit upper**: | Not Determined<br>Not Determined |
| **Odor**: | Not Determined | **Vapor pressure**: | Not Determined |
| **Odor threshold**: | Not Determined | **Vapor density**: | Not Determined |
| **pH-value**: | Not Determined | **Relative density**: | 1.02 |
| **Melting/Freezing point**: | Not Determined | **Solubilities**: | |
| **Boiling point/Boiling range**: | Not Determined | **Partition coefficient (n-octanol/water)**: | Not Determined |
| **Flash point (closed cup)**: | Not Determined | **Auto/Self-ignition temperature**: | Not Determined |
| **Evaporation rate**: | Not Determined | **Decomposition temperature**: | Not Determined |

| | | | |
|---|---|---|---|
| **Flammability (solid,gaseous)**: | Not Determined | **Viscosity**: | a. Kinematic:Not Determined<br>b. Dynamic: Not Determined |
| **Density**: Not Determined | | | |

## SECTION 10 : Stability and reactivity

**Reactivity:**
**Chemical stability:**No decomposition if used and stored according to specifications.
**Possible hazardous reactions:**
**Conditions to avoid:**Store away from oxidizing agents, strong acids or bases.
**Incompatible materials:**Strong acids.Strong bases.
**Hazardous decomposition products:**Nitrogen oxides, hydrogen gas, oxygen, hydrazoic acid.Carbon oxides (CO, CO2).

## SECTION 11 : Toxicological information

| | |
|---|---|
| **Acute Toxicity**: No additional information. | |
| **Chronic Toxicity**: No additional information. | |
| **Corrosion Irritation**: No additional information. | |
| **Sensitization**: | No additional information. |
| **Single Target Organ (STOT)**: | No additional information. |
| **Numerical Measures**: | No additional information. |
| **Carcinogenicity**: | No additional information. |
| **Mutagenicity**: | No additional information. |
| **Reproductive Toxicity**: | No additional information. |

## SECTION 12 : Ecological information

**Ecotoxicity Persistence and degradability**: Readily degradable in the environment.
**Bioaccumulative potential**:
**Mobility in soil**: Aqueous solution has high mobility in soil.
**Other adverse effects**:

## SECTION 13 : Disposal considerations

**Waste disposal recommendations**:

Product/containers must not be disposed together with household garbage. Do not allow product to reach sewage system or open water.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). Consult federal state/ provincial and local regulations regarding the proper disposal of waste material that may incorporate some amount of this product.

## SECTION 14 : Transport information

**UN-Number**

Not Dangerous Goods

**UN proper shipping name**

Not Dangerous Goods

**Transport hazard class(es)**

**Class:**
5.1 Oxidizing substances

**Packing group**:Not Dangerous Goods
**Environmental hazard**:
**Transport in bulk**:
**Special precautions for user**:

## SECTION 15 : Regulatory information

**United States (USA)**

**SARA Section 311/312 (Specific toxic chemical listings)**:

None of the ingredients is listed

**SARA Section 313 (Specific toxic chemical listings)**:

None of the ingredients is listed

**RCRA (hazardous waste code)**:

None of the ingredients is listed

**TSCA (Toxic Substances Control Act)**:

All ingredients are listed.

**CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act)**:

None of the ingredients is listed

**Proposition 65 (California)**:

**Chemicals known to cause cancer**:

None of the ingredients is listed

**Chemicals known to cause reproductive toxicity for females**:

None of the ingredients is listed

**Chemicals known to cause reproductive toxicity for males**:

None of the ingredients is listed

**Chemicals known to cause developmental toxicity**:

None of the ingredients is listed

**Canada**

**Canadian Domestic Substances List (DSL)**:

All ingredients are listed.

**Canadian NPRI Ingredient Disclosure list (limit 0.1%)**:

None of the ingredients is listed

**Canadian NPRI Ingredient Disclosure list (limit 1%)**:

7722-84-1 Hydrogen Peroxide Solution

## SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

**GHS Full Text Phrases**:

**Abbreviations and acronyms**:
IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

**Effective date** : 12.16.2014
**Last updated** : 03.23.2015

## ATTACHMENT 9

SDS - Isopropyl Alcohol Wipes

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

* 

## 1 Identification

· **Product identifier**

· **Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**
· **Relevant identified uses of the substance or mixture and uses advised against** Cleansing Wipes
· **Product description** Isopropyl Alcohol topical wipes.

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Custom Manufactured Products, LLC
P.O. Box 6646
Greenville, SC 29606
Phone: 864-527-9715
Fax: 864-655-0021
Toll Free: 1-888-696-7663
info@customproductsllc.com
www.customproductsllc.com

## 2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS02 Flame

Flam. Liq. 3 H226 Flammable liquid and vapor.

GHS07

Eye Irrit. 2A H319 Causes serious eye irritation.
STOT SE 3 H336 May cause drowsiness or dizziness.

· **Label elements**
· **GHS label elements**
The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS02 GHS07

· **Signal word** Warning

· **Hazard-determining components of labeling:**
Isopropyl alcohol
· **Hazard statements**
Flammable liquid and vapor.
Causes serious eye irritation.
May cause drowsiness or dizziness.
· **Precautionary statements**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Use explosion-proof electrical/ventilating/lighting/equipment.
Avoid breathing dust/fume/gas/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.

(Contd. on page 2)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

Wear protective gloves / eye protection / face protection.
Wear eye protection / face protection.
Ground/bond container and receiving equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wash thoroughly after handling.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a poison center/doctor if you feel unwell.
If eye irritation persists: Get medical advice/attention.
In case of fire: Use for extinction: CO2, powder or water spray.
Store locked up.
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Dispose of contents/container in accordance with local/regional/national/international regulations.

· ***Unknown acute toxicity:***
70 percent of the mixture consists of ingredient(s) of unknown toxicity.

· ***Classification system:***

· ***NFPA ratings (scale 0 - 4)***

Health = 2
Fire = 3
Reactivity = 1

· ***HMIS-ratings (scale 0 - 4)***

Health = 2
Fire = 3
Reactivity = 1

· ***Hazard(s) not otherwise classified (HNOC):*** None known

* 

## 3 Composition/information on ingredients

| | | |
|---|---|---|
| CAS: 7732-18-5<br>RTECS: ZC 0110000 | water, distilled, conductivity or of similar purity | 30% |

· ***Chemical characterization: Mixtures***
· ***Description:*** Mixture of substances listed below with nonhazardous additions.
· ***Dangerous Components:***

| | | |
|---|---|---|
| CAS: 67-63-0<br>RTECS: NT 8050000 | Isopropyl alcohol<br>Flam. Liq. 2, H225; Eye Irrit. 2, H319; STOT SE 3, H336 | 70% |

* 

## 4 First-aid measures

· ***Description of first aid measures***
· ***After inhalation:***
Supply fresh air. If required, provide artificial respiration. Consult doctor if symptoms persist.
In case of unconsciousness, place patient securely on side position for transportation.
· ***After skin contact:***
Generally the product does not irritate the skin.
If skin irritation occurs, consult a doctor.

(Contd. on page 3)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

· ***After eye contact:***
Rinse opened eye for at least 15 minutes under running water. If symptoms persist, consult a doctor.
· ***After swallowing:*** If swallowed and symptoms occur, consult a doctor.
· ***Information for doctor:***
· ***Most important symptoms and effects, both acute and delayed:*** No further relevant information available.
· ***Indication of any immediate medical attention and special treatment needed***
No further relevant information available.

* 

## 5 Fire-fighting measures

· ***Extinguishing media***
· ***Suitable extinguishing agents:***
$CO_2$, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· ***Special hazards arising from the substance or mixture*** Carbon Oxides.
· ***Advice for firefighters***
· ***Protective equipment:***
As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

* 

## 6 Accidental release measures

· ***Personal precautions, protective equipment and emergency procedures***
Wear protective equipment. Keep unprotected persons away.
· ***Environmental precautions:***
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.
· ***Methods and material for containment and cleaning up:***
Pick up mechanically.
Dispose contaminated material as waste according to section 13.
Ensure adequate ventilation.
Dispose of the collected material according to regulations.
· ***Reference to other sections***
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

* 

## 7 Handling and storage

· ***Handling:***
· ***Precautions for safe handling*** Ensure good ventilation/exhaustion at the workplace.
· ***Information about protection against explosions and fires:***
Keep ignition sources away - Do not smoke.
Protect from heat.
Protect against electrostatic charges.

· ***Conditions for safe storage, including any incompatibilities***
Store away from strong acids, strong bases, strong oxidizing agents and strong reducing agents.
· ***Storage:***
· ***Requirements to be met by storerooms and receptacles:***
Store in a well ventilated place.
Store only in the original receptacle.
Store away from direct sunlight.
· ***Information about storage in one common storage facility:*** Not required.
· ***Further information about storage conditions:***
Keep receptacle tightly sealed.

(Contd. on page 4)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

Protect from heat and direct sunlight.
· **Specific end use(s)** No further relevant information available.

* 

## 8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see section 7.

· **Control parameters**
All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94). Use mechanical (general) ventilation for storage areas. Use appropriate ventilation as required to keep Exposure Limits in Air below TLV & PEL limits.

· **Components with occupational exposure limits:**

**67-63-0 Isopropyl alcohol**

| | |
|---|---|
| PEL | Long-term value: 980 mg/m³, 400 ppm |
| REL | Short-term value: 1225 mg/m³, 500 ppm<br>Long-term value: 980 mg/m³, 400 ppm |
| TLV | Short-term value: 984 mg/m³, 400 ppm<br>Long-term value: 492 mg/m³, 200 ppm<br>BEI |

· **Ingredients with biological limit values:**

**67-63-0 Isopropyl alcohol**

| | |
|---|---|
| BEI | 40 mg/L<br>urine<br>end of shift at end of workweek<br>Acetone (background, nonspecific) |

· **Additional information:** The lists that were valid during the creation of this SDS were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing and wash before reuse.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes.
· **Breathing equipment:** Not required.
· **Protection of hands:** Not required.
· **Eye protection:** Not required.
· **Body protection:** Not required.

* 

## 9 Physical and chemical properties

· **Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**

| | |
|---|---|
| **Form:** | Disposable wipe |
| **Color:** | White |
| · **Odor:** | Alcohol-like |
| · **Odor threshold:** | Not determined. |
| · **pH-value:** | Not determined. |

(Contd. on page 5)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

| | |
|---|---|
| · **Change in condition** | |
| **Melting point/Melting range:** | Not determined. |
| **Boiling point/Boiling range:** | 82 °C (180 °F) |
| · **Flash point:** | 24 °C (75 °F) |
| · **Flammability (solid, gaseous):** | Not applicable. |
| · **Ignition temperature:** | 399 °C (750 °F) |
| · **Decomposition temperature:** | Not determined. |
| · **Auto igniting:** | Product is not self-igniting. |
| · **Danger of explosion:** | Product is not explosive. However, formation of explosive air/vapor mixtures are possible. |
| · **Explosion limits:** | |
| **Lower:** | 2.0 Vol % |
| **Upper:** | 12.7 Vol % |
| · **Vapor pressure @ 20 °C (68 °F):** | 33 mm Hg |
| · **Density @ 20 °C (68 °F):** | > 1.00 g/cm³ (> 8.345 lbs/gal) |
| · **Relative density** | Not determined. |
| · **Vapor density @ 20 °C (68 °F)** | 2.1 g/cm³ (17.525 lbs/gal) (air=1) |
| · **Evaporation rate @ 20 °C (68 °F)** | 1.7 (Buryl Acetate=1) |
| · **Solubility in / Miscibility with** | |
| **Water:** | Fully miscible. |
| · **Partition coefficient (n-octanol/water):** | Not determined. |
| · **Viscosity:** | |
| **Dynamic:** | Not determined. |
| **Kinematic:** | Not determined. |
| · **Solvent content:** | |
| **Organic solvents:** | 70.0 % |
| **Water:** | 30.0 % |
| **VOC content:** | 70.0 % |
| · **Other information** | No further relevant information available. |

## * 10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability** Stable under normal conditions.
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** Heat, flame and ignition sources.
· **Incompatible materials:** Strong acids, strong bases, strong oxidizing agents and strong reducing agents.
· **Hazardous decomposition products:** Carbon Oxides.

(Contd. on page 6)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

## * 11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**
· **LD/LC50 values that are relevant for classification:**

**67-63-0 Isopropyl alcohol**

| | | |
|---|---|---|
| Oral | LD50 | 5045 mg/kg (rat) |
| Dermal | LD50 | 12800 mg/kg (rabbit) |
| Inhalative | LC50/4 h | 30 mg/l (rat) |
| | LC50/96 hours | 9640 mg/l (Pimephales) |

· **Primary irritant effect:**
· **on the skin:** No irritating effect.
· **on the eye:**
Irritating effect.
Causes serious eye irritation.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Irritant

· **Carcinogenic categories**
· **IARC (International Agency for Research on Cancer)**
Group 1 - Carcinogenic to humans
Group 2A - Probably carcinogenic to humans
Group 2B - Possibly carcinogenic to humans
Group 3 - Not classifiable as to its carcinogenicity to humans
Group 4 - Probably not carcinogenic to humans

| | | |
|---|---|---|
| 67-63-0 | Isopropyl alcohol | 3 |

· **NTP (National Toxicology Program)**
None of the ingredients are listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients are listed.

## * 12 Ecological information

· **Toxicity**
· **Aquatic toxicity:**

**67-63-0 Isopropyl alcohol**

| | |
|---|---|
| EC50 | 6851 mg/l (Green algae) |
| | 5102 mg/l (Water flea) |

· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:** Not known to be hazardous to water.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

(Contd. on page 7)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

· **Other adverse effects** No further relevant information available.

* 

## 13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:** Recycle or dispose with household trash.

· **Uncleaned packagings:**
· **Recommendation:**
Disposal must be made according to official regulations.
Dispose of as unused product.
· **Recommended cleansing agent:** Water, if necessary with cleansing agents.

* 

## 14 Transport information

· **UN-Number**
· **DOT, ADR, IMDG, IATA** UN1987
· **UN proper shipping name**
· **DOT** Alcohols, n.o.s. (Isopropanol)
· **ADR** UN1987 Alcohols, n.o.s. (Isopropanol)
· **IMDG, IATA** ALCOHOLS, N.O.S. (ISOPROPANOL (ISOPROPYL ALCOHOL))
· **Transport hazard class(es)**
· **DOT**

· **Class** 3 Flammable liquids
· **Label** 3

· **ADR**

· **Class** 3 (F1) Flammable liquids
· **Label** 3

· **IMDG, IATA**

· **Class** 3 Flammable liquids
· **Label** 3
· **Packing group**
· **DOT, ADR, IMDG, IATA** III
· **Environmental hazards:** Not applicable.
· **Special precautions for user** Warning: Flammable liquids
· **Danger code (Kemler):** 30
· **EMS Number:** F-E,S-D

(Contd. on page 8)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

· **Transport/Additional information:**

· **DOT**

· **Quantity limitations** On passenger aircraft/rail: 60 L
On cargo aircraft only: 220 L

· **Remarks:** Limited Quantities - Ground, Consumer Commodity

· **ADR**

· **Excepted quantities (EQ)** Code: E1
Maximum net quantity per inner packaging: 30 ml
Maximum net quantity per outer packaging: 1000 ml

· **IMDG**

· **Limited quantities (LQ)** 5L

· **Excepted quantities (EQ)** Code: E1
Maximum net quantity per inner packaging: 30 ml
Maximum net quantity per outer packaging: 1000 ml

· **UN "Model Regulation":** UN1987, Alcohols, n.o.s. (Isopropanol), 3, III

## 15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**

· **Sara**

· **Section 355 (extremely hazardous substances):**

None of the ingredients are listed.

· **Section 313 (Specific toxic chemical listings):**

67-63-0 Isopropyl alcohol

· **TSCA (Toxic Substances Control Act):**

All ingredients are listed.

· **California Proposition 65**

· **Chemicals known to cause cancer:**

None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for females:**

None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for males:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity:**

None of the ingredients are listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**

None of the ingredients are listed.

· **TLV (Threshold Limit Value established by ACGIH)**

67-63-0 Isopropyl alcohol A4

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

None of the ingredients are listed.

(Contd. on page 9)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

· **GHS label elements**
The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS02 GHS07

· **Signal word** Warning

· **Hazard-determining components of labeling:**
Isopropyl alcohol
· **Hazard statements**
Flammable liquid and vapor.
Causes serious eye irritation.
May cause drowsiness or dizziness.
· **Precautionary statements**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Use explosion-proof electrical/ventilating/lighting/equipment.
Avoid breathing dust/fume/gas/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.
Wear protective gloves / eye protection / face protection.
Wear eye protection / face protection.
Ground/bond container and receiving equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wash thoroughly after handling.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a poison center/doctor if you feel unwell.
If eye irritation persists: Get medical advice/attention.
In case of fire: Use for extinction: $CO_2$, powder or water spray.
Store locked up.
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **National regulations:**
The product is subject to be classified according with the latest version of the regulations on hazardous substances.
· **State Right to Know**

| | | |
|---|---|---|
| CAS: 67-63-0<br>RTECS: NT 8050000 | Isopropyl alcohol<br>Flam. Liq. 2, H225; Eye Irrit. 2, H319; STOT SE 3, H336 | 70% |
| CAS: 7732-18-5<br>RTECS: ZC 0110000 | water, distilled, conductivity or of similar purity | 30% |

All ingredients are listed.
· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

(Contd. on page 10)

# Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Issue date 05/11/2015 Reviewed on 05/11/2015

**Trade name: Pharma-C-Wipe, 70% Isopropyl Alcohol Wipes**

## 16 Other information

The information and recommendations in this safety data sheet are, to the best of our knowledge, accurate as of the date of issue. Nothing herein shall be deemed to create warranty, expressed or implied and shall not establish a legally valid contractual relationship. It is the responsibility of the user to determine applicability of this information and the suitability of the material or product for any particular purpose.

· **Date of preparation / last revision** 05/11/2015 / -

· **Abbreviations and acronyms:**

ADR: The European Agreement concerning the International Carriage of Dangerous Goods by Road
ADN: The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Flam. Liq. 2: Flammable liquids, Hazard Category 2
Flam. Liq. 3: Flammable liquids, Hazard Category 3
Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
Eye Irrit. 2A: Serious eye damage/eye irritation, Hazard Category 2A
STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3

· ***Data compared to the previous version altered.***

SDS created by MSDS Authoring Services www.msdsauthoring.com (877) 204-9106

## ATTACHMENT 10

SDS - Lysol Disinfectant Spray All Scents

Conforms to USDOL OSHA 29CFR 1910.1200 HAZCOM

# SAFETY DATA SHEET

Professional Lysol®l Brand III Kills 99.9% of Viruses & Bacteria** Disinfectant Spray, All Scents

## 1. Product and company identification

**Product name** : Professional Lysol®l Brand III Kills 99.9% of Viruses & Bacteria** Disinfectant Spray, All Scents

**Distributed by** : Reckitt Benckiser LLC.
Morris Corporate Center IV
399 Interpace Parkway (P.O. Box 225)
Parsippany, New Jersey 07054-0225
+1 973 404 2600

**Emergency telephone number (Medical)** : 1-800-338-6167

**Emergency telephone number (Transport)** : 1-800-424-9300 (U.S. & Canada) CHEMTREC
Outside U.S. and Canada (North America), call Chemtrec:703-527-3887

**Website:** : **http://www.rbnainfo.com**

**Product use** : Disinfectant.

**This SDS is designed for workplace employees, emergency personnel and for other conditions and situations where there is greater potential for large-scale or prolonged exposure, in accordance with the requirements of USDOL Occupational Safety and Health Administration.**

**This SDS is not applicable for consumer use of our products. For consumer use, all precautionary and first aid language is provided on the product label in accordance with the applicable government regulations, and shown in Section 15 of this SDS.**

**SDS #** : D0224478 v5.0

**Formulation #:** : 1338-022 (0175933) Original
1544-106 (0175940) Fresh
1338-019 (0175919) Country
1178-172 (0175917) Crisp Linen / Crystal Waters
1338-015 (0175918) Spring Waterfall
1338-026 (0175929) Early Morning Breeze / Lavender

**EPA ID No.** : 777-99-675

**UPC Code / Sizes** : 19 oz. Aerosol Cans
Original Scent, 36241-04650
Fresh, 36241-04675
Country Scent®, 36241-74276
Crisp Linen®, 36241-74828
Spring Waterfall®, 36241-76075
Crystal Waters, 36241-84044
Early Morning Breeze, 36241-81737
Lavender, 36241-89097

# 2. Hazards identification

**Classification of the substance or mixture** : FLAMMABLE AEROSOLS - Category 2

**GHS label elements**

**Hazard pictograms** :

**Signal word** : Warning

**Hazard statements** : Flammable aerosol.
Pressurized container: may burst if heated.

**Precautionary statements**

**General** : Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention** : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Pressurized container: Do not pierce or burn, even after use. Do not spray on an open flame or other ignition source.

**Response** : Not applicable.

**Storage** : Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.

**Disposal** : Not applicable.

**Supplemental label elements** : None known.

**Hazards not otherwise classified** : None known.

# 3. Composition/information on ingredients

**Substance/mixture** : Mixture

| Ingredient name | % | CAS number |
|---|---|---|
| Ethyl alcohol | 30 - 60 | 64-17-5 |
| butane | 1 - 5 | 106-97-8 |
| propane | < 2.5 | 74-98-6 |

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

# 4. First aid measures

**Description of necessary first aid measures**

**Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

# 4. First aid measures

**Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

**Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

**Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

## Most important symptoms/effects, acute and delayed

### Potential acute health effects

**Eye contact** : May cause eye irritation upon direct contact with eyes.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : No known significant effects or critical hazards.

**Ingestion** : No known significant effects or critical hazards.

### Over-exposure signs/symptoms

**Eye contact** : Adverse symptoms may include the following:
irritation
redness

**Inhalation** : Adverse symptoms may include the following:
respiratory tract irritation
coughing

**Skin contact** : No specific data.

**Ingestion** : No specific data.

## Indication of immediate medical attention and special treatment needed, if necessary

**Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

**Specific treatments** : No specific treatment.

**Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

**See toxicological information (Section 11)**

# 5. Fire-fighting measures

## Extinguishing media

**Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.

**Unsuitable extinguishing media** : None known.

**Specific hazards arising from the chemical** : Flammable aerosol. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion. Bursting aerosol containers may be propelled from a fire at high speed. Runoff to sewer may create fire or explosion hazard.

**Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

**Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

# 6. Accidental release measures

## Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. In the case of aerosols being ruptured, care should be taken due to the rapid escape of the pressurized contents and propellant. If a large number of containers are ruptured, treat as a bulk material spillage according to the instructions in the clean-up section. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

**For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

**Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

## Methods and materials for containment and cleaning up

**Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

# 6. Accidental release measures

**Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

# 7. Handling and storage

## Precautions for safe handling

**Protective measures** : Put on appropriate personal protective equipment (see Section 8). Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous.

**Conditions for safe storage, including any incompatibilities** : Do not store above the following temperature: 50°C (122°F). Store in accordance with local regulations. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Use appropriate containment to avoid environmental contamination.

# 8. Exposure controls/personal protection

## Control

### Occupational exposure limits

| Ingredient name | Exposure limits |
|---|---|
| Ethyl alcohol | **ACGIH TLV (United States, 6/2013).**<br>STEL: 1000 ppm 15 minutes.<br>**OSHA PEL 1989 (United States, 3/1989).**<br>TWA: 1000 ppm 8 hours.<br>TWA: 1900 mg/m³ 8 hours.<br>**NIOSH REL (United States, 10/2013).**<br>TWA: 1000 ppm 10 hours.<br>TWA: 1900 mg/m³ 10 hours.<br>**OSHA PEL (United States, 2/2013).**<br>TWA: 1000 ppm 8 hours.<br>TWA: 1900 mg/m³ 8 hours. |
| butane | **OSHA PEL 1989 (United States, 3/1989).**<br>TWA: 800 ppm 8 hours.<br>TWA: 1900 mg/m³ 8 hours.<br>**NIOSH REL (United States, 10/2013).**<br>TWA: 800 ppm 10 hours.<br>TWA: 1900 mg/m³ 10 hours.<br>**ACGIH TLV (United States, 6/2013).**<br>STEL: 1000 ppm 15 minutes. |

# 8. Exposure controls/personal protection

| | |
|---|---|
| propane | **OSHA PEL 1989 (United States, 3/1989).**<br>TWA: 1000 ppm 8 hours.<br>TWA: 1800 mg/m³ 8 hours.<br>**NIOSH REL (United States, 10/2013).**<br>TWA: 1000 ppm 10 hours.<br>TWA: 1800 mg/m³ 10 hours.<br>**OSHA PEL (United States, 2/2013).**<br>TWA: 1000 ppm 8 hours.<br>TWA: 1800 mg/m³ 8 hours. |

**Appropriate engineering controls** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

**Individual protection measures**

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

**Skin protection**

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

# 9. Physical and chemical properties

**Appearance**

**Physical state** : Liquid. [Aerosol.]

**Color** : Clear.

**Odor** : Characteristic.

**Odor threshold** : Not available.

**pH** : 10.8 to 11.8 [Conc. (% w/w): 100%]

**Melting point** : Not available.

**Boiling point** : Not available.

**Flash point** : Closed cup: 25.6°C (78.1°F)

**Evaporation rate** : Not available.

**Flammability (solid, gas)** : Not available.

**Lower and upper explosive (flammable) limits** : Not available.

**Vapor pressure** : Not available.

**Vapor density** : Not available.

**Relative density** : 0.8667 to 0.8967 g/cm³ [20 to 25°C]

**Solubility** : Easily soluble in the following materials: cold water and hot water.

**Partition coefficient: n-octanol/water** : Not available.

**Auto-ignition temperature** : Not available.

**Decomposition temperature** : Not available.

**Viscosity** : Not available.

**Aerosol product**

**Type of aerosol** : Spray

**Heat of combustion** : 17.99 kJ/g

**Ignition distance** : <45.72 cm

# 10. Stability and reactivity

**Reactivity** : No specific test data related to reactivity available for this product or its ingredients.

**Chemical stability** : The product is stable.

**Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.

**Conditions to avoid** : Avoid all possible sources of ignition (spark or flame).

**Incompatible materials** : Do not mix with household chemicals.

**Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

# 11. Toxicological information

## Information on toxicological effects

### Acute toxicity

| Product/ingredient name | Result | Species | Dose | Exposure |
|---|---|---|---|---|
| Ethyl alcohol | LC50 Inhalation Vapor | Rat | 124700 mg/m³ | 4 hours |
| | LD50 Oral | Rat | 7 g/kg | - |
| *Professional Lysol® Disinfectant Spray, All Scents (Aerosol) | LC50 Inhalation Vapor | Rat | >2.12 mg/l | 4 hours Maximum attainable concentration |

**Conclusion/Summary** : Not classified Harmful. *Information is based on toxicity test result of the concentrate of a similar product.

### Irritation/Corrosion

| Product/ingredient name | Result | Species | Score | Exposure | Observation |
|---|---|---|---|---|---|
| Ethyl alcohol | Eyes - Moderate irritant | Rabbit | - | 0.066666667 minutes 100 milligrams | - |
| | Eyes - Mild irritant | Rabbit | - | 24 hours 500 milligrams | - |
| | Eyes - Moderate irritant | Rabbit | - | 100 microliters | - |
| | Eyes - Severe irritant | Rabbit | - | 500 milligrams | - |
| | Skin - Mild irritant | Rabbit | - | 400 milligrams | - |
| | Skin - Moderate irritant | Rabbit | - | 24 hours 20 milligrams | - |
| *Professional Lysol® Disinfectant Spray, All Scents (Aerosol) | Eyes - Cornea opacity | Rabbit | < 1 | 72 hours | 4 days |
| | Skin - Primary dermal irritation index (PDII) | Rabbit | 0.3 | 4 hours | 72 hours |

### Conclusion/Summary

**Skin** : Slightly irritating to the skin. *Information is based on toxicity test result of the concentrate of a similar product.

**Eyes** : Moderately irritating to eyes. *Information is based on toxicity test result of the concentrate of a similar product.

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Classification

| Product/ingredient name | OSHA | IARC | NTP |
|---|---|---|---|
| Ethyl alcohol | - | 1 | - |

### Reproductive toxicity

# 11. Toxicological information

Not available.

## Teratogenicity

Not available.

## Specific target organ toxicity (single exposure)

Not available.

## Specific target organ toxicity (repeated exposure)

Not available.

## Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

## Potential acute health effects

**Eye contact** : May cause eye irritation upon direct contact with eyes.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : No known significant effects or critical hazards.

**Ingestion** : No known significant effects or critical hazards.

## Symptoms related to the physical, chemical and toxicological characteristics

**Eye contact** : Adverse symptoms may include the following:
irritation
redness

**Inhalation** : Adverse symptoms may include the following:
respiratory tract irritation
coughing

**Skin contact** : No specific data.

**Ingestion** : No specific data.

## Delayed and immediate effects and also chronic effects from short and long term exposure

### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

## Potential chronic health effects

Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

# 11. Toxicological information

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

## Numerical measures of toxicity

### Acute toxicity estimates

Not available.

# 12. Ecological information

## Toxicity

| Product/ingredient name | Result | Species | Exposure |
|---|---|---|---|
| Ethyl alcohol | Acute EC50 17.921 mg/l Marine water<br>Acute EC50 2000 µg/l Fresh water<br>Acute LC50 25500 µg/l Marine water<br><br>Acute LC50 42000 µg/l Fresh water<br>Chronic NOEC 4.995 mg/l Marine water<br>Chronic NOEC 0.375 ul/L Fresh water | Algae - Ulva pertusa<br>Daphnia - Daphnia magna<br>Crustaceans - Artemia franciscana - Larvae<br>Fish - Oncorhynchus mykiss<br>Algae - Ulva pertusa<br>Fish - Gambusia holbrooki - Larvae | 96 hours<br>48 hours<br>48 hours<br><br>4 days<br>96 hours<br>12 weeks |

## Persistence and degradability

Not available.

## Bioaccumulative potential

| Product/ingredient name | $LogP_{ow}$ | BCF | Potential |
|---|---|---|---|
| Ethyl alcohol | -0.35 | - | low |

## Mobility in soil

**Soil/water partition coefficient ($K_{OC}$)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

# 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

## 13. Disposal considerations

## 14. Transport information

| Regulatory information | UN number | Proper shipping name | Classes | PG* | Label | Additional information |
|---|---|---|---|---|---|---|
| DOT Classification | UN1950 | Aerosols, flammable | 2.1 | - | | Limited quantity |
| TDG Classification | UN1950 | Aerosols, flammable | 2.1 | - | | Limited quantity |
| Mexico Classification | UN1950 | AEROSOLES | 2.1 | - | | Limited quantity |
| IMDG Class | UN1950 | Aerosols, flammable | 2.1 | - | | Limited quantity |
| IATA-DGR Class | UN1950 | Aerosols, flammable | 2.1 | - | | See DG List |

PG* : Packing group

## 15. Regulatory information

**U.S. Federal regulations** : **TSCA 8(a) PAIR**: 2-methylpropan-2-ol

**TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

**United States inventory (TSCA 8b)**: All components are listed or exempted.

**Clean Water Act (CWA) 311**: ammonia

**Clean Air Act (CAA) 112 regulated flammable substances**: butane; propane

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Not listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

**SARA 302/304**

**Composition/information on ingredients**

No products were found.

# 15. Regulatory information

**SARA 304 RQ** : Not applicable.

**SARA 311/312**

**Classification** : Fire hazard

**Composition/information on ingredients**

| Name | % | Fire hazard | Sudden release of pressure | Reactive | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|---|---|---|---|---|---|---|
| Ethyl alcohol | 30 - 60 | Yes. | No. | No. | Yes. | No. |

**State regulations**

**Massachusetts** : The following components are listed: ETHYL ALCOHOL; BUTANE; PROPANE

**New York** : None of the components are listed.

**New Jersey** : The following components are listed: ETHYL ALCOHOL; ALCOHOL; BUTANE; PROPANE

**Pennsylvania** : The following components are listed: DENATURED ALCOHOL; BUTANE; PROPANE

**Label elements**

**Signal word:** : CAUTION

**Hazard statements** : Causes moderate eye irritation

**Precautionary measures** : Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. Wash with soap and water.

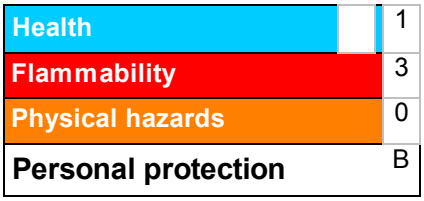
Keep out of the reach of children.
CONTENTS UNDER PRESSURE. Do not puncture or incinerate container. Do not expose to heat or store at temperatures above 120 °F. Keep away from heat, sparks, open flames and hot surfaces. - No smoking.

**Hazard statements** :

Flammable

# 16. Other information

**Hazardous Material Information System (U.S.A.)** :




**Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.**

**The customer is responsible for determining the PPE code for this material.**

# 16. Other information

**National Fire Protection Association (U.S.A.)** :

NFPA (30B) aerosol Flammability Level 1

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**Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.**

**Key to abbreviations** : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

**Date of issue** : 26/06/2015.

**Date of previous issue** : 09/04/2015.

**Version** : 5

**Prepared by** : Reckitt Benckiser LLC.
Product Safety Department
1 Philips Parkway
Montvale, New Jersey 07646-1810 USA.
FAX: 201-476-7770

**Revision comments** : Revision as per US GHS. Correction to NFPA 30B level.

**Indicates information that has changed from previously issued version.**

**Notice to reader**

**To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.**
**Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.**

# 16. Other information

RB is a member of the CSPA Product Care Product Stewardship Program.

## ATTACHMENT 11

SDS - Windex Original Formula

*Safety Data Sheet*

according to Hazard Communication Standard; 29 CFR 1910.1200

# WINDEX® CLEANER ORIGINAL

Version 1.3

Print Date 03/09/2018

Revision Date 01/23/2018

SDS Number 350000014153

## 1. PRODUCT AND COMPANY IDENTIFICATION

**Product information**

| | | |
|---|---|---|
| **Product name** | : | WINDEX® CLEANER ORIGINAL |
| **Recommended use** | : | Hard Surface Cleaner |
| **Restrictions on use** | : | Use only as directed on label |
| **Manufacturer, importer, supplier** | : | S.C. Johnson & Son, Inc.<br>1525 Howe Street<br>Racine WI 53403-2236 |
| **Telephone** | : | +1-800-558-5252 |
| **Emergency telephone number** | : | 24 Hour Medical Emergency Phone: (866)231-5406<br>24 Hour International Emergency Phone: (703)527-3887<br>24 Hour Transport Emergency Phone: (800)424-9300 |

## 2. HAZARDS IDENTIFICATION

**Classification of the substance or mixture**

**Globally Harmonized System (GHS) Classification**
This product does not meet the criteria for classification in any hazard class according to regulation OSHA 29 CFR 1910.1200.

**Labelling**

**Precautionary statements**

**Other hazards** : None identified

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

This product does not contain hazardous chemicals at or above a reportable level as defined by OSHA 29 CFR 1910.1200

For additional information on product ingredients, see www.whatsinsidescjohnson.com.

## 4. FIRST AID MEASURES

### Description of first aid measures

**Eye contact** : No special requirements

**Skin contact** : No special requirements

**Inhalation** : No special requirements.

**Ingestion** : No special requirements

### Most important symptoms and effects, both acute and delayed

Eyes : No adverse effects expected when used as directed.

Skin effect : No adverse effects expected when used as directed.

Inhalation : No adverse effects expected when used as directed.

Ingestion : No adverse effects expected when used as directed.

### Indication of any immediate medical attention and special treatment needed

See Description of first aid measures unless otherwise stated.

## 5. FIREFIGHTING MEASURES

**Suitable extinguishing media** : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Specific hazards during firefighting** : Container may melt and leak in heat of fire.

**Further information** : Fight fire with normal precautions from a reasonable distance. Standard procedure for chemical fires. Wear full protective clothing and positive pressure self-contained breathing apparatus.

## 6. ACCIDENTAL RELEASE MEASURES

| | | |
|---|---|---|
| **Personal precautions** | : | Wash thoroughly after handling. |
| **Environmental precautions** | : | Outside of normal use, avoid release to the environment. |
| **Methods and materials for containment and cleaning up** | : | Dike large spills.<br>Clean residue from spill site. |

## 7. HANDLING AND STORAGE

**Handling**

| | | |
|---|---|---|
| **Precautions for safe handling** | : | Avoid contact with skin, eyes and clothing.<br>For personal protection see section 8.<br>KEEP OUT OF REACH OF CHILDREN AND PETS. |
| **Advice on protection against fire and explosion** | : | Normal measures for preventive fire protection. |

**Storage**

| | | |
|---|---|---|
| **Requirements for storage areas and containers** | : | Keep container closed when not in use. |
| **Other data** | : | Stable under normal conditions. |

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Occupational Exposure Limits**

ACGIH or OSHA exposure limits have not been established for this product or reportable ingredients unless noted in the table above.

**Personal protective equipment**

| | | |
|---|---|---|
| **Respiratory protection** | : | No special requirements. |
| **Hand protection** | : | No special requirements. |
| **Eye protection** | : | No special requirements. |
| **Skin and body protection** | : | No special requirements. |

| | | |
|---|---|---|
| **Hygiene measures** | : | Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly after handling. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|---|---|---|
| **Form** | : | liquid |
| **Color** | : | blue |
| **Odour** | : | floral |
| **Odour Threshold** | : | Test not applicable for this product type |
| **pH** | : | 10.7<br>at (25 C) |
| **Melting point/freezing point** | : | 0 C |
| **Initial boiling point and boiling range** | : | 100 C |
| **Flash point** | : | does not flash |
| **Evaporation rate** | : | Test not applicable for this product type |
| **Flammability (solid, gas)** | : | Does not sustain combustion. |
| **Upper/lower flammability or explosive limits** | : | Test not applicable for this product type |
| **Vapour pressure** | : | Calculated31.7 hPa |
| **Vapour density** | : | Test not applicable for this product type |

| | | |
|---|---|---|
| **Relative density** | : | 1.00 g/cm3 at 25 C |
| **Solubility(ies)** | : | soluble |
| **Partition coefficient: n-octanol/water** | : | Test not applicable for this product type |
| **Auto-ignition temperature** | : | Test not applicable for this product type |
| **Decomposition temperature** | : | Heating can release hazardous gases. |
| **Viscosity, dynamic** | : | similar to water |
| **Viscosity, kinematic** | : | similar to water |
| **Oxidizing properties** | : | Test not applicable for this product type |
| **Volatile Organic Compounds Total VOC (wt. %)*** | : | 0.2 % - additional exemptions may apply<br>*as defined by US Federal and State Consumer Product Regulations |
| **Other information** | : | None identified |

## 10. STABILITY AND REACTIVITY

| | | |
|---|---|---|
| **Reactivity** | : | No dangerous reaction known under conditions of normal use. |
| **Chemical stability** | : | Stable under recommended storage conditions. |
| **Possibility of hazardous reactions** | : | If accidental mixing occurs and toxic gas is formed, exit area immediately. Do not return until well ventilated. |

**Conditions to avoid** : Direct sources of heat.

**Incompatible materials** : Do not mix with bleach or any other household cleaners. Strong bases

**Hazardous decomposition products** : Thermal decomposition can lead to release of irritating gases and vapours.

## 11. TOXICOLOGICAL INFORMATION

**Acute oral toxicity** : LD50 > 5000 mg/kg
**Acute inhalation toxicity** : LC50 > 10 mg/L

**Acute dermal toxicity** : LD50 > 5000 mg/kg

| GHS Properties | Classification | Routes of entry |
|---|---|---|
| Acute toxicity | No classification proposed | Oral |
| Acute toxicity | No classification proposed | Dermal |
| Acute toxicity | No classification proposed | Inhalation - Dust and Mist |
| Acute toxicity | No classification proposed | Inhalation - Vapour |
| Acute toxicity | No classification proposed | Inhalation - Gas |
| Skin corrosion/irritation | No classification proposed | - |
| Serious eye damage/eye irritation | No classification proposed | - |
| Skin sensitisation | No classification proposed | - |
| Respiratory sensitisation | No classification proposed | - |
| Germ cell mutagenicity | No classification proposed | - |
| Carcinogenicity | No classification proposed | - |

| | | |
|---|---|---|
| Reproductive toxicity | No classification proposed | - |
| Specific target organ toxicity - single exposure | No classification proposed | - |
| Specific target organ toxicity - repeated exposure | No classification proposed | - |
| Aspiration hazard | No classification proposed | - |

**Aggravated Medical Condition** : None known.

## 12. ECOLOGICAL INFORMATION

**Product :** The product itself has not been tested.

**Toxicity**
The ingredients in this formula have been reviewed and no adverse impact to the environment is expected when used according to label directions.

**No environmental data required.**

**Other adverse effects** : None known.

## 13. DISPOSAL CONSIDERATIONS

Consumer may discard empty container in trash, or recycle where facilities exist.

## 14. TRANSPORT INFORMATION

Please refer to the Bill of Lading/receiving documents for up-to-date shipping information.

**Land transport**
Not classified as dangerous in the meaning of transport regulations.

**Sea transport**
Not classified as dangerous in the meaning of transport regulations.

**Air transport**
Not classified as dangerous in the meaning of transport regulations.

## 15. REGULATORY INFORMATION

**Notification status** : All ingredients of this product are listed or are excluded from listing on the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

**Notification status** : All ingredients of this product comply with the New Substances Notification requirements under the Canadian Environmental Protection Act (CEPA).

**California Prop. 65** : This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

**State Right To Know**

| | | |
|---|---|---|
| No components are subject to the Massachusetts Right to Know Act. | | |
| No components are subject to the Minnesota "Right To Know" Act | | |
| No components are subject to the New Jersey "Right To Know" Act | | |
| Pennsylvania RTKL | Water | 7732-18-5 |
| | Ammonium Hydroxide | 1336-21-6 |

# WINDEX® CLEANER ORIGINAL

Version 1.3

Print Date 03/09/2018

Revision Date 01/23/2018

SDS Number 350000014153

## 16. OTHER INFORMATION

**HMIS Ratings**

| | |
|---|---|
| **Health** | 1 |
| **Flammability** | 0 |
| **Reactivity** | 0 |

**NFPA Ratings**

| | |
|---|---|
| **Health** | 1 |
| **Fire** | 0 |
| **Reactivity** | 0 |
| **Special** | - |

This information is being provided in accordance with the Occupational Safety and Health Administration (OSHA) regulation (29 CFR 1910.1200). The information supplied is designed for workplaces where product use and frequency of exposure exceeds that established for the labeled consumer use.

**Further information**

This document has been prepared using data from sources considered to be technically reliable. It does not constitute a warranty, expressed or implied, as to the accuracy of the information contained herein. Actual conditions of use are beyond the seller's control. User is responsible to evaluate all available information when using product for any particular use and to comply with all Federal, State, Provincial and Local laws and regulations.

| | |
|---|---|
| Prepared by | SC Johnson Global Safety Assessment & Regulatory Affairs (GSARA) |

## ATTACHMENTS

1. SDS - Banana Boat® Sport Performance CoolZone SPF 30
2. SDS - CO2_Fire Extinguisher
3. SDS - Dust-Off compressed gas duster
4. SDS - Gel Ice Pack
5. SDS - Generic ALCOHOL HAND SANITIZER
6. SDS - Hand Warmer Air Activated Packet
7. SDS - Kidde Multipurpose ABC Fire Extinguisher
8. SDS - OFF! - Deep Woods Bug Spray
9. SDS - PB Blaster-Penetrating-Catalyst
10. SDS - Permethrin Insect Repellent (Clothing and Gear)
11. SDS - Rust-Oleum Inverted Marking Paint - Fluorescent Orange
12. SDS - Salinaxx Eye Wash
13. SDS - Sharpie Permanant Marker
14. SDS - Spray Adhesive Glue
15. SDS - Sunblock Lotion

## ATTACHMENT 1

# SDS - Banana Boat® Sport Performance CoolZone SPF 30

# SAFETY DATA SHEET

## I. IDENTIFICATION OF THE PRODUCT AND RESPONSIBLE PARTY

| | |
|---|---|
| **Product Name:** | **Banana Boat® Sport Performance CoolZone SPF 30 (Aerosol)** |
| **Product Code(s):** | **92005900** |
| **Recommended Use(s):** | **Sunscreen personal care product for external use only** |
| **Uses Advised Against:** | **All other uses** |
| **Contact Information for Responsible Party:** | **Edgewell Personal Care, LLC**<br>6 Research Drive<br>Shelton, CT 06484<br>Phone: 1-888-999-6736 |
| **Emergency Phone Number:** | 1-888-879-3798 (Medical Emergency- Product Safety Info Service)<br>1-800-424-9300 (ChemTrec--24 hrs. Transportation Information or Spills)<br>1-703-527-3887 (ChemTrec--International Transportation Information or Spills) |

## II. HAZARDS IDENTIFICATION

This product is not a hazardous chemical for purposes of the OSHA Hazard Communication Standard (HCS), 29 CFR 1910.1200. It is an over-the-counter (OTC) drug regulated by the U.S. Food and Drug Administration (FDA) and packaged for sale to consumers in a retail establishment. Therefore, it is exempt from the requirements of the HCS per 29 CFR 1910.1200(b)(6)(vii).

**Classified Physical Hazards**:

Hazard category: Flammable aerosol, Cat. 2; Liquefied gas under pressure.
Signal word: Warning.
Hazard Statement(s): Flammable aerosol; Contains gas under pressure; may explode if heated.
Pictogram: Gas cylinder; Flame.

**Precautionary Statements**:

Prevention Statements:

Keep away from heat, hot surfaces, sparks, open flames and other heat sources and ignition sources. No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.

Storage Statement(s):

Do not expose to temperatures exceeding 50 ºC/120 ºF.

## Classified Health Hazards:

Hazard category: Eye irritation, Cat 2A
Signal word: Warning.
Hazard Statement(s): Causes serious eye irritation.
Pictogram: Exclamation mark.

Skin contact may cause an allergic skin reaction in a small proportion of individuals; ingestion may cause irritation to mucous membranes.

### Precautionary statement(s)

Prevention statement(s):

Keep away from heat, hot surfaces, sparks, open flames and other heat sources and ignition sources. No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.

Response Statement(s):

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/attention.

**Environmental Impact:** See Section 12 of this SDS.

## III. COMPOSTION INFORMATION

| Chemical Name | CAS Number | Weight % |
|---|---|---|
| Isobutane | 75-28-5 | 30.0 |
| Ethanol | 64-17-5 | 58.4 |

## IV. FIRST AID MEASURES

**Eye Contact:** Rinse thoroughly with plenty of water, also under the eyelids. If irritation persists, call a physician. Irritation is most important effect/symptom.

**Skin Contact:** None anticipated to be needed. Product is a personal care product intended for use on skin.

**Inhalation:** None anticipated to be needed under normal use. If breathing is difficult, move person to fresh air. If not breathing, give artificial respiration. Consult a physician.

**Ingestion:** None anticipated to be needed under normal use. Not a foreseeable route of exposure. Should such an event occur, rinse mouth with water and afterwards drink plenty of water or milk

**Notes to Physician:** Treat symptomatically.

## V. FIRE-FIGHTING MEASURES

| | |
|---|---|
| **Uniform Fire Code:** | Aerosol Level 3 |
| **Flash Point:** | -37°C (concentrate)<br>(Isobutane FP is -83 C; ethanol FP is 14 C) |
| **Specific hazards arising From the product:** | Sensitivity to Static Discharge. Be prepared for risk of exploding cans if product is exposed to fire. |
| **Suitable Extinguishing Media:** provided the | Use dry chemical, alcohol resistant foam, all purpose AFFF, carbon dioxide or water spray (fog), media are appropriate to local circumstances and the surrounding environment. |
| **Protective Equipment and Precautions for Firefighters** | For any structural fire (one beyond the incipient stage), wear self-contained, pressure-demand, breathing apparatus approved by MSHA/NIOSH for that use and full protective gear. Be prepared for risk of exploding cans if product is exposed to fire. |

**NFPA Hazard Rating: Health Hazard 1 Flammability 3 Stability 0**

## VI. ACCIDENTAL RELEASE MEASURES

| | |
|---|---|
| **Personal Precautions:** | Avoid contact with eyes. |
| **Protective Equipment:** | None needed. |
| **Emergency Procedures:** | None needed in the absence of a fire. Be prepared for risk of exploding cans if product is exposed to fire. |
| **Environmental Precautions:** | Refer to protective measures listed in Sections 7 and 8. |
| **Methods for Containment:** | Use absorbent material to prevent further leakage or spillage if safe to do so. |
| **Methods for Cleaning Up:** | Keep in suitable, closed containers for disposal |

## VII. HANDLING & STORAGE

| | |
|---|---|
| **Handling:** | Handle in accordance with good industrial hygiene and safety practice. Avoid contact with eyes. Do not puncture or incinerate cans. |
| **Storage:** | Keep away from heat and sources of ignition. Do not expose to temperatures exceeding 50 ºC/120 ºF. |

## VIII. EXPOSURE CONTROLS & PERSONAL PROTECTION

**Exposure Guidelines:**

| Chemical Name | ACGIH TLV | OSHA PEL | NIOSH IDLH |
|---|---|---|---|
| Isobutane<br>75-28-5 | TWA: 1000 ppm | N/A | N/A |
| Ethanol<br>64-17-5 | TWA: 1000 ppm | TWA: 1000 ppm<br>TWA: 1900 mg/m3 | IDLH: 3300 ppm<br>TWA: 1900 mg/m3<br>TWA: 1000 ppm |

**Engineering Measures:** Adequate ventilation and a suitable means of rinsing eyes with water are recommended.

**Personal Protective Equipment:** No need for personal protective equipment is anticipated for reasonably foreseeable conditions of use.

**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety practice.

## IX. PHYSICAL & CHEMICAL PROPERTIES

**(a) Appearance**
- **(1) physical state:** liquid aerosol
- **(2) color, etc.:** clear, light yellow

**(b) Odor – characteristic:** aquatic, floral, musk
**(c) Odor threshold:** No data available
**(d) pH:** No data available
**(e) Melting point/freezing point:** No data available
**(f) Initial boiling point and boiling range:** No data available
**(g) Flash point:** -37°C (concentrate)
**(h) Evaporation rate:** No data available
**(i) Flammability (solid, gas):** Yes
**(j) Upper/lower flammability or explosive limits:** No data available.
**(k) Vapor pressure:** No data available
**(l) Vapor density:** No data available
**(m) Relative density (specific gravity):** 0.81-0.83
**(n) Solubility(ies): immiscible in water**
**(o) Partition coefficient (n-octanol/water):** No data available
**(p) Auto-ignition temperature:** No data available
**(q) Decomposition temperature:** No data available
**(r) Viscosity:** No data available
**(s) VOC Content(%):** Available upon request

## X. STABILITY & REACTIVITY

**Reactivity:** Not reactive.

**Chemical Stability:** Stable

**Possibility of Hazardous Reactions:** Yes in the event of a fire. Hazardous polymerization does not occur.

**Conditions to Avoid:** Heat, flames and sparks.

**Incompatible Products:** None known.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide

**Hazardous Polymerization:** Hazardous polymerization does not occur.

## XI. TOXICOLOGICAL INFORMATION

This product is safe for its intended use based on the formulation, testing results, and the long history of safe consumer use.

Ethanol is classified for germ cell mutagenicity, reproductive toxicity and repeated exposure STOT based on studies with repeated exposures to airborne ethanol at concentrations on the order of 10,000 ppm and higher. Those studies clearly indicate that the three hazards will not be evident from reasonably foreseeable exposures to this product.

## XII. ECOLOGICAL INFORMATION

**Ecotoxicity:** The environmental impact of this product has not been investigated.

## XIII. DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable federal, state, and/or local regulations.

## XIV. TRANSPORTATION INFORMATION

**UN Number:** 1950
**Proper Shipping Name:** Aerosols, flammable
**Hazard Class:** 2.1
**Packing Group:** N/A

**Note: This product may be eligible for shipment under Limited Quantity provisions of the transport regulations or as a Consumer Commodity.**

## XV. REGULATORY INFORMATION

**U.S. Regulations**

**SARA 311/312 Hazard Categories**

| | |
|---|---|
| **Acute Health Hazard** | No |
| **Chronic Health Hazard** | No |
| **Fire Hazard** | Yes |
| **Sudden Release of Pressure Hazard** | Yes |
| **Reactive Hazard** | No |
| **California Proposition 65** | This personal care product is not subject to warning labeling under California Proposition 65. |

**TSCA: This product is regulated under the Federal Food, Drug, and Cosmetic Act and is not subject to Toxic Substances Control Act requirements.**

## XVI. OTHER INFORMATION

**Prepared By** **Edgewell Personal Care, LLC**

**Issuing Date** **3-June-2015 Reflects GHS Amendment to the OSHA Hazard Communication Standard.**

**Revision Date**

**Revision Note**

### Disclaimer

**The information provided on this SDS is correct to the best of our knowledge, information and belief at the date of its publication. The Information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text of this SDS.**

## ATTACHMENT 2

SDS - CO2_Fire Extinguisher

# SAFETY DATA SHEET
## Carbon Dioxide
## (Fire Extinguishing Agent and Expellant)

## 1. IDENTIFICATION

| | |
|---|---|
| **Product Name** | Carbon Dioxide (Fire Extinguishing Agent and Expellant) |
| **Other Names** | CO2 |
| **Recommended use of the chemical and restrictions on use** | |
| **Identified uses** | Fire Extinguishing Agent and Expellant |
| **Restrictions on use** | Consult applicable fire protection codes |
| **Company Identification** | Kidde Residential & Commercial<br>1016 Corporate Park Drive<br>Mebane, NC 27302<br>USA |
| **Customer Information Number** | (919) 563-5911<br>(919) 304-8200 |
| **Emergency Telephone Number** | |
| **CHEMTREC Number** | (800) 424-9300<br>(703) 527-3887 (International) |
| **Issue Date** | October 1, 2015 |
| **Supersedes Date** | April 10, 2015 |

*Safety Data Sheet prepared in accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200) and the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*

## 2. HAZARD IDENTIFICATION

**Hazard Classification**
Gas under pressure – liquefied gas
Simple Asphyxiant

**Label Elements**
Hazard Symbols

Signal Word: Warning

**Hazard Statements**
Contents under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

**Precautionary Statements**

**Prevention**
Do not enter confined space unless adequately ventilated.
In case of inadequate ventilation wear respiratory protection.

## 2. HAZARD IDENTIFICATION

**Response**
None
**Storage**
Keep container tightly closed.
Protect from sunlight and store in well-ventilated place.
**Disposal**
None

**Other Hazards**

Direct contact with the cold gas or liquid can cause freezing of exposed tissues. Avoid direct inhalation of undiluted gas. Can cause suffocation by reducing oxygen available for breathing. Breathing very high concentrations can cause dizziness, shortness of breath, unconsciousness or asphyxiation.

**Specific Concentration Limits**

The values listed below represent the percentages of ingredients of unknown toxicity.

| | |
|---|---|
| Acute oral toxicity | 0% |
| Acute dermal toxicity | 0% |
| Acute inhalation toxicity | 0% |
| Acute aquatic toxicity | 100% |

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Synonyms:** CO2
This product is a substance.

| Component | CAS Number | Concentration |
|---|---|---|
| Carbon Dioxide | 124-38-9 | >99.8% |

## 4. FIRST- AID MEASURES

**Description of necessary first-aid measures**
**Eyes**
Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.
**Skin**
Gently warm affected areas. Obtain medical attention if frostbite or blistering occurs or redness persists.
**Ingestion**
Ingestion is not considered a potential route of exposure.
**Inhalation**
Remove from exposure. If there is difficulty in breathing, give oxygen. Obtain medical attention immediately.

**Most important symptoms/effects, acute and delayed**
Aside from the information found under Description of necessary first aid measures (above) and Indication of immediate medical attention and special treatment needed, no additional symptoms and effects are anticipated.

## 4. FIRST- AID MEASURES

**Indication of immediate medical attention and special treatment needed**

**Notes to Physicians**

In case of frostbite, place the frostbitten part in warm water. If warm water is not available or impractical to use, wrap the affected parts gently in blankets. DO NOT USE HOT WATER.

## 5. FIRE - FIGHTING MEASURES

**Suitable Extinguishing Media**

Carbon Dioxide is used as an extinguishing agent and therefore is not a problem when trying to control a blaze. Use extinguishing agent appropriate to other materials involved. Keep containers and surroundings cool with water spray as containers may rupture or burst in the heat of a fire.

**Specific hazards arising from the chemical**

Containers may explode in heat of fire.

**Special Protective Actions for Fire-Fighters**

Wear full protective clothing and self-contained breathing apparatus as appropriate for specific fire conditions.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**

Remove leaking cylinder to a safe place. Ventilate the area. Leaks inside confined spaces may cause suffocation as oxygen is displaced and should not be entered without a self-contained breathing apparatus.

**Environmental Precautions**

None - Material is a normal atmospheric gas.

**Methods and materials for containment and cleaning up**

None - Material evaporates.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**

Containers should be properly stored and secured to prevent falling or being knocked over. Do not drag, slide or roll containers. Do not drop containers or permit them to strike against each other. Never apply flame or localized heat directly to any part of the containers.

**Conditions for safe storage**

Store away from sources of heat or ignition. Storage area should be: - cool - dry - well ventilated - under cover - out of direct sunlight

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**
Exposure limits are listed below, if they exist.

**Carbon Dioxide**
ACGIH TLV: 5000 ppm (9000 mg/m$^3$) STEL: 30,000 ppm (54,000 mg/m$^3$)
OSHA PEL: 5000 ppm (9000 mg/m$^3$)

**Appropriate engineering controls**
Use with adequate ventilation (natural or mechanical), especially in a confined space.

**Individual protection measures**
**Respiratory Protection**
Not normally required. In oxygen deficient atmospheres, use a self contained breathing apparatus, as an air purifying respirator will not provide protection.
**Skin Protection**
Gloves
**Eye/Face Protection**
Chemical goggles or safety glasses with side shields.
**Body Protection**
Normal work wear.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Appearance** | |
| **Physical State** | Liquefied gas under pressure |
| **Color** | Colorless |
| **Odor** | Odorless to Slightly Acidic |
| **Odor Threshold** | No data available |
| **pH** | Not applicable |
| **Specific Gravity** | 1.522 |
| **Boiling Range/Point (°C/F)** | -56.6°C/-69.8 °F |
| **Melting Point (°C/F)** | -78.5°C/109.2 °F (sublimation) |
| **Flash Point (PMCC) (°C/F)** | Not flammable |
| **Vapor Pressure** | 838 psig @70°F and 1 atmosphere |
| **Evaporation Rate (BuAc=1)** | Not applicable |
| **Solubility in Water** | Soluble |
| **Vapor Density (Air = 1)** | Heavier than air. |
| **VOC (%)** | Not applicable |
| **Partition coefficient (n-octanol/water)** | No data available |
| **Viscosity** | Not applicable |
| **Auto-ignition Temperature** | No data available |
| **Decomposition Temperature** | No data available |
| **Upper explosive limit** | Not explosive |
| **Lower explosive limit** | Not explosive |
| **Flammability (solid, gas)** | Not flammable |

## 10. STABILITY AND REACTIVITY

**Reactivity**
Containers may rupture or explode if exposed to heat.

**Chemical Stability**
Stable under normal conditions.

**Possibility of hazardous reactions**
Hazardous polymerization will not occur.

**Conditions to Avoid**
Extremely high temperatures - contact with incompatible materials

**Incompatible Materials**
Powdered metals (ex. aluminum, zinc, etc.) - strong oxidizing agents – alkalis

**Hazardous Decomposition Products**
In contact with moisture will generate carbonic acid.

## 11. TOXICOLOGICAL INFORMATION

**Acute Toxicity**
Simple asphyxiant. LCLo (inhalation in humans): 90,000ppm/ 5 minutes.

**Specific Target Organ Toxicity (STOT) – single exposure**
Exposure to carbon dioxide vapor at high concentrations can cause loss of consciousness which may prove fatal due to suffocation as it displaces oxygen. Symptoms may include light headedness, dizziness, difficulty with breathing, drowsiness, nausea, mental confusion, increased blood pressure and increased respiratory rate.

**Specific Target Organ Toxicity (STOT) – repeat exposure**
No data available.

**Serious Eye damage/Irritation**
Direct contact with the cold gas or liquid can cause freezing of exposed tissues.

**Skin Corrosion/Irritation**
Direct contact with the cold gas or liquid can cause freezing of exposed tissues.

**Respiratory or Skin Sensitization**
Available data indicates this product is not expected to cause skin or respiratory sensitization.

**Carcinogenicity**
Not considered carcinogenic by NTP, IARC, and OSHA.

**Germ Cell Mutagenicity**
Available data indicates this product is is not expected to be mutagenic.

**Reproductive Toxicity**
Available data indicates this product is not expected to cause reproductive toxicity or birth defects.

## 11. TOXICOLOGICAL INFORMATION

**Aspiration Hazard**
Not an aspiration hazard.

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**
LC50 (Rainbow trout) 60mg/l 96 hr

**Mobility in soil**
Carbon dioxide occurs naturally in the atmosphere.

**Persistence/Degradability**
Carbon dioxide occurs naturally in the atmosphere.

**Bioaccumulative Potential**
Carbon dioxide occurs naturally in the atmosphere.

**Other adverse effects**
No relevant studies identified.

## 13. DISPOSAL CONSIDERATIONS

**Disposal Methods**
Dispose of container in accordance with all applicable local and national regulations. Do not cut puncture or weld on or near to the container. If spilled, contents will vaporize to the atmosphere.

## 14. TRANSPORT INFORMATION

Safety Data Sheet information is intended to address a specific material and not various forms or states of containment.

Special Precautions for Shipping:
Individuals must be certified as Hazardous Material Shipper for all transportation modes.
Pressurized Fire Extinguishers are considered a hazardous material by the US Department of Transportation and Transport Canada.

**Bulk Shipments:**

| | |
|---|---|
| **DOT CFR 172.101 Data** | Carbon Dioxide, 2.2, UN1013 |
| **UN Proper Shipping Name** | Carbon Dioxide |
| **UN Class** | (2.2) Non-Flammable Gas |
| **UN Number** | UN1013 |
| **UN Packaging Group** | Not Applicable |
| **Classification for AIR Transportation (IATA)** | Consult current IATA Regulations prior to shipping by air. |
| **Classification for Water Transport IMDG** | Consult current IMDG Regulations prior to shipping by water. |

## 14. TRANSPORT INFORMATION

**Fire Extinguishers:**

| | |
|---|---|
| **DOT CFR 172.101 Data** | Fire extinguishers, 2.2, UN1044 |
| **UN Proper Shipping Name** | Fire extinguishers |
| **UN Class** | (2.2) |
| **UN Number** | UN1044 |
| **UN Packaging Group** | Not applicable |
| **Classification for AIR Transportation (IATA)** | Consult current IATA Regulations prior to shipping by air. |
| **Classification for Water Transport IMDG** | Consult current IMDG Regulations prior to shipping by water. |

This section is believed to be accurate at the time of preparation. It is not intended to be a complete statement or summary of the applicable laws, rules, or hazardous material regulations, and is subject to change. Users have the responsibility to confirm compliance with all laws, rules, and hazardous material regulations in effect at the time of shipping.

## 15. REGULATORY INFORMATION

**United States TSCA Inventory**
All components of this product are in compliance with the inventory listing requirements of the US Toxic Substance Control Act (TSCA) Chemical Substance Inventory.

**Canada DSL Inventory**
All ingredients in this product have been verified for inclusion on the Domestic Substance List (DSL).

**SARA Title III Sect. 311/312 Categorization**
Pressure Hazard

**SARA Title III Sect. 313**
This product does not contain any chemicals listed in Section 313 at or above de minimis concentrations.

## 16. OTHER INFORMATION

**NFPA Ratings**
NFPA Code for Health - 1
NFPA Code for Flammability - 0
NFPA Code for Reactivity - 0
NFPA Code for Special Hazards – None

**HMIS Ratings**
HMIS Code for Health - 1
HMIS Code for Flammability - 0
HMIS Code for Physical Hazard - 0
HMIS Code for Personal Protection - See Section 8
*Chronic

## 16. OTHER INFORMATION

**Legend**
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service
IARC: International Agency for Research on Cancer
LCLo: Lethal concentration low
N/A: Denotes no applicable information found or available
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration
PEL: Permissible Exposure Limit
SDS: Safety Data Sheet
STEL: Short Term Exposure Limit
TLV: Threshold Limit Value

Revision Date: October 1, 2015
Replaces: April 10, 2015
Changes made: Update to Section 14.

**Information Source and References**
This SDS is prepared by Hazard Communication Specialists based on information provided by internal company references.

**Prepared By:** EnviroNet LLC.

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## ATTACHMENT 3

Dust-Off compressed gas duster

# Safety Data Sheet

## Dust-Off Compressed Gas Duster

## Section 1. Identification

| | |
|---|---|
| Product Identifier | Dust-Off Compressed Gas Duster |
| Synonyms | Professional 12 oz.; Jumbo 17 oz.; Classic and Plus; Dust-Off¨ Compressed Gas Duster |
| Manufacturer Stock Numbers | N/A |
| Recommended use | Dust Removal |
| Uses advised against | Use Only as Directed - Read label instructions carefully |
| Manufacturer Contact | |
| Address | Falcon Safety Products, Inc.<br>25 ImClone Drive<br>Branchburg, NJ, 08876<br>USA |

| Phone | Emergency Phone | Fax |
|---|---|---|
| (908) 707-4900 | (800) 498-7192 | N/A |

## Section 2. Hazards Identification

| | |
|---|---|
| Classification | FLAMMABLE GASES - Category 2<br>GASES UNDER PRESSURE - Compressed gas |
| Signal Word | Warning |
| Pictogram | |
| Hazard Statements | Contains gas under pressure; may explode if heated<br>Flammable gas |
| Precautionary Statements | |
| Response | Eliminate all ignition sources if safe to do so.<br>Leaking gas fire: Do not extinguish, unless leak can be stopped safely. |
| Prevention | Do not spray on an open flame or other ignition source.<br>Keep away from heat. |

| | |
|---|---|
| | Pressurized container: Do not pierce or burn, even after use. |
| Storage | Protect from sunlight. Store in a well-ventilated place.<br>Store at temperatures not exceeding 120 degrees F/49 degrees C |
| Disposal | N/A |
| General | Keep out of reach of children |
| Ingredients of unknown toxicity | 0% |
| Hazards not Otherwise Classified | N/A |
| | No Data Available |

## Section 3. Ingredients

| CAS | Ingredient Name | Weight % |
|---|---|---|
| 75-37-6 | Ethane, 1,1-difluoro- | 100 % |

**Occupational exposure limits, if available, are listed in Section 8.**

## Section 4. First-Aid Measures

| | |
|---|---|
| General Advice | Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt, seek medical advice. |
| Inhalation | Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention. |
| Skin | Take off all contaminated clothing immediately. Flush area with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician. |
| Eye | Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention. |
| Ingestion | Is not considered a potential route of exposure. |
| Most important symptoms/effects, acute and delayed | Anaesthetic effects: light-headedness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness. |
| Protection of First-aiders | If potential for exposure exists refer to Section 8 for specific personal protective equipment. |
| Notes to Physician | Because of possible disturbances of cardiac rhythm catecholamine drugs, such as epinephrine, which may be used in situations of emergency life support, should be used with special caution. |

## Section 5. Fire Fighting Measures

| | |
|---|---|
| Suitable Extinguishing Media | Water spray, water fog, dry chemical, alcohol resistant foam, carbon dioxide (CO2) |
| Unsuitable Extinguishing Media | No applicable data available. |
| Specific Hazards | Flammable. This substance's fire decomposition by-products will include hydrofluoric acid and possibly carbonyl flouride. Avoid contact with these materials, which are toxic and irritating. Evacuate personnel immediately in the event of a fire involving this substance. Vapors may form explosive mixtures with air. Vapors are heavier than air and may spread along floors. Vapors or gases may travel considerable distances to ignition source and flash back. |
| Special protective equipment for firefighters | Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire. Exposure to decompositon products may be a hazard to health. |
| Further Information | Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Cool containers/tanks with water spray. |

## Section 6. Accidental Release Measures

| | |
|---|---|
| NOTE: | Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up. |
| Safeguards (Personnel) | Evacuate personnel to safe areas. Ventilate the area. Refer to protective measures listed in sections 7 and 8. |
| Spill Clean-up | If this product is spilled and not recovered, or is recovered as a waste for treatment and disposal, the CERCLA Reportable Quantity is 100 lbs. (release of an Unlisted Hazardous Waste with the Characteristic of Ignitability). Evaporates. Ventilate area using forced ventilation, especially low or enclosed places where heavy vapors might collect. |
| Accidental Release Measures | Wear self-contained breathing apparatus (SCBA). |

## Section 7. Handling and Storage

| | |
|---|---|
| Handling (Personnel) | Avoid breathing vapors or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8. Handle in accordance with good industrial hygiene and safety practice. |
| Handling (Physical Aspects) | Vapors are heavier than air and may spread along floors. Vapors may form flammable mixture with air. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Electrical equipment should be protected to the appropirate standard. No sparking tools should be used. Take measures to prevent the build up of electrostatic charge. Keep away from open flames, hot surfaces and sources of ignition. When using DO NOT SMOKE. Do not use in areas where vapors may accumulate such as paper shredders. |
| Dust Explosion class | Not applicable |
| Storage | Keep container tightly closed and in a dry, well-ventilated location. Store in original container. The product has an indefinite shelf life when stored properly. |
| Storage Period | Recommended shelf life - 10 years provided product is stored in a dry location as directed. |
| Storage Temperature | Do not expose to temperatures above 120 degrees F (49 degrees C) as overheating could cause can to burst. DO NOT leave in direct sunlight or enclosed vehicle. |

## Section 8. Exposure Controls/Personal Protection

**Occupational Exposure Limits**

| Ingredient Name | ACGIH TLV | OSHA PEL | STEL |
|---|---|---|---|
| Ethane, 1,1-difluoro- | N/A | N/A | N/A |

**Personal Protective Equipment**

N/A

**Engineering controls**

Ensure adequate ventilation, especially in confined areas. Use respiratory protection if needed.

**Eye/Face Protection**

Wear safety glasses with side shields. Direct contact with liquid may cause frostbite.

**Respiratory Protection**

For rescue use self-contained breathing apparatus. Vapors are heavier than air and can cause suffication by reducing oxygen available for breathing.

**Skin and body protection**

As required by employer code. If there is risk of skin contact, wear protective clothing, gloves, etc. Direct contact with liquid can cause frostbite.

**General Hygiene Considerations**

Handle in accordance with good industrial hygiene and safety practices. When using do not eat or drink. Wash hands and face before breaks and immediately after handling the product.

## Section 9. Physical and Chemical Properties

| | |
|---|---|
| Physical State | Gas |
| Color | Clear |
| Odor | slight, ether-like |
| Odor Threshold | No applicable data available |
| Solubility | Water - Slightly |
| Partition coefficient Water/n-octanol | N/A |
| VOC% | N/A |
| Viscosity | No applicable data available |
| Specific Gravity | 0.91 |
| Density lbs/Gal | 0.9 |
| Pounds per Cubic Foot | N/A |
| Flash Point | <-58°F (<-50° C) |
| FP Method | N/A |
| Ph | Neutral |
| Melting Point | No applicable data available |
| Boiling Point | -13 °F (-25 ° C) |
| Boiling Range | N/A |
| LEL | 3.9 |
| UEL | 16.9 |
| Evaporation Rate | No applicable data available |
| Flammability | Flammable |
| Decomposition Temperature | N/A |
| Auto-ignition Temperature | No applicable data available |
| Vapor Pressure | 5,960 KPa at 77F (25C) |
| Vapor Density | 2.4 at 77F (25C) (Air=1) |

## Section 10. Stability and Reactivity

| | |
|---|---|
| Reactivity | Stable under recommended storage conditions. |
| Chemical Stability | The product is chemically stable under recommended storage conditions. |
| Conditions to Avoid | Aerosol containers are unstable at temperatures above 120 degrees F/49 degrees C |
| Incompatible Materials | Incompatible products include Alkali metals, Alkaline earth metals, powdered metals, powdered metal salts. |
| Hazardous Decomposition Products | Decomposition products are hazardous. This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride. |

## Section 11. Toxicological Information

| | |
|---|---|
| Component Analysis - LC50 | 1,1-Difluoroethane - > 64000 ppm rat |
| Component analysis - Oral LD50 | 1,1-Difluoroethane - 1500 mg/kg rat |
| Effects of Acute Exposure - Eye | Contact with liquid may cause frostbite |
| Effects of Acute Exposure - Skin | Contact with liquid may cause frostbite |
| Effects of Acute Exposure - Inhalation | Excessive intentional inhalation may cause respiratory tract irritation and central nervous system effect (headaches, dizziness). Vapors may cause dizziness or suffocation. |
| Effects of Acute Exposure - Ingestion | Not a normal route of exposure |
| Sensitization | Non-hazardous by WHMIS/OSHA criteria. |
| Carcinogenicity | Not classifiable as a human carcinogen. Animal testing did not show carcinogenic effects. None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA as a carcinogen. |
| Mutagenicity | Animal testing did not show any mutagenic effects. Did not cause genetic damage in cultured bacterial cells. Tests on mammalian cell cultures showed mutagenic effects. |
| Reproductive Toxicity | No toxcicity to reproduction. Animal testing showed no reproductive toxicity. |
| Teratogenicity | Animal testing showed no developmental toxicity. |
| Further Information | Cardiac sensitization threshold limit: 405000 mg/m3 |

## Section 12. Ecological Information

| | |
|---|---|
| Aquatic Toxicity | 1,1-Difluoroethane 96 h LC50 : Fish 295.78 mg/l 96 h EC50 : Algae 47.76 mg/l 48 h EC50 : Daphnia (water flea) 146.7 mg/l |

## Section 13. Disposal

| | |
|---|---|
| Waste Disposal Methods | Comply with applicable Federal, State/Provincial and Local Regulations. May be a RCRA Hazardous waste due to the ignitability characteristic. Do not puncture or incinerate container. |
| Contaminated Packaging | Not Available |

## Section 14. Transport Information

| | |
|---|---|
| UN Number | 1030 |
| UN Proper Shipping Name | 1,1-Difluoroethane |
| DOT Classification | 2.1 |
| Packing Group | N/A |
| Packaging Exceptions | Note: Falcon Safety Products has been granted a DOT special permit. A copy of DOT Special Permit SP-11516 can be obtained by calling Falcon Safety Products, Inc. at 908-707-4900. |
| Transportation of Dangerous Goods (TDG - Canada) | Proper Shipping name: 1,1-Difluoroethane Hazard Class: 2.1 UN number: 1030 Packaging Exceptions: Limited quantity (containers up to 125mL) |
| IATA/ICAO (Air) | Proper Shipping Name: 1,1-Difuoroethane. Hazard Class: 2.1. UN Number: 1030. Maximum Net Quantity Packaging: Cargo Aircraft only - 150 kg maximum (forbidden on passenger aircraft). Maximum Net Quantity packaging cargo only: 150 kg. |
| IMDG (Marine Transport) | Proper Shipping Name: 1,1-DIFLUOROETHANE. Hazard Class: 2.1. UN Number: 1030. |
| Additional Information | TDG Canada: Falcon Safety Products has been granted Equivalency Certificate SU 9211 (ren. 1) by the TCSS, TDGD to offer for transport by road, rail and marine. |

## Section 15. Regulatory Information

| | |
|---|---|
| Canadian Federal Regulations | This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations. |
| WHMIS Status | Controlled |
| WHMIS Classification | Class A - Compressed Gas, Class B - Division 1 - Flammable Gas |
| TSCA | On the inventory, or in compliance with the inventory. |
| SARA 313 Regulated Chemical(s) | This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313. |
| US Federal Regulations | This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. |
| NJ Right to Know Regulated Chemical(s) | Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): 1,1-Difluoroethane. |
| California Prop. 65 | This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm. |
| Canada Domestic Substances List (DSL) | This product is listed on the DSL inventory list and complies with the inventory requirements administered by the governing country. |

## Section 16. Other Information

| | |
|---|---|
| Revision Date | 4/28/2015 |
| Disclaimer | Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or consequential damages which may result from the use of or reliance on any information contained in this document. |
| Prepared By | Falcon Safety Products, Inc. 908-707-4900 |

# ATTACHMENT 4

Gel Ice Pack

# SAFETY DATA SHEET

## Section 1: Identification

| | |
|---|---|
| Product Name: | Cold Packs |
| Distributor: | Uline Shipping Supplies<br>12575 Uline Drive<br>Pleasant Prairie, WI 53158 |
| Phone #: | (800) 295-5510 |
| Emergency Phone #: | Chemtrec: US- 1-800-424-9300, International- +1-703-527-3887 |
| Product Description: | Leak-proof, long lasting, viscous gel refrigerant made with non- toxic ingredients, listed as FDA GRAS, and packaged in white poly or foil laminated poly bags. |
| Recommended use: | Prevent thawing by packaging frozen Cold Packs along with product in a properly insulated container.<br>Prevent from freezing by packaging warmed Cold Packs along with product in a properly insulated container. |

## Section 2: Hazard Identification

| | |
|---|---|
| Emergency Overview: | A soft, clear, viscous gel that is sealed in a polyethylene bag and does not present a hazard in normal handling and transportation. |
| GHS Pictograms: | N / A |
| GHS Hazard Statements: | N /A |
| GHS Precautionary Statements: | P305+351+338: IF IN EYES, rinse cautiously with water for several minutes<br>Remove contact lenses if present and easy to do - continue rinsing<br>P301+352: IF ON SKIN, wash with soap and plenty of water.<br>P301+314: IF SWALLOWED, get medical advice if you feel unwell. |
| Other Information: | NFPA hazard rating: |

## Section 3: Composition / Information on Ingredients

| Material Component: | CAS Number: | Percentage: |
|---|---|---|
| 1. Water | N / A | 98% |
| 2. Carboxy Methyl Cellulose | 9004-32-4 | 2% |

## Section 4: First-Aid Measures

| | |
|---|---|
| Eyes: Skin: | Not normally required. Flush with water for approximately 15 minutes. |
| Inhalation: | Not normally required. Wash with soap and water. |
| Ingestion: | N / A |
| | Not normally required. If swallowed, get medical attention if symptoms appear. |

## Section 5: Fire-Fighting Measures

| | |
|---|---|
| Flash Point: | N / A |
| Flammable Limits: | N / A |
| Extinguishing Media: | N / A - Contains 98% water; non-flammable |
| Special Fire Fighting Procedures: | N / A |
| Unusual Fire and Explosion Hazards: | N / A |

## Section 6: Accidental Release Measures

| | |
|---|---|
| Large or small spills: | Product can create a slippery environment. Rinse with water and dispose of through the sewer in accordance with Federal, State and local regulations. |

## Section 7: Handling and Storage

| | |
|---|---|
| Handling Precautions: | Avoid any actions that would cause bags to be sliced or cut, in order to prevent spills. |
| Storage Precautions: | Do not exceed safe height when stacking cases, in order to prevent spills or falls. Do not stack pallets. |

## Section 8: Exposure Controls / Personal Protection

| | |
|---|---|
| Protective Gloves: | Not normally required. Wear if deemed appropriate. |
| Eye Protection: | Not normally required. Wear if deemed appropriate. |
| Other Protection: | N / A |

## Section 9: Physical and Chemical Properties

| | | | |
|---|---|---|---|
| Appearance: | A soft, clear, viscous gel that is sealed in a polyethylene bag. | | |
| Odor: | None | pH: | N / A |
| Vapor Pressure: | N / A | Vapor Density: | N / A |
| % Volatile by Volume: | 98% | % Solid by Weight: | 2% |
| Boiling Point: | N / A | Melting Point: | N / A |
| Specific Gravity: | Approx. 1.1 lbs/ft3 | Flash Point: | N / A |
| Evaporation Rate: | 1 | Solubility in Water: | Soluble in cold water |

## Section 10: Stability and Reactivity

| | |
|---|---|
| Stability: | Stable |
| Hazardous Polymerization: | Will not occur |
| Conditions to Avoid: | N / A |
| Incompatibility (materials to avoid): | Reactive with oxidizing agents |
| Hazardous Decomposition Products: | N / A |

## Section 11: Toxicological Information

General: Gel is non-toxic.

## Section 12: Ecological Information

General: This product itself and its products of degradation are non-toxic.

## Section 13: Disposal Considerations

Disposal: Place in a suitable container for disposal. Product is to be disposed of in accordance with Federal, State and local regulations.

## Section 14: Transport Information

| | | | |
|---|---|---|---|
| Proper Shipping Name: | Not regulated | DOT (US): | Not dangerous goods |
| Transport Hazard Class: | N / A | IMDG: | Not dangerous goods |
| ID Number: | N / A | IATA: | Not dangerous goods |
| Packing Group: | N / A | | |
| Marine Pollutant: | Not regulated by 49 CFR 172.101. | | |

## Section 15: Regulatory Information

| | |
|---|---|
| TSCA: | All components are listed or exempt from listing on the TSCA inventory. |
| CA prop 65: | This product contains no chemicals known to the state of California to cause cancer, birth defects or other reproductive harm. |

## Section 16: Other Information

| | | | |
|---|---|---|---|
| Last Revision Date | 1/26/2015 | Preparation Date | 1/4/2004 |

| | | |
|---|---|---|
| Key to abbreviations | N/A | Not available or not applicable |
| | GHS | Globally Harmonized System |
| | NFPA | National Fire Protection Association |
| | GRAS | Generally Recognized as Safe (FDA listing) |
| | FDA | U.S. Food and Drug Administration |
| | IMDG | International Maritime Dangerous Goods Code |
| | IATA | International Air Transport Association |
| | TSCA | Toxic Substances Control Act |

Notice to reader:

The information contained herein is believed to be accurate but is not warranted to be so. Data and calculations are based on information furnished by the manufacturer of the product and manufacturers of the components of the product. Users are advised to confirm in advance of need that information is correct, applicable and suited to the circumstance of use. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Furthermore, vendor assumes no responsibility for injury caused by abnormal use of this material even if reasonable safety procedures are followed.

## ATTACHMENT 5

# SDS - Generic ALCOHOL HAND SANITIZER

## SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

**Product name** : Alcohol Antiseptic 80% Topical Solution
Hand Sanitizer Non-sterile Solution

**Product Use** : Sanitizer

**Manufacturer or supplier's details**

**Company** : Insolcorp, LLC
24807 S Business 52, Albemarle NC 28001

**Address**

**Emergency telephone number:**

Health North America: (800) 509-2199

Transport North America: (800) 509-2199

**Additional Information:** : Responsible Party: Peter Horwath
E-Mail: info@insolcorp.com
SDS Requests: info@insolcorp.com
Website: www.insolcorppcm.com

---

## SECTION 2. HAZARDS IDENTIFICATION

### GHS Classification

Flammable liquids : Category 2

Eye irritation : Category 2A

Specific target organ toxicity - single exposure : Category 3 (Respiratory system, Central nervous system)

### GHS Label element

Hazard pictograms

Signal word: Danger

Hazard statements:
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H336 May cause drowsiness or dizziness.

Precautionary Statements:

**Prevention:**

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ eye protection/ face protection.
**Response:**
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
**Storage:**
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
**Disposal:**
P501 Dispose of contents/ container to an approved waste disposal plant.

**Potential Health Effects**

**Carcinogenicity:**

| | |
|---|---|
| **IARC** | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| **ACGIH** | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| **OSHA** | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |
| **NTP** | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |

**Emergency Overview**

| | |
|---|---|
| Appearance | liquid |
| Color | colourless |
| Odor | alcohol-like, sweet |

| | |
|---|---|
| Hazard Summary | No information available. |

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Hazardous components**

| CAS-No. | Chemical Name | Concentration (%) | Hazard |
|---|---|---|---|
| 64-17-5 | Ethanol | 80-90% | Flam. Liq. 2, Eye irrit.2A STOTSE 3 (Respiratory, CNS) |
| 7722-84-1 | Hydrogen peroxide | 0.125% | Ox. Liq. 1, H271 Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Inhalation), H332 Skin Corr. 1A, H314 |

All concentrations are in percent by weight unless otherwise indicated. Components not listed are either non-hazardous or are below reportable limits. Note this product lacks tert-butanol and has been denatured with denatonium benzoate only per FDA guidance in response to the COVID-19 pandemic and the current lack of tert-butanol.

## SECTION 4. FIRST AID MEASURES

| | | |
|---|---|---|
| General advice | : | Move out of dangerous area.<br>Show this safety data sheet to the doctor in attendance.<br>Do not leave the victim unattended. |
| If inhaled | : | If unconscious place in recovery position and seek medical advice.<br>If symptoms persist, call a physician. |
| In case of skin contact | : | If on skin, rinse well with water.<br>If on clothes, remove clothes. |
| In case of eye contact | : | Flush eyes with water as a precaution.<br>Remove contact lenses.<br>Protect unharmed eye.<br>Keep eye wide open while rinsing.<br>If eye irritation persists, consult a specialist. |
| If swallowed | : | Keep respiratory tract clear.<br>Do not give milk or alcoholic beverages.<br>Never give anything by mouth to an unconscious person.<br>If symptoms persist, call a physician. |

Most important symptoms/effects acute and delayed: Headache. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Coughing.

## SECTION 5. FIREFIGHTING MEASURES

| | | |
|---|---|---|
| Suitable extinguishing media | : | Alcohol-resistant foam<br>Carbon dioxide (CO2) |

| | | |
|---|---|---|
| | | Dry chemical |
| Unsuitable extinguishing media | : | High volume water jet |
| Specific hazards during firefighting | : | Do not allow run-off from fire fighting to enter drains or water courses. |
| Hazardous combustion products | : | No hazardous combustion products are known |
| Specific extinguishing methods | : | Use a water spray to cool fully closed containers. |
| Further information | : | Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.<br>For safety reasons in case of fire, cans should be stored separately in closed containments. |
| Special protective equipment for firefighters | : | Wear self-contained breathing apparatus for firefighting if necessary. |

**NFPA Flammable and Combustible Liquids Classification**:
Flammable Liquid Class IB

## SECTION 6. ACCIDENTAL RELEASE MEASURES

| | | |
|---|---|---|
| Personal precautions, protective equipment and emergency procedures | : | Ensure adequate ventilation.<br>Remove all sources of ignition.<br>Evacuate personnel to safe areas.<br>Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. |
| Environmental precautions | : | Prevent product from entering drains.<br>Prevent further leakage or spillage if safe to do so.<br>If the product contaminates rivers and lakes or drains inform respective authorities. |
| Methods and materials for containment and cleaning up | : | Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). |

## SECTION 7. HANDLING AND STORAGE

| | | |
|---|---|---|
| Advice on safe handling: | | Avoid formation of aerosol.<br>For personal protection see section 8.<br>Smoking, eating and drinking should be prohibited in the application area. |

| | |
|---|---|
| | Take precautionary measures against static discharges.<br>Provide sufficient air exchange and/or exhaust in work rooms.<br>Container may be opened only under exhaust ventilation hood.<br>Open drum carefully as content may be under pressure.<br>Dispose of rinse water in accordance with local and national regulations. |
| Conditions for safe storage: | No smoking.<br>Keep container tightly closed in a dry and well-ventilated place.<br>Containers which are opened must be carefully resealed and kept upright to prevent leakage.<br>Observe label precautions.<br>Electrical installations / working materials must comply with the technological safety standards. |

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

| CAS-No. | Components | Value type (Form of exposure) | Control parameters / Permissible concentration | Basis |
|---|---|---|---|---|
| 64-17-5 | Ethanol | TWA | 1,000 ppm | ACGIH |
| | | TWA | 1,000 ppm<br>1,900 mg/m3 | NIOSH REL |
| | | TWA | 1,000 ppm<br>1,900 mg/m3 | OSHA Z-1 |
| | | TWA | 1,000 ppm<br>1,900 mg/m3 | OSHA P0 |
| | | STEL | 1,000 ppm | ACGIH |
| 7722-84-1 | Hydrogen peroxide | TWA | 1 ppm<br>1.4 mg/m³ | ACGIH |
| | | TWA | 1 ppm<br>1.4 mg/m³ | OSHA |
| | | IDLH | 75 ppm | IDLH US |
| | | TWA | 1 ppm<br>1.4 mg/m³ | NIOSH |

**Personal protective equipment**

Respiratory protection : No personal respiratory protective equipment normally required.

Hand protection

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Eye protection : Eye wash bottle with pure water

| | | |
|---|---|---|
| | | Tightly fitting safety goggles |
| Skin and body protection | : | impervious clothing<br>Choose body protection according to the amount and concentration of the dangerous substance at the work place. |
| Hygiene measures | : | Wash hands before breaks and at the end of workday. |

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|---|---|---|
| Appearance | : | liquid |
| Color | | : colourless |
| Odor | : | alcohol-like, sweet |
| Odor Threshold | : | No data available |
| pH | : | No data available |
| Freezing Point (Melting point/range) | : | -114.1 °C (-173.4 °F) |
| Boiling Point (Boiling point/boiling range) | | 79 °C (174 °F)<br>(1013 hPa) |
| Flash point | : | 12 °C (54 °F) |
| Evaporation rate | : | Expected to be rapid |
| Flammability (solid, gas) | : | Not applicable |
| Burning rate | : | No data available |
| Upper explosion limit | : | 19 % (by volume 100% ethanol) |
| Lower explosion limit | : | 3.3 %(by volume 100% ethanol) |
| Vapor pressure | : | 60 hPa @ 20 °C (68 °F) |
| Relative vapor density | : | 1.6 |
| Relative density | : | 0.789 @ 20 °C (68 °F) |
| Density | : | 0.816 g/cm3 @ 20 °C (68 °F) |
| Bulk density | : | No data available |
| Solubility(ies) | | |
| Water solubility | : | completely soluble |
| Other solubilities | : | Miscible in many other organic solvents |
| Partition coefficient: n-octanol/water | : | No data available |
| Auto-ignition temperature | : | No data available |
| Thermal decomposition | : | No data available |
| Viscosity | : | Water thin |

## SECTION 10. STABILITY AND REACTIVITY

| | | |
|---|---|---|
| Reactivity | : | No dangerous reaction known under conditions of normal use. |
| Chemical stability | : | Stable under normal conditions. |
| Possibility of hazardous reactions | : | No hazards to be specially mentioned. |
| Conditions to avoid | : | Extremes of temperature and direct sunlight. |

| | | |
|---|---|---|
| | | Heat, flames and sparks. |
| Incompatible materials | : | Alkali metals<br>Ammonia<br>Oxidizing agents<br>peroxides |

## SECTION 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

**Information on likely routes of exposure**

**Inhalation:** Prolonged inhalation may be harmful.

**Skin contact:** Prolonged skin contact may cause temporary irritation.

**Eye contact:** Causes serious eye irritation.

**Ingestion:** Expected to be a low ingestion hazard due to denaturant.

**Product:**

Acute oral toxicity : Not expected to be acutely toxic.

**Components:**

**64-17-5: Ethanol**

**Aspiration toxicity**

**Components:**

**64-17-5:**

No aspiration toxicity classification

**Further information**

**Product:**

Remarks: Solvents may degrease the skin.

Skin corrosion/irritation: Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye: Causes serious eye irritation.
Respiratory or skin sensitization:
Not a respiratory sensitizer.
This product is not expected to cause skin sensitization.
Germ cell mutagenicity: No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity Not classifiable as to carcinogenicity to humans.
IARC Monographs. Overall Evaluation of Carcinogenicity: Not listed. Only drinking of alcoholic beverages is listed. Denaturing removes that risk.
NTP Report on Carcinogens: Not listed.
OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053): Not regulated.
Reproductive toxicity This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure: Not classified.
Specific target organ toxicity - repeated exposure: Not classified.
Aspiration hazard: Not an aspiration hazard.
Chronic effects: Prolonged inhalation may be harmful.

## SECTION 12. ECOLOGICAL INFORMATION

### Ecotoxicity

**Components:**

**64-17-5:**

| | | |
|---|---|---|
| Toxicity to fish | : | LC50 (Pimephales promelas (fathead minnow)): 15,300 mg/l<br>Exposure time: 96 h<br>Test Type: flow-through test |
| Toxicity to daphnia and other aquatic invertebrates | : | EC50 (Ceriodaphnia dubia): 5,012 mg/l<br>Exposure time: 48 h<br>Test Type: static test |
| Toxicity to algae | : | EC50 (Chlorella vulgaris (Fresh water algae)): 275 mg/l<br>End point: Growth rate<br>Exposure time: 72 h<br>Test Type: static test<br>Method: OECD Test Guideline 201<br>GLP: No data available |

### Persistence and degradability

**Components:**

**64-17-5:**

| | | |
|---|---|---|
| Biodegradability | : | Result: Readily biodegradable. |

### Bioaccumulative potential

**Components:**

**64-17-5:**

| | | |
|---|---|---|
| Bioaccumulation | : | Remarks: Bioaccumulation is unlikely. |

### Mobility in soil

No data available

### Other adverse effects

No data available

**Product:**

| | | |
|---|---|---|
| Regulation | | 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances |
| Remarks | | This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B). |
| Additional ecological information | : | No data available |

## SECTION 13. DISPOSAL CONSIDERATIONS

**Disposal methods**

| | | |
|---|---|---|
| Waste from residues | : | Dispose of in accordance with all applicable local, state and federal regulations.<br>For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact NEXEO's Environmental Services Group at 800-637-7922. |
| Contaminated packaging | : | Empty remaining contents.<br>Dispose of as unused product.<br>Do not re-use empty containers.<br>Do not burn, or use a cutting torch on, the empty drum. |

## SECTION 14. TRANSPORT INFORMATION

**IATA (International Air Transport Association)**: UN1170, ETHANOL, 3, II, Flash Point:12 °C(54 °F)

**IMDG (International Maritime Dangerous Goods):** UN1170, ETHANOL, 3, II

**DOT (Department of Transportation)**: UN1170, ETHANOL, 3, II

## SECTION 15. REGULATORY INFORMATION

| | | |
|---|---|---|
| **OSHA Hazards** | : | Flammable liquid, Moderate eye irritant, Moderate respiratory irritant |
| **WHMIS Classification** | : | B2: Flammable liquid<br>D2B: Toxic Material Causing Other Toxic Effects |

**EPCRA - Emergency Planning and Community Right-to-Know Act**

**CERCLA Reportable Quantity**

This material does not contain any components with a CERCLA RQ.

**SARA 304 Extremely Hazardous Substances Reportable Quantity**

This material does not contain any components with a section 304 EHS RQ.

| | | |
|---|---|---|
| **SARA 311/312 Hazards** | : | Fire Hazard<br>Acute Health Hazard |
| **SARA 302** | : | SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302. |
| **SARA 313** | : | SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313. |

**Clean Air Act**

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 12 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489):

| | | |
|---|---|---|
| 64-17-5 | Ethanol | ≥ 80 % |

**Clean Water Act**

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

**US State Regulations**

**Massachusetts Right To Know**

| | | |
|---|---|---|
| 64-17-5 | Ethanol | 80 - 95 % |

**Pennsylvania Right To Know**

| | | |
|---|---|---|
| 64-17-5 | Ethanol | 80 - 95 % |

**New Jersey Right To Know**

| | | |
|---|---|---|
| 64-17-5 | Ethanol | 80 - 95 % |

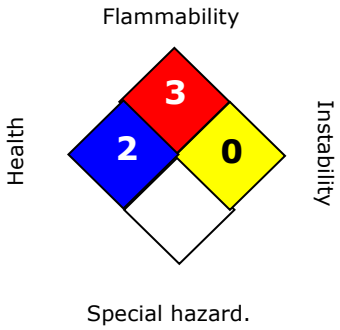
| | |
|---|---|
| **California Prop 65** | WARNING! This product contains a chemical known to the State of California to cause cancer. |
| 75-07-0 | Acetaldehyde |

**The components of this product are reported in the United States TSCA Inventory**

## SECTION 16. OTHER INFORMATION

### Further information

**NFPA:**




**HMIS III:**

| | |
|---|---|
| **HEALTH** | **2** |
| **FLAMMABILITY** | **3** |
| **PHYSICAL HAZARD** | **0** |

0 = not significant, 1 =Slight,

2 = Moderate, 3 = High

4 =Extreme, * = Chronic

The information provided is based on the data we are aware of and is believed to be correct as of the date of creation. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date of creation, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Company Name company email.

Revision Date Add date.

## ATTACHMENT 6

SDS - Hand Warmer Air Activated Packet

# SAFETY DATA SHEET

## Section 1: Identification

**Product identifier used on the label;**

**Product name:** Air-activated heating packs of various styles
(HotHands warmers, hand warmers, body warmers, foot warmers, insole foot warmers, toe warmers, pocket warmers, super warmers, seat warmers, clothing adhesive warmers, biodegradable warmers, shipping warmers, and food warmers.)

**Other means of identification;**

Heating pad wrapped in plastic film, Air-activated disposable warmers

**Recommended use of the chemical and restrictions on use;**

**Recommended use:** Air-Activated Disposable Warmer
**Restrictions on use:** No Applicable Information Available

**Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party;**

**Name:** Heatmax Inc
**Department in Charge:** Consumer Relations Dept.
**Address:** 245 Kraft drive, Dalton, GA 30721, USA
**Telephone number:** 7062261800
**Fax number:** 7065297705
**e-mail address:** kcp_compliance@kobayashi.com

**Emergency phone number**

7062261800

## Section 2: Hazard(s) identification

**Classification of the chemical in accordance with paragraph (d) of §1910.1200;**

**Physical Hazards**

Not classified

**Health Hazards**

Not classified

**Environmental Hazards**

Not classified

**Other Hazards**

No Applicable Information Available

**Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200;**

**Symbol(s)** No Applicable Information Available

| | |
|---|---|
| **Signal word** | No Applicable Information Available |
| **Hazard Statement(s)** | No Applicable Information Available |
| **Precautionary Statement(s)** | No Applicable Information Available |

**Description of any hazards not otherwise classified;**

General caution: powdered materials may ignite, under certain conditions.
May generate heat if the contents removed from the bag.

**Ingredient with unknown acute toxicity in the mixture**

No Applicable Information Available

## Section 3: Composition/information on ingredients

**Compositions (contents of the product)***

| Chemical name | CAS No. | Concentration/concentration ranges (wt %) |
|---|---|---|
| Iron powder | 7439-89-6 | 50-60 |
| Activated charcoal | 7440-44-0 | 5-10 |
| Vermiculite | 1318-00-9 | 5-10 |
| Water-absorbent resin | 9003-04-7 | 1-5 |
| Sodium chloride | 7647-14-5 | 1-5 |
| Water | 7732-18-5 | 30-40 |

*This product consists of the non-woven fabric and the heating element.
Contents of the heating element are described in this table.
Exact concentrations have been withheld as a trade secret.

## Section 4: First-aid measures

**Necessary first-aid measures by relevant routes of exposure;**

| | |
|---|---|
| IF INHALED | Remove victim to fresh air and keep at rest in a position comfortable for breathing.<br>If symptoms continue, call a doctor/physician. |
| IF ON SKIN | Rinse with plenty of water and soap.<br>If symptoms continue, call a doctor/physician. |
| IF IN EYES | Immediately rinse cautiously with water for 15 - 20 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If symptoms continue, call a doctor/physician. |
| IF SWALLOWED | Rinse mouth. Immediately get medical advice/attention. |

**Most important symptoms/effects, acute and delayed;**

No Applicable Information Available

**Indication of immediate medical attention and special treatment needed, if necessary;**

No Applicable Information Available

## Section 5: Fire-fighting measures

**Suitable (and unsuitable) extinguishing media;**

**Suitable extinguishing media:**

Use dry sand, dry chemical powder, fire foam or carbon dioxide.

**Unsuitable extinguishing media**

Do not use water to extinguish fire.

**Specific hazards arising from the chemical;**

General caution: powdered materials may ignite, under certain conditions.

**Special protective equipment and precautions for fire-fighters;**

Cut off any ignition sources and extinguish with an appropriate agent.
Take action upwind from the source.

## Section 6: Accidental release measures

**Personal precautions, protective equipment, and emergency procedures;**

Avoid release into the environment because product may cause local effects.

**Methods and materials for containment and cleaning up;**

Sweep up materials or vacuum using a vacuum cleaner so as not to cause dust, then place material in a container of water.
ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
Prevent flow of material into drains, sewers, basements or closed areas.

## Section 7: Handling and storage

**Precautions for safe handling**

**Protective measures:**

Do not use for other than Recommended use.
Avoid the generation of dust.

**Advice on general occupational hygiene:**

Wash contaminated clothing before reuse.

**Conditions for safe storage, including any incompatibilities**

**Technical measures:**

Take precautionary measures against static discharge.

**Incompatible materials:**

Oxidizing agents

**Conditions for safe storage:**

Avoid storing in direct sunlight, high temperature and high humidity. Store at room temperature.

**Packing material:**

Use a sealed container without damage or leakage.

## Section 8: Exposure controls/personal protection

**Occupational Exposure Limits;**

| | |
|---|---|
| OSHA PEL-TWA | 5 mg/$m^3$ (Respirable fraction)<br>15 mg/$m^3$ (Total dust) |
| ACGIH TLV (2014) | 3 mg/$m^3$ (Insoluble respirable particles not other specified)<br>10 mg/$m^3$ (Insoluble inhalable particles not other specified) |

**Appropriate engineering controls;**

In a work place where dusts generate, ensure to use sealed instrument or local ventilation.

**Individual protection measures, such as personal protective equipment;**

| | |
|---|---|
| Respiratory protection | In case of dust generation, wear appropriate protective mask or air aspirator as required. |
| Hand protection | If hand contact is possible, wear protective gloves. |
| Eye protection | Wear safety glasses or goggles if in eyes. |
| Skin and body protection | Wear protective clothing and apron if necessary. |

## Section 9: Physical and chemical properties

| | |
|---|---|
| Appearance (physical state, color, etc.) | White sheet (contents: black) |
| Odor | odorless |
| Odor threshold | No Applicable Information Available |
| pH | unmeasurable |
| Melting point/freezing point | No Applicable Information Available |
| Initial boiling point and boiling range | No Applicable Information Available |
| Flash point | No Applicable Information Available |
| Evaporation rate | No Applicable Information Available |
| Flammability (solid, gas) | No Applicable Information Available |
| Upper/lower flammability or explosive limits | No Applicable Information Available |
| Vapor pressure | No Applicable Information Available |
| Vapor density | No Applicable Information Available |
| Relative density | No Applicable Information Available |
| Solubility (ies) | No Applicable Information Available |
| Partition coefficient: *n*-octanol/water | No Applicable Information Available |
| Auto-ignition temperature | No Applicable Information Available |
| Decomposition temperature | No Applicable Information Available |
| Viscosity | No Applicable Information Available |

**Other information**

No Applicable Information Available

## Section 10: Stability and reactivity

**Reactivity**

Stable under normal handling condition.

**Chemical stability**

Stable under normal handling condition.

**Possibility of hazardous reactions**

No hazardous reaction expected under normal handling.

**Conditions to avoid**

Avoid storing in direct sunlight, high temperature and high humidity.

**Incompatible materials**

Oxidizing agents

**Hazardous decomposition products**

In case of fire, toxic decomposition products may be generated.

## Section 11: Toxicological information

**Information on the likely routes of exposure (inhalation, ingestion, skin, and eye contact);**

No Applicable Information Available

**Symptoms related to the physical, chemical and toxicological characteristics;**

Information on product:

Acute toxicity (oral): Rat $LD_{50} > 2{,}000$ mg/kg

Information on ingredients:

No Applicable Information Available

**Delayed and immediate effects and also chronic effects from short- and long-term exposure;**

No Applicable Information Available

**Numerical measures of toxicity (such as acute toxicity estimates);**

No Applicable Information Available

**Whether the chemical is listed in the NTP Report on Carcinogens or has been found to be a potential carcinogen in the IARC Monographs, or by OSHA;**

IARC: Not listed
NTP Report: Not listed
OSHA: Not listed

## Section 12: Ecological information

**Ecotoxicity:**

| | |
|---|---|
| Information on product: | No Applicable Information Available |
| Information on ingredients: | No Applicable Information Available |

**Persistence and degradability:**

| | |
|---|---|
| Information on product: | No Applicable Information Available |
| Information on ingredients: | No Applicable Information Available |

**Bioaccumulative potential:**

| | |
|---|---|
| Information on product: | No Applicable Information Available |
| Information on ingredients: | No Applicable Information Available |

**Mobility in soil:**

| | |
|---|---|
| Information on product: | No Applicable Information Available |
| Information on ingredients: | No Applicable Information Available |

**Other adverse effects:**

No information

## Section 13: Disposal considerations

**Waste treatment methods**

Dispose of waste in accordance with applicable local, regional and international regulations and standards.

When disposing, consult a certificated waste trader or local offices if they deal with the waste.

Used container should be recycled after cleaning or dispose of in compliance with related laws and local regulations.

Contents should be removed completely prior to disposal of empty containers.

## Section 14: Transport information

| | |
|---|---|
| **UN number** | No Applicable Information Available |
| **UN proper shipping name** | No Applicable Information Available |
| **Transport hazard class(es)** | No Applicable Information Available |
| **Packing group** | No Applicable Information Available |
| **Environmental hazards** | No Applicable Information Available |

**Transport in bulk according to Annex II of MARPOL 73/78 and IBC code**

No Applicable Information Available

**Special precautions for user**

When transporting, avoid direct sunlight. Confirm no leakage to containers. When loading, prevent containers from falling, dropping or damaging. Take preventive measures of collapse.

## Section 15: Regulatory information

| | |
|---|---|
| **OSHA:** | Not hazardous chemical |
| **TSCA inventory:** | All ingredients except vermiculite in this product are listed on the TSCA Inventory. |
| **TSCA SNUR:** | Not listed |
| **SARA Title III:** | Section 302 (Extremely Hazardous Substances): Not listed<br>Section 304 (Hazardous Substances): Not listed<br>Section 313 (TRI Chemicals): Not listed |
| **Clean Air Act:** | This product does not contain any substances regulated as hazardous air pollutants under Section 112 of the Clean Air Act. |
| **Clean Water Act:** | This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act. |

## Section 16: Other information, including date of preparation or last revision

**Update history:**

Date of issue: April 10, 2015

**References:**

Information of KOBAYASHI Pharmaceutical Co., Ltd.
ACGIH, American Conference of Governmental Industrial Hygienists (2014) TLVs and BEIs.

**[Disclaimer]**

This SDS has been prepared based on the best available information however, it may not be sufficient in some cases. It is user's responsibility to modify or update any contents in this SDS regarding information on hazardous properties and/or instruction for safe handling of the product when they become available. Precautionary measures in this SDS are only applicable for normal handling conditions and it is necessary to take appropriate additional measures to ensure safe handling which depend on your specific use conditions or situations.

## ATTACHMENT 7

SDS - Kidde Multipurpose ABC Fire Extinguisher

# SAFETY DATA SHEET
## Kidde 90 Multi-Purpose ABC Dry Chemical (Fire Extinguishing Agent, Pressurized and Non-pressurized)

## 1. IDENTIFICATION

| | |
|---|---|
| **Product Name** | Kidde 90 Multi-Purpose ABC Dry Chemical (Fire Extinguishing Agent, Pressurized and Non-pressurized) |
| **Other Names** | ABC, Ammonium Phosphate, Monoammonium Phosphate, Tri-Class |
| **Recommended use of the chemical and restrictions on use** | |
| **Identified uses** | Fire Extinguishing Agent |
| **Restrictions on use** | Consult applicable fire protection codes |
| **Company Identification** | Kidde Residential & Commercial<br>1016 Corporate Park Drive<br>Mebane, NC 27302<br>USA |
| **Customer Information Number** | (919) 563-5911<br>(919) 304-8200 |
| **Emergency Telephone Number** | |
| **CHEMTREC Number** | (800) 424-9300<br>(703) 527-3887 (International) |
| **Issue Date** | December 10, 2019 |
| **Supersedes Date** | July 8, 2019 |

*Safety Data Sheet prepared in accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200, the Canadian Hazardous Products Regulations (HPR) and the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*

## 2. HAZARD IDENTIFICATION

**This SDS covers the product listed above as sold in pressurized and non-pressurized containers. GHS classifications for both forms are listed below.**

**GHS Classification – Pressurized**

**Hazard Classification**
Gas under pressure – Compressed gas

**Label Elements**
Hazard Symbols

Signal Word: Warning

**Hazard Statements**
Contents under pressure; may explode if heated.

**Precautionary Statements**
**Prevention**
None

## 2. HAZARD IDENTIFICATION

**Response**
None
**Storage**
Protect from sunlight.
Store in well-ventilated place.
**Disposal**
None

**GHS Classification: Non - pressurized**

**Hazard Classification**
This product is classified as not hazardous in accordance with the Globally Harmonized System of Classification and Labelling (GHS).

**Label Elements**
Hazard Symbols
None

Signal Word: None

**Hazard Statements**
None

**Precautionary Statements**
**Prevention**
None
**Response**
None
**Storage**
None
**Disposal**
None

**Other Hazards**
Mica may contain small quantities of quartz (crystalline silica) as an impurity. Prolonged exposure to respirable crystalline silica dust at concentrations exceeding the occupational exposure limits may increase the risk of developing a disabling lung disease known as silicosis. IARC found limited evidence for pulmonary carcinogenicity of crystalline silica in humans.

**Specific Concentration Limits**
The values listed below represent the percentages of ingredients of unknown toxicity.

| | |
|---|---|
| Acute oral toxicity | < 10% |
| Acute dermal toxicity | < 10% |
| Acute inhalation toxicity | < 10% |
| Acute aquatic toxicity | < 10% |

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

This product is a mixture.

| Component | CAS Number | Concentration* |
|---|---|---|
| Calcium Carbonate | 471-34-1 | 1 – 5% |
| Clay | 1332-58-7 | 0.5 – 1.5% |
| Mica | 12001-26-2 | 0.5 – 1.5% |
| **Non-hazardous ingredients** | | |
| Monoammonium Phosphate | 7722-76-1 | 80 – 100% |

**Note: Pressurized product uses nitrogen or compressed air as the expellant.**

*Exact concentration withheld as trade secret.

## 4. FIRST- AID MEASURES

**Description of necessary first-aid measures**
**Eyes**
Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.
**Skin**
Wash skin thoroughly with soap and water. Obtain medical attention if irritation persists.
**Ingestion**
Dilute by drinking large quantities of water and obtain medical attention.
**Inhalation**
Move victim to fresh air. Obtain medical attention immediately for any breathing difficulty.

**Most important symptoms/effects, acute and delayed**
Aside from the information found under Description of necessary first aid measures (above) and Indication of immediate medical attention and special treatment needed, no additional symptoms and effects are anticipated.

**Indication of immediate medical attention and special treatment needed**
**Notes to Physicians**
Treat symptomatically.

## 5. FIRE - FIGHTING MEASURES

**Suitable Extinguishing Media**
This preparation is used as an extinguishing agent and therefore is not a problem when trying to control a fire. Use extinguishing agent appropriate to other materials involved. Keep pressurized containers and surroundings cool with water spray as they may rupture or burst in the heat of a fire.

**Specific hazards arising from the chemical**
Pressurized containers may explode in heat of fire.

**Special Protective Actions for Fire-Fighters**
Wear full protective clothing and self-contained breathing apparatus as appropriate for specific fire conditions.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**
Wear appropriate protective clothing. Prevent skin and eye contact. Remove leaking container to a safe place. Ventilate the area.

**Environmental Precautions**
Prevent large quantities of the material from entering drains or watercourses.

**Methods and materials for containment and cleaning up**
Sweep up or vacuum and transfer into suitable containers for recovery or disposal.

## 7. HANDLING AND STORAGE

**Precautions for safe handling**
Wear appropriate protective clothing. Prevent skin and eye contact.

**Conditions for safe storage**
Pressurized containers should be properly stored and secured to prevent falling or being knocked over. Do not drag, slide or roll pressurized containers. Do not drop pressurized containers or permit them to strike against each other. Never apply flame or localized heat directly to any part of the pressurized or plastic container. Store pressurized and plastic containers away from high heat sources. Storage area should be: - cool - dry - well ventilated - under cover - out of direct sunlight

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**
Exposure limits are listed below, if they exist.
**Calcium Carbonate**
OSHA PEL: 15 mg/m3 TWA, total dust
5 mg/m3 TWA, respirable fraction
**Mica**
ACGIH TLV: 3 mg/m3 TWA, measured as respirable fraction of the aerosol.
OSHA PEL: 20 mppcf, <1% crystalline silica
**Kaolin**
ACGIH TLV: 2 mg/m3 TWA, for particulate matter containing no asbestos and <1% Crystalline silica
OSHA PEL: 15 mg/m3 TWA, total dust
5 mg/m3 TWA, respirable fraction
**Particulates not otherwise classified /regulated**
OSHA PEL: 50 mppcf or 15 mg/m3 TWA, total dust
15 mppcf or 5 mg/m3 TWA, respirable fraction

**Appropriate engineering controls**
Use with adequate ventilation. If this product is used in a pressurized system, there should be local procedures for the selection, training, inspection and maintenance of this equipment. When used in large volumes, use local exhaust ventilation.

**Individual protection measures**
**Respiratory Protection**
Not normally required. Use dust mask where dustiness is prevalent, or TLV is exceeded. In oxygen deficient atmospheres, use a self contained breathing apparatus, as an air purifying respirator will not provide protection.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Skin Protection**
Gloves
**Eye/Face Protection**
Chemical goggles or safety glasses with side shields.
**Body Protection**
Normal work wear.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Non- Pressurized**

| | |
|---|---|
| **Appearance** | |
| **Physical State** | Solid (powder) |
| **Color** | Pale Yellow |
| **Odor** | Odorless |
| **Odor Threshold** | No data available |
| **pH** | Not applicable |
| **Specific Gravity** | No data available |
| **Boiling Range/Point (°C/F)** | Not applicable |
| **Melting Point (°C/F)** | No data available |
| **Flash Point (PMCC) (°C/F)** | Not flammable |
| **Vapor Pressure** | No data available |
| **Evaporation Rate (BuAc=1)** | No data available |
| **Solubility in Water** | No data available |
| **Vapor Density (Air = 1)** | Not applicable |
| **VOC (g/l)** | None |
| **VOC (%)** | None |
| **Partition coefficient (n-octanol/water)** | No data available |
| **Viscosity** | No data available |
| **Auto-ignition Temperature** | No data available |
| **Decomposition Temperature** | No data available |
| **Upper explosive limit** | No data available |
| **Lower explosive limit** | No data available |
| **Flammability (solid, gas)** | No data available |

**Expellant - Nitrogen**

| | |
|---|---|
| **Appearance** | |
| **Physical State** | Compressed gas |
| **Color** | Colorless |
| **Odor** | None |
| **Odor Threshold** | No data available |
| **pH** | Not applicable |
| **Specific Gravity** | 0.075 lb/ft$^3$ @70°F as vapor |
| **Boiling Range/Point (°C/F)** | -196˚C/-321˚F |
| **Melting Point (°C/F)** | -210˚C/-346˚F |
| **Flash Point (PMCC) (°C/F)** | Not flammable |
| **Vapor Pressure** | No data available |
| **Evaporation Rate (BuAc=1)** | Not applicable |
| **Solubility in Water** | 0.02 g/L |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Vapor Density (Air = 1)** | 0.97 |
| **VOC (g/l)** | Not applicable |
| **VOC (%)** | Not applicable |
| **Partition coefficient (n-octanol/water)** | No data available |
| **Viscosity** | Not applicable |
| **Auto-ignition Temperature** | No data available |
| **Decomposition Temperature** | No data available |
| **Upper explosive limit** | Not explosive |
| **Lower explosive limit** | Not explosive |
| **Flammability (solid, gas)** | Not flammable |

## 10. STABILITY AND REACTIVITY

**Reactivity**
Pressurized containers may rupture or explode if exposed to heat.

**Chemical Stability**
Stable under normal conditions.

**Possibility of hazardous reactions**
Hazardous polymerization will not occur.

**Conditions to Avoid**
Exposure to direct sunlight - contact with incompatible materials

**Incompatible Materials**
Strong oxidizing agents - strong acids - sodium hypochlorite

**Hazardous Decomposition Products**
Oxides of carbon - ammonia - oxides of phosphorus - nitrogen oxides

## 11. TOXICOLOGICAL INFORMATION

**Acute Toxicity**
Mica:
Oral LD50 (Rat) >2000 mg/kg
Kaolin (clay):
Oral LD50 (Rat) >5000 mg/kg
Dermal LD50 (Rabbit) >5000mg/kg
Nitrogen
Simple asphyxiant

**Specific Target Organ Toxicity (STOT) – single exposure**
Nitrogen: Exposure to nitrogen gas at high concentrations can cause suffocation by reducing oxygen available for breathing. Breathing very high concentrations can cause dizziness, shortness of breath, unconsciousness or asphyxiation.

**Specific Target Organ Toxicity (STOT) – repeat exposure**
No relevant studies identified.

## 11. TOXICOLOGICAL INFORMATION

**Serious Eye damage/Irritation**
Mica: Not irritating (rabbit)

**Skin Corrosion/Irritation**
Mica: Not irritating (rabbit)

**Respiratory or Skin Sensitization**
No relevant studies identified.

**Carcinogenicity**
Mica may contain small quantities of quartz (crystalline silica) as an impurity. Prolonged exposure to respirable crystalline silica dust at concentrations exceeding the occupational exposure limits may increase the risk of developing a disabling lung disease known as silicosis. IARC has classified Silica Dust, Crystalline, in the form of quartz or cristobalite as 1 (carcinogenic to humans).

**Germ Cell Mutagenicity**
No relevant studies identified.

**Reproductive Toxicity**
No relevant studies identified.

**Aspiration Hazard**
Not an aspiration hazard.

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**
No relevant studies identified.

**Mobility in soil**
No relevant studies identified.

**Persistence/Degradability**
No relevant studies identified.

**Bioaccumulative Potential**
No relevant studies identified.

**Other adverse effects**
No relevant studies identified.

## 13. DISPOSAL CONSIDERATIONS

**Disposal Methods**
Dispose of container in accordance with all applicable local and national regulations.

## 14. TRANSPORT INFORMATION

Safety Data Sheet information is intended to address a specific material and not various forms or states of containment.

Special Precautions for Shipping:
Individuals must be certified as Hazardous Material Shipper for all transportation modes.
Pressurized Fire Extinguishers are considered a hazardous material by the US Department of Transportation and Transport Canada.

| | |
|---|---|
| **DOT CFR 172.101 Data** | Fire extinguishers, 2.2, UN1044 |
| **UN Proper Shipping Name** | Fire extinguishers |
| **UN Class** | (2.2) |
| **UN Number** | UN1044 |
| **UN Packaging Group** | Not applicable |
| **Classification for AIR Transportation (IATA)** | Consult current IATA Regulations prior to shipping by air. |
| **Classification for Water Transport IMDG** | Consult current IMDG Regulations prior to shipping by water. |

When shipping via ground, portable fire extinguishers pressurized to less than 241 psi and of less than 1100 cubic inches in size meet the requirements of "Limited Quantity" as referenced in 49 CFR 173.309 (2010). There is no limited quantity designation for fire extinguishers when shipped by air or water.

This section is believed to be accurate at the time of preparation. It is not intended to be a complete statement or summary of the applicable laws, rules, or hazardous material regulations, and is subject to change. Users have the responsibility to confirm compliance with all laws, rules, and hazardous material regulations in effect at the time of shipping.

## 15. REGULATORY INFORMATION

**United States TSCA Inventory**
This product contains ingredients that are listed on or exempt from listing on the EPA Toxic Substance Control Act Chemical Substance Inventory.

**Canada DSL Inventory**
All ingredients in this product are listed on the Domestic Substance List (DSL) or the Non-Domestic Substance List (NDSL) or are exempt from listing.

**SARA Title III Sect. 311/312 Categorization: Pressurized**
Gas under pressure
**SARA Title III Sect. 311/312 Categorization: Non-pressurized**
None

**SARA Title III Sect. 313**
This product does not contain any chemicals that are listed in Section 313 at or above de minimis concentrations.

## 16. OTHER INFORMATION

**NFPA Ratings**
NFPA Code for Health - 1
NFPA Code for Flammability - 0
NFPA Code for Reactivity - 0
NFPA Code for Special Hazards - None

**Legend**
ACGIH: American Conference of Governmental Industrial Hygienists
CAS#: Chemical Abstracts Service Number
EC50: Effect Concentration 50%
IARC: International Agency for Research on Cancer
LC50: Lethal Concentration 50%
LD50: Lethal Dose 50%
N/A: Denotes no applicable information found or available
OSHA: Occupational Safety and Health Administration
PEL: Permissible Exposure Limit
STEL: Short Term Exposure Limit
TLV: Threshold Limit Value
TSCA: Toxic Substance Control Act

Revision Date: December 10, 2019
Replaces: July 8, 2019
Changes made: Update to Sections 3 and 9.

**Information Source and References**
This SDS is prepared by Hazard Communication Specialists based on information provided by internal company references.
**Prepared By:** EnviroNet LLC.

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## ATTACHMENT 8

SDS - OFF! - Deep Woods Bug Spray

# OFF!® DEEP WOODS® INSECT REPELLENT V

Version *0*.0 Print Date 09/06/2016

Revision Date 00/00/0000 SDS Number 350000004807

## 1. PRODUCT AND COMPANY IDENTIFICATION

**Product information**

**Product name** : **OFF!® DEEP WOODS® INSECT REPELLENT V**

**Recommended use** : Insect Repellent

**Manufacturer, importer, supplier** : S.C. Johnson & Son, Inc.
1525 Howe Street
Racine WI 53403-2236

**Telephone** : +18005585252

**Emergency telephone number** : 24 Hour Medical Emergency Phone: (866)231-5406
24 Hour International Emergency Phone: (703)527-3887
24 Hour Transport Emergency Phone: (800)424-9300

## 2. HAZARDS IDENTIFICATION

**Classification of the substance or mixture**

**Globally Harmonized System (GHS) Classification**

| Hazard classification | Hazard category | Hazards identification |
|---|---|---|
| Aerosol | Category 1 | Extremely flammable aerosol. |
| Gases under pressure | Liquefied gas | Contains gas under pressure; may explode if heated. |

**Labelling**

**Hazard symbols**
Flame
Gas cylinder

**Signal word**
Danger

**Hazard statements**
Extremely flammable aerosol.
Contains gas under pressure; may explode if heated.

**Precautionary statements**
Protect from sunlight. Do not expose to temperatures exceeding 50 °C/ 122 °F.
Protect from sunlight. Store in a well-ventilated place.

Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Do not spray on an open flame or other ignition source.
Do not pierce or burn, even after use.

**Other hazards** : None identified

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

| Chemical Name | CAS-No. | Weight percent |
|---|---|---|
| Ethyl alcohol | 64-17-5 | 30.00 - 60.00 |
| N,N-Diethyl-m-toluamide | 134-62-3 | 10.00 - 30.00 |
| Butane | 106-97-8 | 1.00 - 5.00 |
| Propane | 74-98-6 | 1.00 - 5.00 |
| Isobutane | 75-28-5 | 1.00 - 5.00 |

The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

For additional information on product ingredients, see www.whatsinsidescjohnson.com.

## 4. FIRST AID MEASURES

**Eye contact** : No special requirements

**Skin contact** : If you suspect a reaction to this product, discontinue use and remove contaminated clothing.

**Inhalation** : No special requirements.

**Ingestion** : No special requirements

## 5. FIREFIGHTING MEASURES

**Suitable extinguishing media** : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Specific hazards during firefighting** : Aerosol Product - Containers may rocket or explode in heat of fire. Do not allow run-off from fire fighting to enter drains or

water courses.

**Further information** : Fight fire from maximum distance or protected area. Cool and use caution when approaching or handling fire-exposed containers. Wear full protective clothing and positive pressure self-contained breathing apparatus. In case of fire and/or explosion do not breathe fumes.

**NFPA Classification** : NFPA Level 2 Aerosol

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions** : Remove all sources of ignition.
Wear personal protective equipment.
Wash thoroughly after handling.

**Environmental precautions** : Do not flush into surface water or sanitary sewer system.
Use appropriate containment to avoid environmental contamination.
Outside of normal use, avoid release to the environment.

**Methods and materials for containment and cleaning up** : If damage occurs to aerosol can:
Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).
Use only non-sparking equipment.
Dike large spills.
Clean residue from spill site.

## 7. HANDLING AND STORAGE

**Handling**

**Precautions for safe handling** : Avoid contact with eyes and lips.
For personal protection see section 8.
Use only as directed.
KEEP OUT OF REACH OF CHILDREN AND PETS.
Pressurized container.
Do not pierce or burn, even after use.

**Advice on protection** : Keep away from sources of ignition - No smoking.

**against fire and explosion** Do not spray on an open flame or other ignition source.

**Storage**

**Requirements for storage areas and containers** : Protect from sunlight. Do not expose to temperatures exceeding 50 °C/ 122 °F.
Keep away from food, drink and animal feedingstuffs.
Keep in a dry, cool and well-ventilated place.

**Other data** : Stable under recommended storage conditions.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Occupational Exposure Limits**

| Components | CAS-No. | mg/m3 | ppm | Non-standard units | Basis |
|---|---|---|---|---|---|
| Ethyl alcohol | 64-17-5 | 1,900 mg/m3 | 1,000 ppm | - | OSHA TWA |
| Ethyl alcohol | 64-17-5 | - | 1,000 ppm | - | ACGIH STEL |
| Butane | 106-97-8 | - | 1,000 ppm | - | ACGIH STEL |
| Propane | 74-98-6 | 1,800 mg/m3 | 1,000 ppm | - | OSHA TWA |
| Propane | 74-98-6 | - | - | - | ACGIH TWA |
| Isobutane | 75-28-5 | - | 1,000 ppm | - | ACGIH STEL |

**Personal protective equipment**

**Respiratory protection** : Do not spray in enclosed areas.

**Hand protection** : No special requirements.

**Eye protection** : No special requirements.

| | | |
|---|---|---|
| **Skin and body protection** | : | No special requirements. |
| **Hygiene measures** | : | Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly after handling. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|---|---|---|
| **Form** | : | aerosol |
| **Form** | : | Compressed gas |
| **Color** | : | clear |
| **Odor** | : | Alcohol Odor |
| **Odour Threshold** | : | No data available |
| **pH** | : | No data available |
| **Melting point/freezing point** | : | No data available |
| **Initial boiling point and boiling range** | : | No data available |
| **Flash point** | : | -7 °C<br>19.4 °F |
| **Evaporation rate** | : | No data available |
| **Flammability (solid, gas)** | : | No data available |
| **Upper/lower flammability or explosive limits** | : | No data available |

| | | |
|---|---|---|
| **Vapour pressure** | : | No data available |
| **Vapour density** | : | No data available |
| **Relative density** | : | 0.84 g/ml at 21 °C |
| **Solubility(ies)** | : | slightly soluble |
| **Partition coefficient: n-octanol/water** | : | No data available |
| **Auto-ignition temperature** | : | No data available |
| **Decomposition temperature** | : | No data available |
| **Viscosity, dynamic** | : | No data available |
| **Viscosity, kinematic** | : | No data available |
| **Oxidizing properties** | : | No data available |
| **Volatile Organic Compounds Total VOC (wt. %)*** | : | 64.2 % - additional exemptions may apply<br>*as defined by US Federal and State Consumer Product Regulations |
| **Other information** | : | None identified : |

## 10. STABILITY AND REACTIVITY

| | | |
|---|---|---|
| **Possibility of hazardous reactions** | : | Stable under recommended storage conditions. |

**Conditions to avoid** : Heat, flames and sparks.

**Incompatible materials** : Strong oxidizing agents

**Hazardous decomposition products** : Thermal decomposition can lead to release of irritating gases and vapours.

## 11. TOXICOLOGICAL INFORMATION

**Emergency Overview** : Danger

**Acute oral toxicity** :
**Acute inhalation toxicity** :

**Acute dermal toxicity** :

| GHS Properties | Classification | Routes of entry |
|---|---|---|
| Acute toxicity | No classification proposed | - |
| Skin corrosion/irritation | No classification proposed | - |
| Serious eye damage/eye irritation | No classification proposed | - |
| Skin sensitisation | No classification proposed | - |
| Respiratory sensitisation | No classification proposed | - |
| Germ cell mutagenicity | No classification proposed | - |
| Carcinogenicity | No classification proposed | - |
| Reproductive toxicity | No classification proposed | - |
| Specific target organ toxicity - single exposure | No classification proposed | - |
| Specific target organ toxicity - repeated exposure | No classification proposed | - |

| | | |
|---|---|---|
| Aspiration hazard | No classification proposed | - |

**Aggravated Medical Condition** :

## 12. ECOLOGICAL INFORMATION

**Product :** The product itself has not been tested.

**Toxicity**
The ingredients in this formula have been reviewed and no adverse impact to the environment is expected when used according to label directions.

**Toxicity to fish**

| Components | End point | Species | Value | Exposure time |
|---|---|---|---|---|
| Ethyl alcohol | LC50 | Fish | 11,200 mg/l | 96 h |
| N,N-Diethyl-m-toluamide | static test LC50 | Oncorhynchus mykiss (rainbow trout) | 71.25 mg/l | 96 h |
| Butane | LC50 QSAR | Fish | 27.98 mg/l | 96 h |
| Propane | LC50 | Fish | 27.98 mg/l | 96 h |
| Isobutane | LC50 QSAR | Fish | 27.98 mg/l | 96 h |

**Toxicity to aquatic invertebrates**

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| Components | End point | Species | Value | Exposure time |
|---|---|---|---|---|
| Ethyl alcohol | static test LC50 | Ceriodaphnia dubia | 5,012 mg/l | 48 h |
| | NOEC | Daphnia magna | 9.6 mg/l | 9 d |
| N,N-Diethyl-m-toluamide | LC50 | Daphnia magna (Water flea) | 75 mg/l | 51 h |
| | semi-static test NOEC Measured OECD Guideline 211 (Daphnia magna Reproduction Test) | Daphnia magna | 3.7 mg/l | 21 d |
| Butane | No data available | | | |
| Propane | LC50 | Daphnid | 14.22 mg/l | 48 h |
| Isobutane | LC50 QSAR | Daphnid | 16.33 mg/l | 48 h |

**Toxicity to aquatic plants**

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| Components | End point | Species | Value | Exposure time |
|---|---|---|---|---|
| Ethyl alcohol | Static EC50 | Chlorella vulgaris (Fresh water algae) | 275 mg/l | 72 h |
| N,N-Diethyl-m-toluamide | NOEC | Pseudokirchneriella subcapitata (green algae) | 0.521 mg/l | 96 h |
| Butane | EC50 QSAR | Green algae | 7.71 mg/l | 96 h |
| Propane | No data available | | | |
| Isobutane | EC50 QSAR | Green algae | 8.57 mg/l | 96 h |

**Persistence and degradability**

| Component | Biodegradation | Exposure time | Summary |
|---|---|---|---|
| Ethyl alcohol | 97 % | 28 d | Readily biodegradable |
| N,N-Diethyl-m-toluamide | 83.8 % | 28 d | Readily biodegradable |
| Butane | 100 % | 385.5 h | Readily biodegradable |
| Propane | 70 % | < 10 d | Readily biodegradable |
| Isobutane | 70 % | < 10 d | Readily biodegradable |

**Bioaccumulative potential**

| Component | Bioconcentration factor (BCF) | Partition Coefficient n-Octanol/water (log) |
|---|---|---|
| Ethyl alcohol | 3.2 estimated | -0.35 Measured |
| N,N-Diethyl-m-toluamide | 21.9 estimated | 2.4 |
| Butane | No data available | 2.89 |
| Propane | No data available | 2.36 |
| Isobutane | 1.57 - 1.97 | 2.8 |

**Mobility**

| Component | End point | Value |
|---|---|---|
| Ethyl alcohol | No data available | |
| N,N-Diethyl-m-toluamide | Koc | 43.3 |
| Butane | No data available | |
| Propane | No data available | |
| Isobutane | No data available | |

**PBT and vPvB assessment**

| Component | Results |
|---|---|
| Ethyl alcohol | Not fulfilling PBT and vPvB criteria |
| N,N-Diethyl-m-toluamide | Not fulfilling PBT and vPvB criteria |
| Butane | Not fulfilling PBT and vPvB criteria |
| Propane | Not fulfilling PBT and vPvB criteria |
| Isobutane | Not fulfilling PBT and vPvB criteria |

**Other adverse effects** : None known.

## 13. DISPOSAL CONSIDERATIONS

PESTICIDAL WASTE:
For disposal information, please read and follow Disposal instructions on the pesticide label.
Consumer may discard empty container in household waste, or recycle where facilities exist.
PESTICIDAL WASTE:
Observe all applicable Federal, Provincial and State regulations and Local/Municipal ordinances regarding disposal.

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## 14. TRANSPORT INFORMATION

Please refer to the Bill of Lading/receiving documents for up-to-date shipping information.

| | Land transport | Sea transport | Air transport |
|---|---|---|---|
| **UN number** | 1950 | 1950 | 1950 |
| **UN proper shipping name** | AEROSOLS, Flammable | AEROSOLS, Flammable | AEROSOLS, Flammable |
| **Transport hazard class(es)** | 2.1 | 2 | 2.1 |
| **Packing group** | - | - | - |
| **Environmental hazards** | - | - | - |
| **Special precautions for user** | Limited quantities derogation may be applicable to this product, please check transport documents. | Limited quantities derogation may be applicable to this product, please check transport documents. | Limited quantities derogation may be applicable to this product, please check transport documents. |

## 15. REGULATORY INFORMATION

**FIFRA Labeling**

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals.

Following is the hazard information as required on the pesticide label:

CAUTION:
Causes moderate eye irritation.
Harmful if swallowed.
Use of this product may cause skin reactions in rare cases.
Flammable.
Contents under pressure.
Exposure to temperatures above 120° F may cause bursting.

**Notification status** : All ingredients of this product are listed or are excluded from

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listing on the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

**Notification status** : All ingredients of this product comply with the New Substances Notification requirements under the Canadian Environmental Protection Act (CEPA).

**California Prop. 65** : This product is not subject to the reporting requirements under California's Proposition 65.

**Registration # / Agency**
4822-167/US/EPA

### 16. OTHER INFORMATION

**HMIS Ratings**

| | |
|---|---|
| **Health** | 2 |
| **Flammability** | 4 |
| **Reactivity** | 0 |

**NFPA Ratings**

| | |
|---|---|
| **Health** | 2 |
| **Fire** | 4 |
| **Reactivity** | 0 |
| **Special** | - |

This information is being provided in accordance with the Occupational Safety and Health Administration (OSHA) regulation (29 CFR 1910.1200). The information supplied is designed for workplaces where product use and frequency of exposure exceeds that established for the labeled consumer use.

**Further information**

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| | |
|---|---|
| Prepared by | SC Johnson Global Safety Assessment & Regulatory Affairs (GSARA) |

## ATTACHMENT 9

SDS - PB Blaster-Penetrating-Catalyst

# SAFETY DATA SHEET

## Section 1: IDENTIFICATION

### 1.1 PRODUCT IDENTIFIER

**Product Name:** PB Penetrating Catalyst (Bulk)

**Product Code:** 128-PB, 5-PB, 55-PB & 4-PB-DB

### 1.2 RECOMMENDED USE OF CHEMICAL AND RESTRICTIONS ON USE

**Use:** Lubricant

### 1.3 DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET

**Name/Address:** The Blaster Corporation
8500 Sweet Valley Drive
Valley View, Ohio 44125 - USA

**Telephone Number:** T (216) 901-5800
F (216) 901-5801

### 1.4 EMERGENCY TELEPHONE NUMBER

**Emergency Telephone Number:** ChemTel 800-255-3924

**Date of Preparation:** Feb. 3, 2016 **Version #:** 1.0

## Section 2: HAZARD(S) IDENTIFICATION

### 2.1 CLASSIFICATION OF THE CHEMICAL ACCORDING TO OSHA HAZCOM 2012

**Hazard class**

Flammable Liquid 4
Serious Eye Irritation 2A
Carcinogenicity 2
Aspiration Hazard 1

### 2.2 LABEL ELEMENTS ACCORDING TO OSHA HAZCOM 2012

**Hazard Pictogram:**

**Signal Word:** Danger

**Hazard Statement:** Combustible liquid. Causes serious eye irritation. Suspected of causing cancer. May be fatal if swallowed and enters airways.

**Prevention:** Keep away from flames and hot surfaces. – No smoking. Wash hands thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.

**Response:** If exposed or concerned: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If swallowed: Immediately

call a poison center/doctor. Do NOT induce vomiting.

**Storage:** Store in a well-ventilated place. Keep cool. Store locked up.

**Disposal:** Dispose of contents and container in accordance with all local, regional, national and international regulations.

### 2.3 ADDITIONAL INFORMATION

**Hazards not otherwise classified:** Not applicable.

1% of the mixture consists of ingredient(s) of unknown acute toxicity.

This product is a hazardous chemical as defined by NOM-018-STPS-2000.

**Mexico Classification:**

**Blue = Health Red = Flammability Yellow = Reactivity White = Special**

**Hazard Rating:** 0 = minimal, 1 = slight, 2 = moderate, 3 = severe, 4 = extreme

## Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 MIXTURES

| Ingredient | UN # | H / F/ R / * | CAS No | Wt. % |
|---|---|---|---|---|
| Distillates (petroleum), hydrotreated light | Not available | Not available | 64742-47-8 | 45 - 55 |
| Solvent naphtha (petroleum), heavy aromatic | UN1270 | Not available | 64742-94-5 | 20 - 30 |
| Distillates (petroleum), hydrotreated heavy naphthenic | Not available | Not available | 64742-52-5 | 20 - 30 |
| Naphthalene | UN1334/ UN2304 | 2/2/0 | 91-20-3 | 0.2 - 2.1 |
| Dinonylphenol, ethoxylated, phosphated | Not available | Not available | 39464-64-7 | 0.5 - 1.5 |

The exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (i) of §1910.1200.

* Per NOM-018-STPS-2000

## Section 4: FIRST- AID MEASURES

### 4.1 DESCRIPTION OF THE FIRST AID MEASURE

**Eye:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. If irritation persists, get medical attention.

**Skin:** In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician if irritation develops and persists.

**Inhalation:** If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Get medical advice/attention if you feel unwell.

**Ingestion:** If swallowed, do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

### 4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

**Eye:** Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

**Skin:** May cause skin irritation. Symptoms may include redness, drying, defatting and cracking of the skin.

**Inhalation:** May be fatal if swallowed and enters airways. This product may be aspirated into the lungs and cause chemical pneumonitis. May cause stomach distress, nausea or vomiting.

**Ingestion:** May cause respiratory tract irritation.

### 4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENTS NEEDED

**Note to Physicians:** Symptoms may not appear immediately.

**Specific Treatments:** In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

## Section 5: FIRE-FIGHTING MEASURES

### 5.1 EXTINGUISHING MEDIA

**Suitable Extinguishing Media:** Dry chemical, carbon dioxide or foam.

**Unsuitable Extinguishing Media:** Water may be ineffective for extinguishing fire.

### 5.2 SPECIAL HAZARDS ARISING FROM THE CHEMICAL

**Products of Combustion:** May include, and are not limited to: oxides of carbon, hydrocarbons.

### 5.3 SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIRE FIGHTERS

Keep upwind of fire. Wear full fire fighting turn-out gear (full Bunker gear) and respiratory protection (SCBA). Cool closed containers exposed to fire with water. Do not use a solid water stream as it may scatter and spread fire. Containers may explode when heated.

## Section 6: ACCIDENTAL RELEASE MEASURES

### 6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Eliminate sources of ignition.

### 6.2 METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING - UP

**Methods for Containment:** Contain and/or absorb spill with inert material (e.g. sand, vermiculite), then place in a suitable container. Do not flush to sewer or allow to enter waterways. Use appropriate Personal Protective Equipment (PPE).

**Methods for Cleaning-Up:** Scoop up material and place in a disposal container. Vapors may be heavier than air and may travel along the ground to a distant ignition source and flash back. Provide ventilation.

## Section 7: HANDLING AND STORAGE

### 7.1 PRECAUTIONS FOR SAFE HANDLING

**Handling:** Keep away from sources of ignition. - No smoking. Avoid contact with skin and eyes. Avoid breathing dust/fume/gas/mist/vapours/spray. Do not swallow. Handle and open container with care. When using do not eat, drink or smoke. Use only outdoors or in a well-ventilated area. (See section 8)

**General Hygiene Advice:** Launder contaminated clothing before reuse. Wash hands before eating, drinking, or smoking.

### 7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

**Storage:** Keep locked up and out of reach of children. Keep container tightly closed. Do not expose to temperatures exceeding 50 °C/ 122 °F. Store in dry, cool, well-ventilated area. (See section 10)

## Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 CONTROL PARAMETERS

**Exposure Guidelines**

| Occupational Exposure Limits | | |
|---|---|---|
| **Ingredient** | **OSHA-PEL** | **ACGIH-TLV** |
| | | |
| Distillates (petroleum), hydrotreated light | 100 ppm | 200 mg/m³ |
| Solvent naphtha (petroleum), heavy aromatic | Not available. | Not available. |
| Distillates (petroleum), hydrotreated heavy naphthenic | 5 mg/m³ (mist) | 5 mg/m³ (mist) |
| Naphthalene | 10 ppm; 50 mg/m$^3$ | 10 ppm |
| Dinonylphenol, ethoxylated, phosphated | Not available. | Not available. |

### 8.2 EXPOSURE CONTROLS

**Engineering Controls:** Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapor, etc.) below recommended exposure limits.

### 8.3 INDIVIDUAL PROTECTIVE MEASURES

**Personal Protective Equipment:**

**Eye/Face Protection:** Safety glasses with side-shields.

**Skin Protection:**

**Hand Protection:** Wear chemically resistant protective gloves.

**Body Protection:** Wear suitable protective clothing.

**Respiratory Protection:** A NIOSH approved respirator is recommended in poorly ventilated areas or when permissible exposure limits may be exceeded. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

# SAFETY DATA SHEET

| | |
|---|---|
| **General Health and Safety Measures:** | Do not eat, smoke or drink where material is handled, processed or stored. Wash hands carefully before eating or smoking. Handle according to established industrial hygiene and safety practices. Ensure that eyewash stations and safety showers are close to the workstation location. |

## Section 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Appearance:** | Viscous / Oily. |
| **Color:** | Orange. |
| **Odor:** | Heavy aromatic. |
| **Odor Threshold:** | Not available. |
| **Physical State:** | Liquid. |
| **pH:** | Not available. |
| **Melting Point/Freezing Point:** | Not available. |
| **Initial Boiling Point and Boiling Range:** | 177.8 °C (352 °F) |
| **Flash Point:** | 65.6 °C (150 °F) |
| **Evaporation Rate:** | >1 (n-butyl acetate = 1) |
| **Flammability:** | Flammable. |
| **Lower Flammability/Explosive Limit:** | Not available. |
| **Upper Flammability/Explosive Limit:** | Not available. |
| **Vapor Pressure:** | Not available. |
| **Vapor Density:** | >1 (Air = 1) |
| **Relative Density/Specific Gravity:** | 0.91 (Water = 1) |
| **Solubility:** | Negligible. |
| **Partition coefficient: n-octanol/water:** | Not available. |
| **Auto-ignition Temperature:** | Not available. |
| **Decomposition Temperature:** | Not available. |
| **Viscosity:** | Not available. |
| **Oxidizing Properties:** | Not available. |
| **Explosive Properties:** | Not available. |
| **VOC content:** | < 50% |

## Section 10: STABILITY AND REACTIVITY

### 10.1 REACTIVITY

No dangerous reaction known under conditions of normal use.

### 10.2 CHEMICAL STABILITY

Stable under normal storage conditions.

### 10.3 POSSIBILITY OF HAZARDOUS REACTIONS

No dangerous reaction known under conditions of normal use.

### 10.4 CONDITIONS TO AVOID

Heat. Incompatible materials. Sources of ignition. Excessive water.

### 10.5 INCOMPATIBLE MATERIALS

Strong oxidizing agents. Strong reducing agents. Moisture.

### 10.6 HAZARDOUS DECOMPOSITION PRODUCTS

May include, and are not limited to: oxides of carbon, hydrocarbons.

## Section 11: TOXICOLOGICAL INFORMATION

### 11.1 INFORMATION ON TOXICOLOGICAL EFFECTS

**Likely Routes of Exposure:** Skin contact, eye contact, inhalation, and ingestion.

**Symptoms related to physical/chemical/toxicological characteristics:**

**Eye:** Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

**Skin:** May cause skin irritation. Symptoms may include redness, drying, defatting and cracking of the skin.

**Ingestion:** May be fatal if swallowed and enters airways. This product may be aspirated into the lungs and cause chemical pneumonitis. May cause stomach distress, nausea or vomiting.

**Inhalation:** May cause respiratory tract irritation.

**Acute Toxicity:**

| Ingredient | IDLH | LC50 | LD50 |
|---|---|---|---|
| Distillates (petroleum), hydrotreated light | Not available. | Inhalation >5.2 mg/L 4h, rat | Oral >5000 mg/kg, rat; Dermal >2000 mg/kg, rabbit |
| Solvent naphtha (petroleum), heavy aromatic | Not available. | Inhalation >5.28 mg/L 4h, rat | Oral >5000 mg/kg, rat; Dermal >2000 mg/kg, rabbit |
| Distillates (petroleum), hydrotreated heavy naphthenic | Not available. | Inhalation >5.0 mg/L 4h, rat | Oral >5000 mg/kg, rat; Dermal >5000 mg/kg, rabbit |
| Naphthalene | 250 ppm | Not available. | Oral 490 mg/kg, rat; Dermal >2500 mg/kg, rat; Dermal >20 g/kg, rabbit |
| Dinonylphenol, ethoxylated, phosphated | Not available. | Not available. | Not available. |

| Calculated overall Chemical Acute Toxicity Values | | |
|---|---|---|
| LC50 (inhalation) | LD50 (oral) | LD50 (dermal) |
| Not available. | > 2000 mg/kg, rat | > 2000 mg/kg, rabbit |

| Ingredient | Chemical Listed as Carcinogen or Potential Carcinogen (NTP, IARC, OSHA, ACGIH, CP65)* |
|---|---|
| Distillates (petroleum), hydrotreated light | Not listed. |
| Solvent naphtha (petroleum), heavy aromatic | Not listed. |
| Distillates (petroleum), hydrotreated heavy naphthenic | Not listed. |
| Naphthalene | G-A4, I-2B, N-2, CP65 |
| Dinonylphenol, ethoxylated, phosphated | Not listed. |

* See Section 15 for more information.

### 11.2 DELAYED, IMMEDIATE, AND CHRONIC EFFECTS OF SHORT- AND LONG-TERM EXPOSURE

**Skin Corrosion/Irritation:** Based on available data, the classification criteria are not met.

**Serious Eye Damage/Irritation:** Causes serious eye irritation.

**Respiratory Sensitization:** Based on available data, the classification criteria are not met.

**Skin Sensitization:** Based on available data, the classification criteria are not met.

**STOT-Single Exposure:** Based on available data, the classification criteria are not met.

**Chronic Health Effects:**

**Carcinogenicity:** Possible carcinogen.

**Germ Cell Mutagenicity:** Based on available data, the classification criteria are not met.

**Reproductive Toxicity:**

**Developmental:** Based on available data, the classification criteria are not met.

**Fertility:** Based on available data, the classification criteria are not met.

**STOT-Repeated Exposure:** Based on available data, the classification criteria are not met.

**Aspiration Hazard:** May be fatal if swallowed and enters airways.

**Other Information:** Not available.

## Section 12: ECOLOGICAL INFORMATION

### 12.1 ECOTOXICITY

**Acute/Chronic Toxicity:** May cause long-term adverse effects in the aquatic environment.

### 12.2 PERSISTENCE AND DEGRADABILITY

Not available.

### 12.3 BIOACCUMULATIVE POTENTIAL

**Bioaccumulation:** Not available.

### 12.4 MOBILITY IN SOIL

Not available.

### 12.5 OTHER ADVERSE EFFECTS

Not available.

## Section 13: DISPOSAL CONSIDERATIONS

### 13.1 WASTE TREATMENT METHODS

| | |
|---|---|
| **Disposal Method:** | This material must be disposed of in accordance with all local, state, provincial, and federal regulations. The generation of waste should be avoided or minimized wherever possible. |
| **Other disposal recommendations:** | Handle empty containers with care because residual vapours are flammable. |

## Section 14: TRANSPORT INFORMATION

### 14.1 UN NUMBER

| DOT | NOM-004-SCT2-1994 |
|---|---|
| NA 1993 | Not regulated. |

### 14.2 UN PROPER SHIPPING NAME

| DOT | NOM-004-SCT2-1994 |
|---|---|
| Combustible liquid, n.o.s. (Petroleum distillate) | Not applicable. |

### 14.3 TRANSPORT HAZARD CLASS (ES)

| DOT | NOM-004-SCT2-1994 |
|---|---|
| 3 | Not applicable. |

### 14.4 PACKING GROUP

| DOT | NOM-004-SCT2-1994 |
|---|---|
| III | Not applicable. |

### 14.5 ENVIRONMENTAL HAZARDS

Not available.

### 14.6 TRANSPORT IN BULK ACCORDING TO ANNEX II OF MARPOL 73/78 AND THE IBC CODE

Not available.

### 14.7 SPECIAL PRECAUTIONS FOR USER

Do not handle until all safety precautions have been read and understood.

## Section 15: REGULATORY INFORMATION

### 15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/ LEGISLATIONS SPECIFIC FOR THE CHEMICAL

**US:** SDS prepared pursuant to the Hazard Communication Standard (CFR29 1910.1200) HazCom 2012

**Mexico:** SDS prepared pursuant to NOM-018-STPS-2000.

| SARA Title III | | | | |
|---|---|---|---|---|
| **Ingredient** | **Section 302 (EHS) TPQ (lbs.)** | **Section 304 EHS RQ (lbs.)** | **CERCLA RQ (lbs.)** | **Section 313** |
| Distillates (petroleum), hydrotreated light | Not listed. | Not listed. | Not listed. | Not listed. |
| Solvent naphtha (petroleum), heavy aromatic | Not listed. | Not listed. | Not listed. | Not listed. |
| Distillates (petroleum), hydrotreated heavy naphthenic | Not listed. | Not listed. | Not listed. | Not listed. |
| Naphthalene | Not listed. | Not listed. | 100 | 313 |
| Dinonylphenol, ethoxylated, phosphated | Not listed. | Not listed. | Not listed. | Not listed. |

**State Regulations**

**California Proposition 65:**

This product contains a chemical known to the State of California to cause cancer.

**Global Inventories:**

| **Ingredient** | **USA TSCA** |
|---|---|
| Distillates (petroleum), hydrotreated light | Yes. |
| Solvent naphtha (petroleum), heavy aromatic | Yes. |
| Distillates (petroleum), hydrotreated heavy naphthenic | Yes. |
| Naphthalene | Yes. |
| Dinonylphenol, ethoxylated, phosphated | Yes. |

| NFPA-National Fire Protection Association: | |
|---|---|
| **Health:** | 2 |
| **Fire:** | 2 |
| **Reactivity:** | 0 |

| HMIS-Hazardous Materials Identification System: | |
|---|---|
| **Health:** | 2* |
| **Fire:** | 2 |
| **Physical Hazard:** | 0 |

**Hazard Rating:** 0 = minimal, 1 = slight, 2 = moderate, 3 = severe, 4 = extreme

**SOURCE AGENCY CARCINOGEN CLASSIFICATIONS:**

**CP65** **California Proposition 65**

**OSHA (O)** **Occupational Safety and Health Administration.**

**ACGIH (G)** **American Conference of Governmental Industrial Hygienists.**
A1 - Confirmed human carcinogen.
A2 - Suspected human carcinogen.
A3 - Animal carcinogen.
A4 - Not classifiable as a human carcinogen.
A5 - Not suspected as a human carcinogen.

**IARC (I)** **International Agency for Research on Cancer.**
1 - The agent (mixture) is carcinogenic to humans.
2A - The agent (mixture) is probably carcinogenic to humans; there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.

2B - The agent (mixture) is possibly carcinogenic to humans; there is limited evidence of carcinogenicity in humans in the absence of sufficient evidence of carcinogenicity in experimental animals.
3 - The agent (mixture, exposure circumstance) is not classifiable as to its carcinogenicity to humans.
4 - The agent (mixture, exposure circumstance) is probably not carcinogenic to humans.

**NTP (N)** **National Toxicology Program.**
1 - Known to be carcinogens.
2 - Reasonably anticipated to be carcinogens.

## Section 16: OTHER INFORMATION

**Date of Preparation:** Feb. 3, 2016

**Version:** 1.0

**Revision Date:** Dec. 13, 2017

**Disclaimer:** We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind. The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for the user's own particular use.

# End of Safety Data Sheet

## ATTACHMENT 10

SDS - Permethrin Insect Repellent (Clothing and Gear)

## 1 IDENTIFICATION OF THE PREPARATION AND COMPANY

| | |
|---|---|
| Product Name: | Sawyer Permethrin Insect Repellent(s): Clothing & Gear |
| EPA Reg. No.: | 50404-3-58188 |
| Product Code(s): | SP649, SP657, SP647, SP652, SP653, PH647, RB648 |
| Application: | Pump / Liquid Insecticide/Repellent for use on clothing |
| Supplier: | Sawyer Products, Inc.<br>605 7th Avenue North<br>P.O. Box 188<br>Safety Harbor, FL 34695 |
| E-mail: | feedback@sawyer.com |
| Website: | http://sawyer.com |
| Telephone Number: | 800-356-7811 (M-F, 9-5, EST) |

## 2 HAZARD IDENTIFICATION

| | |
|---|---|
| Classification of Preparation: | None. |
| Primary Hazards: | R50/53: Very toxic to aquatic organisms, may cause long-term adverse affects in the aquatic environment. |

## 3 COMPOSITION / INFORMATION ON INGREDIENTS

Product Description: Dangerous preparation according to EU directive 1999/45EC:
Information of Hazardous Substances:

| Substance Name | Concentration | CAS Number | EC Number | Symbols | R-Phrases |
|---|---|---|---|---|---|
| Permethrin | 0.50%w/w | 52645-53-1 | 258-067-9 | Xn, R50/53 | R22 |

Reference is made to Chapter 16 for full test of each relevant R phrase. Occupational exposure limit(s), if relevant, are listed in Section 8.

## 4 FIRST-AID MEASURES

| | |
|---|---|
| Any Special Measure: | None. |
| First Aid Measures – | |
| If Swallowed: | Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person. |
| If Inhaled: | Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for treatment advice. |
| Skin Contact: | Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. |
| If In Eyes: | Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice. |

## 5 FIRE-FIGHTING MEASURES

Extinguishing Media –

Suitable: Carbon dioxide ($CO_2$), Dry chemical, Foam, Water

Not Suitable: As appropriate for surrounding fire.

Special Exposure Hazards: None known.

Hazardous Thermal Decomposition Products: None.

Special Protective Equipment for Firefighters: Use adequate respiratory equipment in case of insufficient ventilation.

## 6 ACCIDENTAL RELEASE MEASURES

| | |
|---|---|
| Personal Precautions: | Avoid contact with face, eyes, or skin. Avoid breathing vapors or spray mist. Harmful if swallowed. Wash thoroughly after handling and before eating or smoking. Do not use on humans. |
| Environmental Precautions: | This product is extremely toxic to fish and other aquatic organisms. Do not apply directly to water. Do not contaminate water when disposing of equipment washwaters.<br>Large Spills: Contain with a dike. |
| Methods for Clean-up: | Absorb residues in sand or other inert material. Collect spilled material in containers. Call your local solid waste agency for disposal instructions. |
| Other Information: | Notify Authorities if any exposure to the general public or the environment occurs or is likely to occur. |

## 7 HANDLING AND STORAGE

| | |
|---|---|
| Handling: | Handle in accordance with good occupational hygiene and safety practices in well-ventilated areas. |
| Storage: | Keep in a cool, dry and well-ventilated place (< 95°F)(< 35°C). Do not store where temperature falls below (32°F)(0°C). Protect from sunlight. Keep away from food, drink and animal feedstuff. |
| Recommended Packaging: | Keep only in the original packaging. |
| Use: | Use insecticides safely. Always read the label and product information before use. |

## 8 EXPOSURE CONTROL/PERSONAL PROTECTION

Engineering Measure: Use only in well-ventilated areas. Comply with standard precautionary measures for working with chemicals.
Hygienic Measures: When using do not eat, drink or smoke.
Occupational Exposure Limits: Occupational exposure limits have not been established for this product.
Workplace exposure limits (mg/m³): Not determined for this product.
Personal Protective Equipment: Exposure limits: non-assigned. As a consumer use product there is no requirement for personal protection.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Appearance: | Liquid |
| Color: | Milky white |
| Odor: | Slight (Characteristic) |
| pH: | 6.0 – 7.0 |
| Flash Point (TCC): | >200°F (>93°C) |
| Specific Gravity: | 0.995 |
| Pounds/Gallon: | 8.31 |
| Solubility (Oil): | Negligible |
| Solubility (Water): | Miscible |
| Shelf Life: | 5-years |

## 10 STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to avoid: Do not store when Temperature exceeds (< 95°F)(< 35°C) or falls below (32°F)(0°C).
Materials to avoid: None.
Hazardous Decomposition Products: No known.
Reactivity: None.

## 11 TOXICOLOGICAL INFORMATION

Symptoms of Overexposure for Each Potential Route of Exposure:

Inhaled: None.
Contact with skin or eyes: None.
Absorbed through skin: None.
Swallowed: None.
Health effects or risk from exposure: Acute: *None established* Chronic: *None established*

## 12 ECOLOGICAL INFORMATION*

No Ecotoxicological research has been carried out on this product.

| | |
|---|---|
| Eco Toxicity: | LD50 quail >675g/kg, LC50 96hr fish (Guppy) = 0.38mg/l, EC50 48hr daphnia = 0.0085mg/l, EC50 72hr algae = 25mg/l. |
| Mobility: | Not specified. |
| Persistence – degradability: | Data given in this section are for the active ingredient: Soil DT50<28 days. Water DT50 6 TO 24 HOURS (ponds & streams), 7 Days (pond sediment). |
| Bioaccumulative potential: | Not specified. |

**Extrapolated from Technical Concentrate*

## 13 DISPOSAL CONSIDERATION

| | |
|---|---|
| Product residues: | Replace cap, wrap clean, empty container in several layers of newspaper, and discard container in rubbish. Containers may be recycled. Treat product residues and non-empty pack as hazardous waste. |
| Additional warning: | None. |

## 14 TRANSPORT INFORMATION

This preparation is not classified as a Dangerous Goods for Transport.

| | |
|---|---|
| Proper Shipping Name: | Insect Repellent/Clothing Treatment |
| | Not Restricted. |

## 15 REGULATORY INFORMATION

TSCA (Toxic Substances Control Act) Regulations, 40CFR710: This preparation is a pesticide and is exempt from TSCA regulation.

CERCLA and SARA Regulations (40CFR355, 370, 372): this preparation does not contain any chemicals subject to the reporting requirements of SARA Sec. 313.

This preparation is classified and labelled in accordance with the Control of Pesticides Regulations (1986) and EU DIRECTIVE 1999/45/EC.

DANGEROUS FOR THE ENVIRONMENT

R50/53: Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.
S29: Do not empty into drains.

**To avoid risks to man and the environment, comply with the instructions for use.**

## 16 OTHER INFORMATION

Prepared in accordance with OSHA Hazard Communication Standard (HCS) to conform to the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

The information in this safety data sheet is compiled in compliance with Regulation (EC) 1907/2006.

This product is intended for consumer (amateur) use only.

The information given in this safety data sheet is correct to the best of our knowledge at the date of issue. It is intended as a guide for the safe use, handling, disposal, storage and transportation and is not intended as warranty or as a specification. Recipients of our products must take responsibility for observing the law and regulations. The information relates only to the product supplied and may not be suitable for use with other product materials other than those described within.

Sawyer Products, Inc. disclaims any liability for loss or damage resulting from the use of this data, information suggestions.

## ATTACHMENT 11

SDS - Rust-Oleum Inverted Marking Paint - Fluorescent Orange

# Safety Data Sheet

RUST-OLEUM CORPORATION
* Trusted Quality Since 1921 *
www.rustoleum.com

## 1. Identification

| | | | |
|---|---|---|---|
| **Product Name:** | PRO LSPR 6PK MARK FLUORESCENT ORANGE | **Revision Date:** | 4/2/2020 |
| **Product Identifier:** | 2554838 | **Supercedes Date:** | 5/12/2017 |
| **Recommended Use:** | Marking Paint/Aerosols | | |
| **Supplier:** | Rust-Oleum Corporation<br>11 Hawthorn Parkway<br>Vernon Hills, IL 60061<br>USA | **Manufacturer:** | Rust-Oleum Corporation<br>11 Hawthorn Parkway<br>Vernon Hills, IL 60061<br>USA |
| **Preparer:** | Regulatory Department | | |
| **Emergency Telephone:** | 24 Hour Hotline: 847-367-7700 | | |

## 2. Hazard Identification

### Classification

**Symbol(s) of Product**

**Signal Word**
Danger

**Possible Hazards**
27% of the mixture consists of ingredient(s) of unknown acute toxicity.

**GHS HAZARD STATEMENTS**

| | | |
|---|---|---|
| Flammable Aerosol, category 1 | H222 | Extremely flammable aerosol. |
| Compressed Gas | H280 | Contains gas under pressure; may explode if heated. |
| Carcinogenicity, category 2 | H351 | Suspected of causing cancer. |
| STOT, repeated exposure, category 2 | H373 | May cause damage to organs through prolonged or repeated exposure. |

**GHS LABEL PRECAUTIONARY STATEMENTS**

| | |
|---|---|
| P210 | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. NO SMOKING. |
| P211 | Do not spray on an open flame or other ignition source. |
| P251 | Do not pierce or burn, even after use. |
| P410+P412 | Protect from sunlight. Do not expose to temperatures exceeding 50°C / 122°F. |
| P410+P403 | Protect from sunlight. Store in a well-ventilated place. |
| P201 | Obtain special instructions before use. |
| P280 | Wear protective gloves/protective clothing/eye protection/face protection. |
| P308+P313 | IF exposed or concerned: Get medical advice/attention. |
| P405 | Store locked up. |
| P501 | Dispose of contents/container in accordance with local, regional and national regulations. |

| | |
|---|---|
| P260 | Do not breathe dust/fume/gas/mist/vapors/spray. |
| P314 | Get medical advice/attention if you feel unwell. |

## 3. Composition / Information On Ingredients

HAZARDOUS SUBSTANCES

| Chemical Name | CAS-No. | Wt.% Range | GHS Symbols | GHS Statements |
|---|---|---|---|---|
| Propane | 74-98-6 | 10-25 | GHS04 | H280 |
| n-Butane | 106-97-8 | 2.5-10 | GHS04 | H280 |
| Naphtha, Petroleum, Hydrotreated Light | 64742-49-0 | 2.5-10 | GHS08 | H304 |
| Hydrotreated Light Distillate | 64742-47-8 | 2.5-10 | GHS08 | H304 |
| Xylenes (o-, m-, p- Isomers) | 1330-20-7 | 2.5-10 | GHS02-GHS07 | H226-315-319-332 |
| Barium Sulfate | 7727-43-7 | 2.5-10 | GHS07 | H332 |
| Ethylbenzene | 100-41-4 | 1.0-2.5 | GHS02-GHS07-GHS08 | H225-304-332-351-373 |
| Stoddard Solvent | 8052-41-3 | 0.1-1.0 | GHS08 | H304-372 |
| Octane | 111-65-9 | 0.1-1.0 | GHS02-GHS07-GHS08 | H225-304-315-336 |
| Pigment Orange 13 | 3520-72-7 | 0.1-1.0 | Not Available | Not Available |
| Crystalline Silica / Quartz | 14808-60-7 | 0.1-1.0 | Not Available | Not Available |

## 4. First-Aid Measures

**FIRST AID - EYE CONTACT:** Immediately flush eyes with plenty of water for at least 15 minutes holding eyelids open. Get medical attention. Do NOT allow rubbing of eyes or keeping eyes closed.

**FIRST AID - SKIN CONTACT:** Wash skin with soap and water. Remove contaminated clothing. Get medical attention if irritation develops or persists.

**FIRST AID - INHALATION:** If you experience difficulty in breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical assistance immediately. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention. Do NOT use mouth-to-mouth resuscitation.

**FIRST AID - INGESTION:** Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. Get immediate medical attention. If swallowed, get medical attention.

## 5. Fire-Fighting Measures

**EXTINGUISHING MEDIA:** Alcohol Film Forming Foam, Carbon Dioxide, Dry Chemical, Dry Sand, Water Fog

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** FLASH POINT IS LESS THAN 20°F. EXTREMELY FLAMMABLE LIQUID AND VAPOR!Water spray may be ineffective. Closed containers may explode when exposed to extreme heat. Vapors may form explosive mixtures with air. Vapors can travel to a source of ignition and flash back. Isolate from heat, electrical equipment, sparks and open flame. Perforation of the pressurized container may cause bursting of the can. Closed containers may explode when exposed to extreme heat due to buildup of steam.

**SPECIAL FIREFIGHTING PROCEDURES:** Evacuate area and fight fire from a safe distance. Full protective equipment including self-contained breathing apparatus should be used. Water may be used to cool closed containers to prevent pressure buildup and possible autoignition or explosion. Use water spray to keep fire-exposed containers cool. Containers may explode when heated.

**Special Fire and Explosion Hazard (Combustible Dust):** No Information

## 6. Accidental Release Measures

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:** Contain spilled liquid with sand or earth. DO NOT use combustible materials such as sawdust. Remove all sources of ignition, ventilate area and remove with inert absorbent and non-sparking tools. Dispose of according to local, state (provincial) and federal regulations. Do not incinerate closed containers. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Ventilate area, isolate spilled material, and remove with inert absorbent. Dispose of contaminated absorbent, container, and unused contents in accordance with local, state, and federal regulations.

## 7. Handling and Storage

**HANDLING:** Wash thoroughly after handling. Wash hands before eating. Use only in a well-ventilated area. Follow all SDS and label precautions even after container is emptied because it may retain product residues. Avoid breathing fumes, vapors, or mist. Remove contaminated clothing and launder before reuse. Use only with adequate ventilation. Avoid contact with eyes, skin and clothing.

**STORAGE:** Keep containers tightly closed. Isolate from heat, electrical equipment, sparks and open flame. Contents under pressure. Do not store above 120 ° F. Store large quantities in buildings designed and protected for storage of flammable aerosols. Contents under pressure. Do not expose to heat or store above 120 ° F. Product should be stored in tightly sealed containers and protected from heat, moisture, and foreign materials. Keep away from heat, sparks, flame and sources of ignition. Avoid excess heat.

**Advice on Safe Handling of Combustible Dust:** No Information

## 8. Exposure Controls / Personal Protection

| Chemical Name | CAS-No. | Weight % Less Than | ACGIH TLV-TWA | ACGIH TLV-STEL | OSHA PEL-TWA | OSHA PEL-CEILING |
|---|---|---|---|---|---|---|
| Propane | 74-98-6 | 20.0 | N.E. | N.E. | 1000 ppm | N.E. |
| n-Butane | 106-97-8 | 10.0 | N.E. | 1000 ppm | N.E. | N.E. |
| Naphtha, Petroleum, Hydrotreated Light | 64742-49-0 | 10.0 | N.E. | N.E. | N.E. | N.E. |
| Hydrotreated Light Distillate | 64742-47-8 | 10.0 | N.E. | N.E. | N.E. | N.E. |
| Xylenes (o-, m-, p- Isomers) | 1330-20-7 | 5.0 | 100 ppm | 150 ppm | 100 ppm | N.E. |
| Barium Sulfate | 7727-43-7 | 5.0 | 5 mg/m3 | N.E. | 15 mg/m3 | N.E. |
| Ethylbenzene | 100-41-4 | 5.0 | 20 ppm | N.E. | 100 ppm | N.E. |
| Stoddard Solvent | 8052-41-3 | 1.0 | 100 ppm | N.E. | 500 ppm | N.E. |
| Octane | 111-65-9 | 1.0 | 300 ppm | N.E. | 500 ppm | N.E. |
| Pigment Orange 13 | 3520-72-7 | 1.0 | N.E. | N.E. | N.E. | N.E. |
| Crystalline Silica / Quartz | 14808-60-7 | 1.0 | 0.025 mg/m3 | N.E. | 50 µg/m3 | N.E. |

**PERSONAL PROTECTION**

**ENGINEERING CONTROLS:** Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof ventilation equipment. Prevent build-up of vapors by opening all doors and windows to achieve cross-ventilation. Provide general dilution of local exhaust ventilation in volume and pattern to keep TLV of hazardous ingredients below acceptable limits.

**RESPIRATORY PROTECTION:** A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use. A NIOSH/MSHA approved air purifying respirator with organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits.

**SKIN PROTECTION:** Use impervious gloves to prevent skin contact and absorption of this material through the skin.

**EYE PROTECTION:** Use safety eyewear designed to protect against splash of liquids.

**OTHER PROTECTIVE EQUIPMENT:** Refer to safety supervisor or industrial hygienist for further information regarding personal protective equipment and its application. Refer to safety supervisor or industrial hygienist for further guidance regarding types of personal protective equipment and their applications.

**HYGIENIC PRACTICES:** Wash thoroughly with soap and water before eating, drinking or smoking. Remove contaminated clothing immediately and launder before reuse.

**Engineering Measures for Combustible Dust:** No Information

## 9. Physical and Chemical Properties

| | | | |
|---|---|---|---|
| **Appearance:** | Aerosolized Mist | **Physical State:** | Liquid |
| **Odor:** | Solvent Like | **Odor Threshold:** | N.E. |
| **Specific Gravity:** | 0.857 | **pH:** | N.A. |
| **Freeze Point, °C:** | N.D. | **Viscosity:** | N.D. |
| **Solubility in Water:** | Slight | **Partition Coefficient, n-octanol/ water:** | N.D. |
| **Decompostion Temp., °C:** | N.D. | | |
| **Boiling Range, °C:** | -37 - 537 | **Explosive Limits, vol%:** | 0.9 - 12.6 |
| **Flammability:** | Supports Combustion | **Flash Point, °C:** | -96 |
| **Evaporation Rate:** | Faster than Ether | **Auto-ignition Temp., °C:** | N.D. |
| **Vapor Density:** | Heavier than Air | **Vapor Pressure:** | N.D. |

(See "Other information" Section for abbreviation legend)

## 10. Stability and Reactivity

**CONDITIONS TO AVOID:** Avoid temperatures above 120°F (49°C). Avoid all possible sources of ignition.

**INCOMPATIBILITY:** Incompatible with strong oxidizing agents, strong acids and strong alkalies.

**HAZARDOUS DECOMPOSITION:** By open flame, carbon monoxide and carbon dioxide. When heated to decomposition, it emits acrid smoke and irritating fumes. Contains solvents which may form carbon monoxide, carbon dioxide, and formaldehyde.

**HAZARDOUS POLYMERIZATION:** Will not occur under normal conditions.

**STABILITY:** This product is stable under normal storage conditions.

## 11. Toxicological Information

**EFFECTS OF OVEREXPOSURE - EYE CONTACT:** Causes Serious Eye Irritation

**EFFECTS OF OVEREXPOSURE - SKIN CONTACT:** Substance may cause slight skin irritation. Prolonged or repeated contact may cause skin irritation.

**EFFECTS OF OVEREXPOSURE - INHALATION:** Harmful if inhaled. High gas, vapor, mist or dust concentrations may be harmful if inhaled. Avoid breathing fumes, spray, vapors, or mist. High vapor concentrations are irritating to the eyes, nose, throat and lungs. Prolonged or excessive inhalation may cause respiratory tract irritation.

**EFFECTS OF OVEREXPOSURE - INGESTION:** Harmful if swallowed.

**EFFECTS OF OVEREXPOSURE - CHRONIC HAZARDS:** Overexposure to xylene in laboratory animals has been associated with liver abnormalities, kidney, lung, spleen, eye and blood damage as well as reproductive disorders. Effects in humans, due to chronic overexposure, have included liver, cardiac abnormalities and nervous system damage. IARC lists Ethylbenzene as a possible human carcinogen (group 2B). Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. May cause central nervous system disorder (e.g., narcosis involving a loss of coordination, weakness, fatigue, mental confusion, and blurred vision) and/or damage. High concentrations may lead to central nervous system effects (drowsiness, dizziness, nausea, headaches, paralysis, and blurred vision) and/or damage.

**PRIMARY ROUTE(S) OF ENTRY:** Eye Contact, Ingestion, Inhalation, Skin Absorption, Skin Contact

ACUTE TOXICITY VALUES

**The acute effects of this product have not been tested. Data on individual components are tabulated below:**

| CAS-No. | Chemical Name | Oral LD50 | Dermal LD50 | Vapor LC50 |
|---|---|---|---|---|
| 106-97-8 | n-Butane | N.E. | N.E. | 658 mg/L Rat |
| 64742-49-0 | Naphtha, Petroleum, Hydrotreated Light | >5000 mg/kg Rat | >3160 mg/kg Rabbit | >4951 mg/L Rat |
| 64742-47-8 | Hydrotreated Light Distillate | >5000 mg/kg Rat | >2000 mg/kg Rabbit | >5000 mg/L Rat |
| 1330-20-7 | Xylenes (o-, m-, p- Isomers) | 3500 mg/kg Rat | >4350 mg/kg Rabbit | 29.08 mg/L Rat |
| 7727-43-7 | Barium Sulfate | 307000 mg/kg Rat | N.E. | N.E. |
| 100-41-4 | Ethylbenzene | 3500 mg/kg Rat | 15400 mg/kg Rabbit | 17.4 mg/L Rat |
| 111-65-9 | Octane | N.E. | N.E. | >23.36 mg/L Rat |
| 3520-72-7 | Pigment Orange 13 | >5000 mg/kg Rat | N.E. | N.E. |
| 14808-60-7 | Crystalline Silica / Quartz | 5500 mg/kg Rat | 5500 | 100 mg/L |

N.E. - Not Established

## 12. Ecological Information

**ECOLOGICAL INFORMATION:** Product is a mixture of listed components. Product is a mixture of listed components.

## 13. Disposal Information

**DISPOSAL INFORMATION:** Dispose of material in accordance to local, state, and federal regulations and ordinances. This product as supplied is a USEPA defined ignitable hazardous waste. Dispose of unusable product as a hazardous waste (D001) in accordance with local, state, and federal regulation. Do not incinerate closed containers.

## 14. Transport Information

| | Domestic (USDOT) | International (IMDG) | Air (IATA) | TDG (Canada) |
|---|---|---|---|---|
| **UN Number:** | N.A. | 1950 | 1950 | N.A. |
| **Proper Shipping Name:** | Paint and Related Spray Products in Ltd Qty | Aerosols | Aerosols, flammable | Aerosols |
| **Hazard Class:** | N.A. | 2 | 2.1 | N.A. |
| **Packing Group:** | N.A. | N.A. | N.A. | N.A. |
| **Limited Quantity:** | Yes | Yes | Yes | Yes |

## 15. Regulatory Information

### U.S. Federal Regulations:

#### CERCLA - SARA Hazard Category

This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Gas under pressure, Carcinogenicity, Specific target organ toxicity (single or repeated exposure)

#### Sara Section 313:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372:

| Chemical Name | CAS-No. |
|---|---|
| Xylenes (o-, m-, p- Isomers) | 1330-20-7 |
| Ethylbenzene | 100-41-4 |

#### Toxic Substances Control Act:

This product contains the following chemical substances subject to the reporting requirements of TSCA 12(b) if exported from the United States:

| Chemical Name | CAS-No. |
|---|---|
| Castor oil, sulfated, sodium salt | 68187-76-8 |

### U.S. State Regulations:

#### California Proposition 65:

**WARNING:** Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

## 16. Other Information

**HMIS RATINGS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Health:** | 2* | **Flammability:** | 4 | **Physical Hazard:** | 0 | **Personal Protection:** | X |

**NFPA RATINGS**

| | | | | | |
|---|---|---|---|---|---|
| **Health:** | 2 | **Flammability:** | 4 | **Instability** | 0 |

**Maximum Incremental Reactivity** 0.82

**SDS REVISION DATE:** 4/2/2020

**REASON FOR REVISION:**

Revision Description Changed
Product Composition Changed
Substance and/or Product Properties Changed in Section(s):
09 - Physical & Chemical Properties
14 - Transport Information
15 - Regulatory Information
16 - Other Information
Revision Statement(s) Changed

**Legend:** N.A. - Not Applicable, N.D. - Not Determined, N.E. - Not Established

Rust-Oleum Corporation believes, to the best of its knowledge, information and belief, the information contained herein to be accurate and reliable as of the date of this safety data sheet. However, because the conditions of handling, use, and storage of these materials are beyond our control, we assume no responsibility or liability for personal injury or property damage incurred by the use of these materials. Rust-Oleum Corporation makes no warranty, expressed or implied, regarding the accuracy or reliability of the data or results obtained from their use. All materials may present unknown hazards and should be used with caution. The information and recommendations in this material safety data sheet are offered for the users' consideration and examination. It is the responsibility of the user to determine the final suitability of this information and to comply with all applicable international, federal, state, and local laws and regulations.

## ATTACHMENT 12

SDS - Salinaxx Eye Wash

Salinaax Saline Solution

# SAFETY DATA SHEET

## Section 1 - Identification of the Material and Supplier

| | |
|---|---|
| Product Name: | Eye Wash - Normal Saline Solution. |
| Product Code/s: | Various |
| Use: | A fluid used for eye and wound irrigation. |
| Company: | Aaxis Pacific |
| Address: | 7A Bessemer St, Blacktown. NSW 2148, Australia |
| Telephone: | (02) 9881-3333 |
| Fax: | (02) 9881-3322 |

## Section 2 - Hazards Identification

| | |
|---|---|
| Hazard Classification | No hazardous product as specified in Directive 93/42/EEC, 67/548/EEC. |
| Eye Contact | Product is intended for use in occular area. |
| Skin Contact | Product has no effect. |
| Inhalation | Product has no effect. |

## Section 3 - Composition/Information on Ingredients

| Chemical Name | CAS No. | Proportion |
|---|---|---|
| Sodium Chloride | 7647-14-5 | 1-0.1% |
| Potassium Dihydrogen Phosphate | 7778-77-0 | 1-0.01% |
| Sodium Hydroxide | 1310-73-2 | 1-0.1% |
| Purified Water | 7732-18-5 | 100QS |

## Section 4 - First Aid Measures

| | |
|---|---|
| Emergency First Aid Procedure | Seek medical assistance for further treatment, observation and support as necessary. |
| Eye Contact | None required. |
| Skin Contact | None required. |
| Inhalation | None required. |
| Ingestion | Call a physician, if stomach discomfort occurs. |

## Section 5 - Fire Fighting Measures

| | |
|---|---|
| Hazard from Combustion Products | None. |
| Suitable Extinguishing Media | Carbon Dioxide, Water, Foam. |
| Fire Fighting Procedures | None. |

## Section 6 - Accidental Release Measures

| | |
|---|---|
| Steps to be taken if material is spilled or released | Mop up or flush down sanitary sewer. |
| Procedures for cleaning | Clean up affected area. |

## Section 7 - Handling and Storage

| | |
|---|---|
| Precautions to be taken in handling and storage | Keep at room temperature (15-30°c). Read label before use |
| Other precautions/special hazards | Keep from freezing, read label or instructions before use. |
| HMIS Rating | Not applicable. |
| NFPA Rating | Not applicable. |

| Section 8 - Exposure Controls/Personal Protection | |
|---|---|
| Respiratory protection | None required. |
| Protection Gloves | None required. |
| Eye Protection | None required. |
| Ventilation to be used | N/A |
| Other protective clothing and equipment | None required. |
| Hygienic Work Practices | Keep container closed when not in use. Always read label or instructions before use. |
| **Section 9 - Physical and Chemical Properties** | |
| Physical State | Liquid |
| Boiling Point | 100°C |
| Vapour Pressure (mm Hg) | N/A |
| Vapour Density (Air =1) | Unknown |
| Solubility in Water | Good |
| Appearance and Odour | Clear, Colourless liquid, Odourless. |
| Specific Gravity (H2O = 1) | ≥ 1 |
| Melting Point | N/A |
| Evaporation Rate (Water =1) | ≥ 1 |
| Water Reactive | None |
| Percent Volatile | ≥ 1 |
| pH | 7.0-7.4 |
| **Section 10 - Stability and Reactivity** | |
| Stability | Stable |
| Incompatibility (Materials to avoid) | Not applicable. |
| Hazardous Decomposition Products | Not applicable. |
| Hazardous Polymerization | Not applicable. |
| Conditions to avoid | None established. |
| **Section 11 - Toxicological Information** | |
| Acute Effects | None established. |
| Swallowed | Call a physician, if stomach discomfort occurs. |
| Eye | Not applicable. |
| Skin | Not applicable. |
| Inhaled | Not applicable. |
| Chronic Effects | None established. |
| **Section 12 - Ecological Information** | |
| Biological Degradation | Not applicable. |
| Behavior in Environmental Compartments | No bioaccumulation is to be expected. |
| Farther Ecologic data | No ecological problems are to be expected when the product is handled and used with due care and attention. |
| **Section 13 - Disposal Considerations** | |
| Method of Disposal | In accordance with Municipal, Provincial and Federal Regulations |

## Section 14 - Transport Information

Product not subject to transport regulations

## Section 15 - Regulatory Information

Product complies with Annex II of Directive 93/42/EEC

## Section 16 - Other Information

The information contained herein is based on the present state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent guarantee of the properties of the product.

This SDS is reviewed every five years.

Rev 01 – No changes.

## ATTACHMENT 13

SDS - Sharpie Permanant Marker

Newell Rubbermaid Brands That Matter | Office Products Group

# MATERIAL SAFETY DATA SHEET MSDS # 3000

## Section One: Identification

Newell Rubbermaid, Inc. (Sanford L.P.)
2707 Butterfield Road
Oak Brook, IL 60523 USA
800-323-0749 or 630-481-2000

EMERGENCY MEDICAL NUMBER:
888-786-0972

Product Name: Sharpie Fine Point Marker, Sharpie Ultra Fine Point Marker, Sharpie Extra Fine Marker, Sharpie Chisel Tip Marker, Sharpie Twin Tip Marker, Super Sharpie Marker, Super Sharpie Twin Tip Marker, Sharpie Mini Fine Point Marker, Sharpie Micro Marker, Sharpie Grip Marker, Sharpie Retractable Fine Point Marker, Sharpie Magnum Marker, Sharpie King Size Marker, Sharpie Liquid Tip Marker. Sharpie Premium, Sharpie CD Marker, Sharpie Pro, Sharpie Pro King Size, Sharpie Pro Magnum, Sharpie Aluminum Barrel, Sharpie Brush Tip Marker, Esterbrook by Sharpie.

Colors: All Colors

NewellRubbermaid, Inc (Sanford L.P.) is a member of The Art and Creative Materials Institute, Inc. This product is certified by the Institute to be labeled in accordance with the voluntary chronic hazard labeling standard ASTM D-4236 and is labeled with the AP Non Toxic Seal. Products bearing the AP Approved Product Seal of The Art and Creative Materials Institute, Inc. are certified in a program of toxicological evaluation by a medical expert, subject to review by the Institute Toxicology Advisory Board, to contain no materials in sufficient quantities to be toxic or injurious to humans, or to cause acute toxicity or chronic health problems.

## Section Two: Hazard Identification

Not Hazardous under normal use conditions. Not for use on skin. Do not ingest. Contact with eyes may cause irritation.

## Section Three: Composition

: Butanol (71-36-3), Propanol (71-23-8), Diacetone Alcohol (123-42-2), Ethanol (64-17-5), pigments, dyes, additives

## Section Four: First Aid Measures

Inhalation: Remove source of irritation. If symptoms persist seek medical attention

Skin Contact: Wash with soap and water. If irritation persists seek medical attention.

Eye Contact: Rinse eyes with water, if irritation persists seek medical attention.

Ingestion: If symptoms occur seek medical attention.

## Section Five: Fire Fighting Measures

Flash Point: N/A

Extinguishing Media: As appropriate for surrounding area.

Special Fire Fighting Measures: N/A

Hazardous combustion products: N/A

## Section Six: Accidental Release Measures

In Case of Spill or Accidental Release: Wipe up with absorbent material.

## Section Seven: Handling and Storage

Handling: Do not shake marker.

Storage: Keep cap on marker when not in use.

## Section Eight: Exposure Controls and Personal Protection

Eye Protection: None under normal use conditions.

Clothing: None under normal use conditions.

Respirator: None under normal use conditions.

## Section Nine: Physical and Chemical Properties

| | |
|---|---|
| Boiling Point: | N/A |
| Specific Gravity: | N/A |
| Vapor Pressure: | N/A |
| Solubility in Water: | N/A |
| Evaporation Rate: | N/A |
| Appearance/Odor: | Marker/Alcohol (ink) |

## Section Ten: Stability and Reactivity

| | |
|---|---|
| Stability: | N/A |
| Conditions to Avoid: | Avoid exposure to heat, flame or other sources of ignition. |
| Chemical Incompatibility: | N/A |
| Hazardous Polymerization: | N/A. |

## Section Eleven: Toxicological Information

See Section Two: Hazard Identification for any hazards

## Section Twelve: Ecological Information

Not available

## Section Thirteen: Disposal Considerations

Dispose of in accordance with all Federal, State, and Local Regulations.

## Section Fourteen: Transport Information

| | |
|---|---|
| DOT: | Not available |
| IATA: | Not available |
| IMO: | Not available |

## Section Fifteen: Regulatory Information

United States: All components in this product are listed on or exempt from reporting under the Federal Toxic Substances Control Act (TSCA).

## Section Sixteen: Other Information

| HMIS Code | |
|---|---|
| Health | N/A |
| Flammability | N/A |
| Reactivity | N/A |
| Personal Protection | N/A |

**0=Minimal / 4 = Severe**

NewellRubbermaid, Inc has been advised by Counsel that the OSHA Hazard Communication Standard and the Health Canada Workplace Hazardous Materials Information Standard do not apply to the Sanford Product described in this Material Safety Data Sheet. The reasons for the exemptions are contained in 29 CFR 1910.1200(b)(6)(ix) as amended Sept 14, 2009 per the Code of Federal Regulations and also Canadian Hazardous Products Act part 12 section (f) as amended June 1, 2009. The information contained in this MSDS is forwarded to you for your information, but is not meant to imply that the product is covered by nor is this MSDS meant to comply with all requirements of the hazard communication standards.

## ATTACHMENT 14

SDS - Spray Adhesive Glue

# Material Safety Data Sheet

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**PRODUCT NAME:** 3M(TM) Super 77 Multipurpose Spray Adhesive and 3M(TM) Hi-Strength 90 Spray Adhesive Mini-Pallet
**MANUFACTURER:** 3M
**DIVISION:** Industrial Adhesives and Tapes

**ADDRESS:** 3M Center
St. Paul, MN 55144-1000

**EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)**

**Issue Date:** 02/25/2004
**Supercedes Date:** Initial Issue

**Document Group:** 19-0877-1

**ID Number(s):**
62-4977-4949-9

**This product is a kit or a multipart product which consists of multiple, independently packaged components. An MSDS for each of these components is included. Please do not separate the component MSDSs from this cover page. The document numbers of the MSDSs for components of this product are:**

16-3472-4, 16-4935-9

No revision information is available.

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| | | | |
|---|---|---|---|
| **Document Group:** | 16-3472-4 | **Version Number:** | 40.00 |
| **Issue Date:** | 05/21/18 | **Supercedes Date:** | 03/31/17 |

## SECTION 1: Identification

**1.1. Product identifier**
3M(TM) Super 77(TM) Multipurpose Adhesive (Aerosol)

**Product Identification Numbers**
62-4977-2924-4, 62-4977-2928-5, 62-4977-4730-3, 62-4977-4922-6, 62-4977-4923-4, 62-4977-4925-9, 62-4977-4929-1, 62-4977-4930-9, 62-4977-4935-8

**1.2. Recommended use and restrictions on use**

**Recommended use**
Adhesive aerosol, General Purpose Aerosol adhesive

**1.3. Supplier's details**

| | |
|---|---|
| **MANUFACTURER:** | 3M |
| **DIVISION:** | Industrial Adhesives and Tapes Division |
| **ADDRESS:** | 3M Center, St. Paul, MN 55144-1000, USA |
| **Telephone:** | 1-888-3M HELPS (1-888-364-3577) |

**1.4. Emergency telephone number**
1-800-364-3577 or (651) 737-6501 (24 hours)

## SECTION 2: Hazard identification

**2.1. Hazard classification**
Flammable Aerosol: Category 1.
Gas Under Pressure: Liquefied gas.
Serious Eye Damage/Irritation: Category 2A.
Reproductive Toxicity: Category 2.
Simple Asphyxiant.
Specific Target Organ Toxicity (single exposure): Category 1.
Specific Target Organ Toxicity (single exposure): Category 3.

**2.2. Label elements**
**Signal word**
Danger

**Symbols**
Flame | Gas cylinder | Exclamation mark | Health Hazard |

**Pictograms**

**Hazard Statements**
Extremely flammable aerosol.
Contains gas under pressure; may explode if heated.

Causes serious eye irritation.
May cause drowsiness or dizziness.
Suspected of damaging fertility or the unborn child.
May displace oxygen and cause rapid suffocation.

Causes damage to organs:
cardiovascular system |

**Precautionary Statements**
**General:**
Keep out of reach of children.

**Prevention:**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.
Do not breathe dust/fume/gas/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.
Wear protective gloves and eye/face protection.
Do not eat, drink or smoke when using this product.
Wash thoroughly after handling.

**Response:**
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF exposed or concerned: Get medical advice/attention.
Specific treatment (see Notes to Physician on this label).

**Storage:**
Protect from sunlight. Do not expose to temperatures exceeding 50C/122F.
Keep container tightly closed.
Store locked up in a well-ventilated place.

**Disposal:**
Dispose of contents/container in accordance with applicable local/regional/national/international regulations.

**Notes to Physician:**

Exposure may increase myocardial irritability. Do not administer sympathomimetic drugs unless absolutely necessary.

## SECTION 3: Composition/information on ingredients

| Ingredient | C.A.S. No. | % by Wt |
|---|---|---|
| Acetone | 67-64-1 | 20 - 30 Trade Secret * |
| Non-volatile components (N.J.T.S. Registry No. 04499600-6433P) | Trade Secret* | 20 - 30 Trade Secret * |
| Propane | 74-98-6 | 15 - 25 Trade Secret * |
| Cyclohexane | 110-82-7 | 10 - 20 Trade Secret * |
| Petroleum distillates | 64742-49-0 | 10 - 20 Trade Secret * |
| Hexane | 110-54-3 | < 0.5 Trade Secret * |

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

## SECTION 4: First aid measures

**4.1. Description of first aid measures**

**Inhalation:**
Remove person to fresh air. Get medical attention.

**Skin Contact:**
Wash with soap and water. If signs/symptoms develop, get medical attention.

**Eye Contact:**
Immediately flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. Get medical attention.

**If Swallowed:**
Rinse mouth. If you feel unwell, get medical attention.

**4.2. Most important symptoms and effects, both acute and delayed**
See Section 11.1. Information on toxicological effects.

**4.3. Indication of any immediate medical attention and special treatment required**
Exposure may increase myocardial irritability. Do not administer sympathomimetic drugs unless absolutely necessary.

## SECTION 5: Fire-fighting measures

**5.1. Suitable extinguishing media**
Use a fire fighting agent suitable for the surrounding fire.

**5.2. Special hazards arising from the substance or mixture**
Closed containers exposed to heat from fire may build pressure and explode.

**Hazardous Decomposition or By-Products**

| Substance | Condition |
|---|---|
| Aldehydes | During Combustion |
| Carbon monoxide | During Combustion |
| Carbon dioxide | During Combustion |

**5.3. Special protective actions for fire-fighters**
Water may not effectively extinguish fire; however, it should be used to keep fire-exposed containers and surfaces cool and prevent explosive rupture.

## SECTION 6: Accidental release measures

**6.1. Personal precautions, protective equipment and emergency procedures**
Evacuate area. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Use only non-sparking tools. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Warning! A motor could be an ignition source and could cause flammable gases or vapors in the spill area to burn or explode. Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

**6.2. Environmental precautions**
Avoid release to the environment.

**6.3. Methods and material for containment and cleaning up**
If possible, seal leaking container. Place leaking containers in a well-ventilated area, preferably an operating exhaust hood, or if necessary outdoors on an impermeable surface until appropriate packaging for the leaking container or its contents is available. Contain spill. Cover spill area with a fire-extinguishing foam. An appropriate aqueous film forming foam (AFFF) is recommended. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Remember, adding an absorbent material does not remove a physical, health, or environmental hazard. Collect as much of the spilled material as possible using non-sparking tools. Place in a metal container approved for transportation by appropriate authorities. Clean up residue with an appropriate solvent selected by a qualified and authorized person. Ventilate the area with fresh air. Read and follow safety precautions on the solvent label and SDS. Seal the container. Dispose of collected material as soon as possible in accordance with applicable local/regional/national/international regulations.

## SECTION 7: Handling and storage

**7.1. Precautions for safe handling**
Keep out of reach of children. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not spray on an open flame or other ignition source. Do not pierce or burn, even after use. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid contact with oxidizing agents (eg. chlorine, chromic acid etc.) Use personal protective equipment (gloves, respirators, etc.) as required.

**7.2. Conditions for safe storage including any incompatibilities**
Store in a well-ventilated place. Keep container tightly closed. Protect from sunlight. Do not expose to temperatures exceeding 50C/122F. Store away from heat. Store away from acids. Store away from oxidizing agents.

## SECTION 8: Exposure controls/personal protection

**8.1. Control parameters**

**Occupational exposure limits**
If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.

| Ingredient | C.A.S. No. | Agency | Limit type | Additional Comments |
|---|---|---|---|---|
| Hexane | 110-54-3 | ACGIH | TWA:50 ppm | SKIN |
| Hexane | 110-54-3 | OSHA | TWA:1800 mg/m3(500 ppm) | |
| Cyclohexane | 110-82-7 | ACGIH | TWA:100 ppm | |
| Cyclohexane | 110-82-7 | OSHA | TWA:1050 mg/m3(300 ppm) | |

| | | | | |
|---|---|---|---|---|
| Acetone | 67-64-1 | ACGIH | TWA:250 ppm;STEL:500 ppm | A4: Not class. as human carcin |
| Acetone | 67-64-1 | OSHA | TWA:2400 mg/m3(1000 ppm) | |
| Propane | 74-98-6 | ACGIH | Limit value not established: | simple asphyxiant |
| Propane | 74-98-6 | OSHA | TWA:1800 mg/m3(1000 ppm) | |

ACGIH : American Conference of Governmental Industrial Hygienists
AIHA : American Industrial Hygiene Association
CMRG : Chemical Manufacturer's Recommended Guidelines
OSHA : United States Department of Labor - Occupational Safety and Health Administration
TWA: Time-Weighted-Average
STEL: Short Term Exposure Limit
CEIL: Ceiling

**8.2. Exposure controls**

**8.2.1. Engineering controls**
Do not remain in area where available oxygen may be reduced. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

**8.2.2. Personal protective equipment (PPE)**

**Eye/face protection**

Select and use eye/face protection to prevent contact based on the results of an exposure assessment. The following eye/face protection(s) are recommended:
Indirect Vented Goggles

**Skin/hand protection**
Select and use gloves and/or protective clothing approved to relevant local standards to prevent skin contact based on the results of an exposure assessment. Selection should be based on use factors such as exposure levels, concentration of the substance or mixture, frequency and duration, physical challenges such as temperature extremes, and other use conditions. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible gloves/protective clothing.
Gloves made from the following material(s) are recommended: Butyl Rubber
Nitrile Rubber

**Respiratory protection**

An exposure assessment may be needed to decide if a respirator is required. If a respirator is needed, use respirators as part of a full respiratory protection program. Based on the results of the exposure assessment, select from the following respirator type(s) to reduce inhalation exposure:
Half facepiece or full facepiece supplied-air respirator

For questions about suitability for a specific application, consult with your respirator manufacturer.

## SECTION 9: Physical and chemical properties

**9.1. Information on basic physical and chemical properties**

| | |
|---|---|
| **General Physical Form:** | Liquid aerosol |
| **Specific Physical Form:** | Aerosol |
| **Odor, Color, Grade:** | Clear, sweet, fruity odor |
| **Odor threshold** | *No Data Available* |
| **pH** | *No Data Available* |
| **Melting point** | *No Data Available* |
| **Boiling Point** | *Not Applicable* |

| | |
|---|---|
| **Flash Point** | -42.00 ºF [*Test Method:*Tagliabue Closed Cup] |
| **Evaporation rate** | 1.9 [*Ref Std:*ETHER=1] |
| **Flammability (solid, gas)** | Not Applicable |
| **Flammable Limits(LEL)** | *No Data Available* |
| **Flammable Limits(UEL)** | *No Data Available* |
| **Vapor Pressure** | [*Details:*Compressed gas]*Not Applicable* |
| **Vapor Density** | 2.97 [*Ref Std:*AIR=1] |
| **Density** | 0.726 g/ml |
| **Specific Gravity** | 0.726 [*Ref Std:*WATER=1] |
| **Solubility in Water** | Nil |
| **Solubility- non-water** | *No Data Available* |
| **Partition coefficient: n-octanol/ water** | *No Data Available* |
| **Autoignition temperature** | *No Data Available* |
| **Decomposition temperature** | *Not Applicable* |
| **Viscosity** | *Not Applicable* |
| **Hazardous Air Pollutants** | <=0.4 % weight [*Test Method:*Calculated] |
| **VOC Less H2O & Exempt Solvents** | <=51 % [*Test Method:*calculated per CARB title 2] |
| **Solids Content** | >=22.4 % |

## SECTION 10: Stability and reactivity

**10.1. Reactivity**
This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

**10.2. Chemical stability**
Stable.

**10.3. Possibility of hazardous reactions**
Hazardous polymerization will not occur.

**10.4. Conditions to avoid**
Heat

**10.5. Incompatible materials**
Strong oxidizing agents

**10.6. Hazardous decomposition products**

| Substance | Condition |
|---|---|
| None known. | |

Refer to section 5.2 for hazardous decomposition products during combustion.

## SECTION 11: Toxicological information

**The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.**

**11.1. Information on Toxicological effects**

**Signs and Symptoms of Exposure**

**Based on test data and/or information on the components, this material may produce the following health effects:**

**Inhalation:**
Intentional concentration and inhalation may be harmful or fatal.

Simple Asphyxiation: Signs/symptoms may include increased heart rate, rapid respirations, drowsiness, headache, incoordination, altered judgement, nausea, vomiting, lethargy, seizures, coma, and may be fatal.

Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

May cause additional health effects (see below).

**Skin Contact:**
Dermal Defatting: Signs/symptoms may include localized redness, itching, drying and cracking of skin.

**Eye Contact:**
Severe Eye Irritation: Signs/symptoms may include significant redness, swelling, pain, tearing, cloudy appearance of the cornea, and impaired vision.

**Ingestion:**
Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

May cause additional health effects (see below).

**Additional Health Effects:**

**Single exposure may cause target organ effects:**
Central Nervous System (CNS) Depression: Signs/symptoms may include headache, dizziness, drowsiness, incoordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness.

Single exposure, above recommended guidelines, may cause:
Cardiac Sensitization: Signs/symptoms may include irregular heartbeat (arrhythmia), faintness, chest pain, and may be fatal.

**Reproductive/Developmental Toxicity:**
Contains a chemical or chemicals which can cause birth defects or other reproductive harm.

**Toxicological Data**
If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

**Acute Toxicity**

| Name | Route | Species | Value |
|---|---|---|---|
| Overall product | Dermal | | No data available; calculated ATE >5,000 mg/kg |
| Overall product | Inhalation-Vapor(4 hr) | | No data available; calculated ATE >50 mg/l |
| Overall product | Ingestion | | No data available; calculated ATE >5,000 mg/kg |
| Propane | Inhalation-Gas (4 hours) | Rat | LC50 > 200,000 ppm |
| Acetone | Dermal | Rabbit | LD50 > 15,688 mg/kg |
| Acetone | Inhalation-Vapor (4 hours) | Rat | LC50 76 mg/l |

| | | | |
|---|---|---|---|
| Acetone | Ingestion | Rat | LD50 5,800 mg/kg |
| Cyclohexane | Dermal | Rat | LD50 > 2,000 mg/kg |
| Cyclohexane | Inhalation-Vapor (4 hours) | Rat | LC50 > 32.9 mg/l |
| Cyclohexane | Ingestion | Rat | LD50 6,200 mg/kg |
| Petroleum distillates | Dermal | Rabbit | LD50 > 3,160 mg/kg |
| Petroleum distillates | Inhalation-Vapor (4 hours) | Rat | LC50 > 14.7 mg/l |
| Petroleum distillates | Ingestion | Rat | LD50 > 5,000 mg/kg |
| Non-volatile components (N.J.T.S. Registry No. 04499600-6433P) | Dermal | | LD50 estimated to be > 5,000 mg/kg |
| Non-volatile components (N.J.T.S. Registry No. 04499600-6433P) | Ingestion | | LD50 estimated to be 2,000 - 5,000 mg/kg |
| Hexane | Dermal | Rabbit | LD50 > 2,000 mg/kg |
| Hexane | Inhalation-Vapor (4 hours) | Rat | LC50 170 mg/l |
| Hexane | Ingestion | Rat | LD50 > 28,700 mg/kg |

ATE = acute toxicity estimate

**Skin Corrosion/Irritation**

| Name | Species | Value |
|---|---|---|
| Propane | Rabbit | Minimal irritation |
| Acetone | Mouse | Minimal irritation |
| Cyclohexane | Rabbit | Mild irritant |
| Petroleum distillates | Rabbit | Irritant |
| Non-volatile components (N.J.T.S. Registry No. 04499600-6433P) | Professional judgement | Minimal irritation |
| Hexane | Human and animal | Mild irritant |

**Serious Eye Damage/Irritation**

| Name | Species | Value |
|---|---|---|
| Propane | Rabbit | Mild irritant |
| Acetone | Rabbit | Severe irritant |
| Cyclohexane | Rabbit | Mild irritant |
| Petroleum distillates | Rabbit | Mild irritant |
| Hexane | Rabbit | Mild irritant |

**Skin Sensitization**

| Name | Species | Value |
|---|---|---|
| Petroleum distillates | Guinea pig | Not classified |
| Hexane | Human | Not classified |

**Respiratory Sensitization**

For the component/components, either no data are currently available or the data are not sufficient for classification.

**Germ Cell Mutagenicity**

| Name | Route | Value |
|---|---|---|
| Propane | In Vitro | Not mutagenic |
| Acetone | In vivo | Not mutagenic |
| Acetone | In Vitro | Some positive data exist, but the data are not sufficient for classification |
| Cyclohexane | In Vitro | Not mutagenic |

| | | |
|---|---|---|
| Cyclohexane | In vivo | Some positive data exist, but the data are not sufficient for classification |
| Petroleum distillates | In Vitro | Not mutagenic |
| Hexane | In Vitro | Not mutagenic |
| Hexane | In vivo | Not mutagenic |

## Carcinogenicity

| Name | Route | Species | Value |
|---|---|---|---|
| Acetone | Not Specified | Multiple animal species | Not carcinogenic |
| Petroleum distillates | Inhalation | Mouse | Some positive data exist, but the data are not sufficient for classification |
| Hexane | Dermal | Mouse | Not carcinogenic |
| Hexane | Inhalation | Mouse | Some positive data exist, but the data are not sufficient for classification |

## Reproductive Toxicity

## Reproductive and/or Developmental Effects

| Name | Route | Value | Species | Test Result | Exposure Duration |
|---|---|---|---|---|---|
| Acetone | Ingestion | Not classified for male reproduction | Rat | NOAEL 1,700 mg/kg/day | 13 weeks |
| Acetone | Inhalation | Not classified for development | Rat | NOAEL 5.2 mg/l | during organogenesis |
| Cyclohexane | Inhalation | Not classified for female reproduction | Rat | NOAEL 24 mg/l | 2 generation |
| Cyclohexane | Inhalation | Not classified for male reproduction | Rat | NOAEL 24 mg/l | 2 generation |
| Cyclohexane | Inhalation | Not classified for development | Rat | NOAEL 6.9 mg/l | 2 generation |
| Hexane | Ingestion | Not classified for development | Mouse | NOAEL 2,200 mg/kg/day | during organogenesis |
| Hexane | Inhalation | Not classified for development | Rat | NOAEL 0.7 mg/l | during gestation |
| Hexane | Ingestion | Toxic to male reproduction | Rat | NOAEL 1,140 mg/kg/day | 90 days |
| Hexane | Inhalation | Toxic to male reproduction | Rat | LOAEL 3.52 mg/l | 28 days |

## Target Organ(s)

## Specific Target Organ Toxicity - single exposure

| Name | Route | Target Organ(s) | Value | Species | Test Result | Exposure Duration |
|---|---|---|---|---|---|---|
| Propane | Inhalation | cardiac sensitization | Causes damage to organs | Human | NOAEL Not available | |
| Propane | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human | NOAEL Not available | |
| Propane | Inhalation | respiratory irritation | Not classified | Human | NOAEL Not available | |
| Acetone | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human | NOAEL Not available | |
| Acetone | Inhalation | respiratory irritation | Some positive data exist, but the data are not sufficient for classification | Human | NOAEL Not available | |
| Acetone | Inhalation | immune system | Not classified | Human | NOAEL 1.19 mg/l | 6 hours |
| Acetone | Inhalation | liver | Not classified | Guinea pig | NOAEL Not available | |
| Acetone | Ingestion | central nervous | May cause drowsiness or | Human | NOAEL Not | poisoning |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | system depression | dizziness | | available | and/or abuse |
| Cyclohexane | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human and animal | NOAEL Not available | |
| Cyclohexane | Inhalation | respiratory irritation | Some positive data exist, but the data are not sufficient for classification | Human and animal | NOAEL Not available | |
| Cyclohexane | Ingestion | central nervous system depression | May cause drowsiness or dizziness | Professional judgement | NOAEL Not available | |
| Petroleum distillates | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human and animal | NOAEL Not available | |
| Petroleum distillates | Inhalation | respiratory irritation | Some positive data exist, but the data are not sufficient for classification | | NOAEL Not available | |
| Petroleum distillates | Ingestion | central nervous system depression | May cause drowsiness or dizziness | Professional judgement | NOAEL Not available | |
| Hexane | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human | NOAEL Not available | not available |
| Hexane | Inhalation | respiratory irritation | Some positive data exist, but the data are not sufficient for classification | Rabbit | NOAEL Not available | 8 hours |
| Hexane | Inhalation | respiratory system | Not classified | Rat | NOAEL 24.6 mg/l | 8 hours |

## Specific Target Organ Toxicity - repeated exposure

| Name | Route | Target Organ(s) | Value | Species | Test Result | Exposure Duration |
|---|---|---|---|---|---|---|
| Acetone | Dermal | eyes | Not classified | Guinea pig | NOAEL Not available | 3 weeks |
| Acetone | Inhalation | hematopoietic system | Not classified | Human | NOAEL 3 mg/l | 6 weeks |
| Acetone | Inhalation | immune system | Not classified | Human | NOAEL 1.19 mg/l | 6 days |
| Acetone | Inhalation | kidney and/or bladder | Not classified | Guinea pig | NOAEL 119 mg/l | not available |
| Acetone | Inhalation | heart \| liver | Not classified | Rat | NOAEL 45 mg/l | 8 weeks |
| Acetone | Ingestion | kidney and/or bladder | Not classified | Rat | NOAEL 900 mg/kg/day | 13 weeks |
| Acetone | Ingestion | heart | Not classified | Rat | NOAEL 2,500 mg/kg/day | 13 weeks |
| Acetone | Ingestion | hematopoietic system | Not classified | Rat | NOAEL 200 mg/kg/day | 13 weeks |
| Acetone | Ingestion | liver | Not classified | Mouse | NOAEL 3,896 mg/kg/day | 14 days |
| Acetone | Ingestion | eyes | Not classified | Rat | NOAEL 3,400 mg/kg/day | 13 weeks |
| Acetone | Ingestion | respiratory system | Not classified | Rat | NOAEL 2,500 mg/kg/day | 13 weeks |
| Acetone | Ingestion | muscles | Not classified | Rat | NOAEL 2,500 mg/kg | 13 weeks |
| Acetone | Ingestion | skin \| bone, teeth, nails, and/or hair | Not classified | Mouse | NOAEL 11,298 mg/kg/day | 13 weeks |
| Cyclohexane | Inhalation | liver | Not classified | Rat | NOAEL 24 mg/l | 90 days |
| Cyclohexane | Inhalation | auditory system | Not classified | Rat | NOAEL 1.7 mg/l | 90 days |

| | | | | | | |
|---|---|---|---|---|---|---|
| Cyclohexane | Inhalation | kidney and/or bladder | Not classified | Rabbit | NOAEL 2.7 mg/l | 10 weeks |
| Cyclohexane | Inhalation | hematopoietic system | Not classified | Mouse | NOAEL 24 mg/l | 14 weeks |
| Cyclohexane | Inhalation | peripheral nervous system | Not classified | Rat | NOAEL 8.6 mg/l | 30 weeks |
| Hexane | Inhalation | peripheral nervous system | Causes damage to organs through prolonged or repeated exposure | Human | NOAEL Not available | occupational exposure |
| Hexane | Inhalation | respiratory system | Some positive data exist, but the data are not sufficient for classification | Mouse | LOAEL 1.76 mg/l | 13 weeks |
| Hexane | Inhalation | liver | Not classified | Rat | NOAEL Not available | 6 months |
| Hexane | Inhalation | kidney and/or bladder | Not classified | Rat | LOAEL 1.76 mg/l | 6 months |
| Hexane | Inhalation | hematopoietic system | Not classified | Mouse | NOAEL 35.2 mg/l | 13 weeks |
| Hexane | Inhalation | auditory system \| immune system \| eyes | Not classified | Human | NOAEL Not available | occupational exposure |
| Hexane | Inhalation | heart \| skin \| endocrine system | Not classified | Rat | NOAEL 1.76 mg/l | 6 months |
| Hexane | Ingestion | peripheral nervous system | Some positive data exist, but the data are not sufficient for classification | Rat | NOAEL 1,140 mg/kg/day | 90 days |
| Hexane | Ingestion | endocrine system \| hematopoietic system \| liver \| immune system \| kidney and/or bladder | Not classified | Rat | NOAEL Not available | 13 weeks |

**Aspiration Hazard**

| Name | Value |
|---|---|
| Cyclohexane | Aspiration hazard |
| Petroleum distillates | Aspiration hazard |
| Hexane | Aspiration hazard |

**Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.**

# SECTION 12: Ecological information

## Ecotoxicological information

Please contact the address or phone number listed on the first page of the SDS for additional ecotoxicological information on this material and/or its components.

## Chemical fate information

Please contact the address or phone number listed on the first page of the SDS for additional chemical fate information on this material and/or its components.

# SECTION 13: Disposal considerations

### 13.1. Disposal methods

Dispose of contents/ container in accordance with the local/regional/national/international regulations.

Dispose of waste product in a permitted industrial waste facility. Facility must be capable of handling aerosol cans.

**EPA Hazardous Waste Number (RCRA):** D001 (Ignitable)

# SECTION 14: Transport Information

For Transport Information, please visit http://3M.com/Transportinfo or call 1-800-364-3577 or 651-737-6501.

# SECTION 15: Regulatory information

**15.1. US Federal Regulations**
Contact 3M for more information.

**EPCRA 311/312 Hazard Classifications:**

| **Physical Hazards** |
|---|
| Flammable (gases, aerosols, liquids, or solids) |
| Gas under pressure |

| **Health Hazards** |
|---|
| Reproductive toxicity |
| Serious eye damage or eye irritation |
| Simple Asphyxiant |
| Specific target organ toxicity (single or repeated exposure) |

**Section 313 Toxic Chemicals subject to the reporting requirements of that section and 40 CFR part 372 (EPCRA):**

| Ingredient | C.A.S. No | % by Wt |
|---|---|---|
| Cyclohexane | 110-82-7 | Trade Secret 10 - 20 |

**15.2. State Regulations**
Contact 3M for more information.

**15.3. Chemical Inventories**
The components of this product are in compliance with the chemical notification requirements of TSCA. All required components of this product are listed on the active portion of the TSCA Inventory.

Contact 3M for more information.

**15.4. International Regulations**
Contact 3M for more information.

**This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.**

# SECTION 16: Other information

**NFPA Hazard Classification**
**Health:** 2 **Flammability:** 4 **Instability:** 0 **Special Hazards:** None
**Aerosol Storage Code:** 3

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

**HMIS Hazard Classification**
**Health:** *2 **Flammability:** 4 **Physical Hazard:** 0 **Personal Protection:** X - See PPE section.

Hazardous Material Identification System (HMIS® IV) hazard ratings are designed to inform employees of chemical hazards in the workplace. These ratings are based on the inherent properties of the material under expected conditions of normal use and are not intended for use in emergency situations. HMIS® IV ratings are to be used with a fully implemented HMIS® IV program. HMIS® is a registered mark of the American Coatings Association (ACA).

| | | | |
|---|---|---|---|
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# Safety Data Sheet

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|---|---|---|---|
| **Document Group:** | 16-4935-9 | **Version Number:** | 11.00 |
| **Issue Date:** | 04/28/17 | **Supercedes Date:** | 09/23/16 |

## SECTION 1: Identification

### 1.1. Product identifier
3M™ Hi-Strength Spray Adhesive 90 (aerosol)

**Product Identification Numbers**
62-4942-4730-7, 62-4942-4920-4, 62-4942-4921-2, 62-4942-4922-0, 62-4942-4925-3, 62-4942-4927-9, 62-4942-4930-3, 62-4942-4935-2, 62-4942-4950-1, 62-4942-4955-0, 62-4942-4970-9, 62-4942-4975-8, CS-0406-7111-0

### 1.2. Recommended use and restrictions on use

**Recommended use**
Aerosol adhesive. Recommended for industrial and professional use., hi-strength aerosol adhesive

### 1.3. Supplier's details
| | |
|---|---|
| **MANUFACTURER:** | 3M |
| **DIVISION:** | Industrial Adhesives and Tapes Division |
| **ADDRESS:** | 3M Center, St. Paul, MN 55144-1000, USA |
| **Telephone:** | 1-888-3M HELPS (1-888-364-3577) |

### 1.4. Emergency telephone number
1-800-364-3577 or (651) 737-6501 (24 hours)

## SECTION 2: Hazard identification

### 2.1. Hazard classification
Flammable Aerosol: Category 1.
Gas Under Pressure: Liquefied gas.
Serious Eye Damage/Irritation: Category 2B.
Simple Asphyxiant.
Specific Target Organ Toxicity (single exposure): Category 1.
Specific Target Organ Toxicity (single exposure): Category 3.

### 2.2. Label elements
**Signal word**
Danger

**Symbols**

Flame | Gas cylinder | Exclamation mark | Health Hazard |

**Pictograms**

**Hazard Statements**
Extremely flammable aerosol.
Contains gas under pressure; may explode if heated.

Causes eye irritation.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May displace oxygen and cause rapid suffocation.

Causes damage to organs:
cardiovascular system |

**Precautionary Statements**
**General:**
Keep out of reach of children.

**Prevention:**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.
Do not breathe dust/fume/gas/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.
Do not eat, drink or smoke when using this product.
Wash thoroughly after handling.

**Response:**
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF exposed: Call a POISON CENTER or doctor/physician.
Specific treatment (see Notes to Physician on this label).

**Storage:**
Protect from sunlight. Do not expose to temperatures exceeding 50C/122F.
Keep container tightly closed.
Store locked up in a well-ventilated place.

**Disposal:**
Dispose of contents/container in accordance with applicable local/regional/national/international regulations.

**Notes to Physician:**
Exposure may increase myocardial irritability. Do not administer sympathomimetic drugs unless absolutely necessary.

**2.3. Hazards not otherwise classified**

**Supplemental Information:**
Intentional misuse by deliberately concentrating and inhaling contents can be harmful or fatal.

## SECTION 3: Composition/information on ingredients

| Ingredient | C.A.S. No. | % by Wt |
|---|---|---|
| Dimethyl ether | 115-10-6 | 35 - 45 Trade Secret * |
| Methyl acetate | 79-20-9 | 25 - 35 Trade Secret * |
| Nonvolatile components (N.J.T.S. Reg. No. 0449960-6448P) | Trade Secret* | 10 - 20 Trade Secret * |
| Cyclohexane | 110-82-7 | 7 - 13 Trade Secret * |
| 1,1-Difluoroethane | 75-37-6 | 1 - 5 Trade Secret * |
| Pentane | 109-66-0 | 1 - 5 Trade Secret * |

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

## SECTION 4: First aid measures

**4.1. Description of first aid measures**

**Inhalation:**
Remove person to fresh air. Get medical attention.

**Skin Contact:**
Wash with soap and water. If signs/symptoms develop, get medical attention.

**Eye Contact:**
Flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. If signs/symptoms persist, get medical attention.

**If Swallowed:**
Rinse mouth. If you feel unwell, get medical attention.

**4.2. Most important symptoms and effects, both acute and delayed**
See Section 11.1. Information on toxicological effects.

**4.3. Indication of any immediate medical attention and special treatment required**
Exposure may increase myocardial irritability. Do not administer sympathomimetic drugs unless absolutely necessary.

## SECTION 5: Fire-fighting measures

**5.1. Suitable extinguishing media**
Use a fire fighting agent suitable for the surrounding fire.

**5.2. Special hazards arising from the substance or mixture**
Closed containers exposed to heat from fire may build pressure and explode.

**Hazardous Decomposition or By-Products**

| Substance | Condition |
|---|---|
| Carbon monoxide | During Combustion |
| Carbon dioxide | During Combustion |
| Irritant Vapors or Gases | During Combustion |

**5.3. Special protective actions for fire-fighters**
No special protective actions for fire-fighters are anticipated.

## SECTION 6: Accidental release measures

**6.1. Personal precautions, protective equipment and emergency procedures**
Evacuate area. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Use only non-sparking tools. Ventilate the area with fresh air. Warning! A motor could be an ignition source and could cause flammable gases or vapors in the spill area to burn or explode. Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

**6.2. Environmental precautions**
Avoid release to the environment.

**6.3. Methods and material for containment and cleaning up**
If possible, seal leaking container. Place leaking containers in a well-ventilated area, preferably an operating exhaust hood, or if necessary outdoors on an impermeable surface until appropriate packaging for the leaking container or its contents is available. Close cylinder. Collect as much of the spilled material as possible using non-sparking tools. Place in a metal container approved for transportation by appropriate authorities. Dispose of collected material as soon as possible.

## SECTION 7: Handling and storage

**7.1. Precautions for safe handling**
Keep out of reach of children. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not spray on an open flame or other ignition source. Do not pierce or burn, even after use. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid release to the environment. Avoid contact with oxidizing agents (eg. chlorine, chromic acid etc.)

**7.2. Conditions for safe storage including any incompatibilities**
Store in a well-ventilated place. Keep container tightly closed. Protect from sunlight. Do not expose to temperatures exceeding 50C/122F. Store away from heat. Store away from acids. Store away from oxidizing agents.

## SECTION 8: Exposure controls/personal protection

**8.1. Control parameters**

**Occupational exposure limits**
If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.

| Ingredient | C.A.S. No. | Agency | Limit type | Additional Comments |
|---|---|---|---|---|
| Pentane | 109-66-0 | OSHA | TWA:2950 mg/m3(1000 ppm) | |
| Pentane | 109-66-0 | ACGIH | TWA:1000 ppm | |
| Cyclohexane | 110-82-7 | OSHA | TWA:1050 mg/m3(300 ppm) | |
| Cyclohexane | 110-82-7 | ACGIH | TWA:100 ppm | |
| Dimethyl ether | 115-10-6 | AIHA | TWA:1880 mg/m3(1000 ppm) | |
| 1,1-Difluoroethane | 75-37-6 | AIHA | TWA:2700 mg/m3(1000 ppm) | |
| Methyl acetate | 79-20-9 | ACGIH | TWA:200 ppm;STEL:250 ppm | |
| Methyl acetate | 79-20-9 | OSHA | TWA:610 mg/m3(200 ppm) | |

ACGIH : American Conference of Governmental Industrial Hygienists
AIHA : American Industrial Hygiene Association
CMRG : Chemical Manufacturer's Recommended Guidelines

OSHA : United States Department of Labor - Occupational Safety and Health Administration
TWA: Time-Weighted-Average
STEL: Short Term Exposure Limit
CEIL: Ceiling

**8.2. Exposure controls**

**8.2.1. Engineering controls**
Do not remain in area where available oxygen may be reduced. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

**8.2.2. Personal protective equipment (PPE)**

**Eye/face protection**

Select and use eye/face protection to prevent contact based on the results of an exposure assessment. The following eye/face protection(s) are recommended:
Indirect Vented Goggles

**Skin/hand protection**
Select and use gloves and/or protective clothing approved to relevant local standards to prevent skin contact based on the results of an exposure assessment. Selection should be based on use factors such as exposure levels, concentration of the substance or mixture, frequency and duration, physical challenges such as temperature extremes, and other use conditions. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible gloves/protective clothing.
Gloves made from the following material(s) are recommended: Butyl Rubber
Nitrile Rubber

**Respiratory protection**

An exposure assessment may be needed to decide if a respirator is required. If a respirator is needed, use respirators as part of a full respiratory protection program. Based on the results of the exposure assessment, select from the following respirator type(s) to reduce inhalation exposure:
Half facepiece or full facepiece supplied-air respirator
Organic vapor respirators may have short service life.

For questions about suitability for a specific application, consult with your respirator manufacturer.

# SECTION 9: Physical and chemical properties

**9.1. Information on basic physical and chemical properties**

| | |
|---|---|
| **General Physical Form:** | Gas |
| **Specific Physical Form:** | Aerosol |
| **Odor, Color, Grade:** | clear, sweet fruity odor |
| **Odor threshold** | *No Data Available* |
| **pH** | *No Data Available* |
| **Melting point** | *Not Applicable* |
| **Boiling Point** | *Not Applicable* |
| **Flash Point** | -42.00 ºF [*Test Method:*Tagliabue Closed Cup] |
| **Evaporation rate** | 1.9 [*Ref Std:*ETHER=1] |
| **Flammability (solid, gas)** | Flammable Aerosol: Category 1. |
| **Flammable Limits(LEL)** | *No Data Available* |
| **Flammable Limits(UEL)** | *No Data Available* |
| **Vapor Density** | 2.97 [*Ref Std:*AIR=1] |
| **Density** | 0.726 g/ml |

| | |
|---|---|
| **Specific Gravity** | 0.726 [*Ref Std:*WATER=1] |
| **Solubility in Water** | Nil |
| **Solubility- non-water** | *No Data Available* |
| **Partition coefficient: n-octanol/ water** | *No Data Available* |
| **Autoignition temperature** | *No Data Available* |
| **Decomposition temperature** | *Not Applicable* |
| **Viscosity** | *Not Applicable* |
| **Hazardous Air Pollutants** | <=0 % weight [*Test Method:*Calculated] |
| **Molecular weight** | *No Data Available* |
| **VOC Less H2O & Exempt Solvents** | <=55 % [*Test Method:*calculated per CARB title 2] |

## SECTION 10: Stability and reactivity

**10.1. Reactivity**
This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

**10.2. Chemical stability**
Stable.

**10.3. Possibility of hazardous reactions**
Hazardous polymerization will not occur.

**10.4. Conditions to avoid**
Heat

**10.5. Incompatible materials**
Strong oxidizing agents

**10.6. Hazardous decomposition products**

| **Substance** | **Condition** |
|---|---|
| None known. | |

Refer to section 5.2 for hazardous decomposition products during combustion.

## SECTION 11: Toxicological information

**The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.**

**11.1. Information on Toxicological effects**

**Signs and Symptoms of Exposure**

**Based on test data and/or information on the components, this material may produce the following health effects:**

**Inhalation:**
Intentional concentration and inhalation may be harmful or fatal.

Simple Asphyxiation: Signs/symptoms may include increased heart rate, rapid respirations, drowsiness, headache,

incoordination, altered judgement, nausea, vomiting, lethargy, seizures, coma, and may be fatal.

Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

May cause additional health effects (see below).

**Skin Contact:**
Mild Skin Irritation: Signs/symptoms may include localized redness, swelling, itching, and dryness.

**Eye Contact:**
Moderate Eye Irritation: Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

**Ingestion:**
Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

May cause additional health effects (see below).

**Additional Health Effects:**

**Single exposure may cause target organ effects:**
Central Nervous System (CNS) Depression: Signs/symptoms may include headache, dizziness, drowsiness, incoordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness.

Single exposure, above recommended guidelines, may cause:
Cardiac Sensitization: Signs/symptoms may include irregular heartbeat (arrhythmia), faintness, chest pain, and may be fatal.

**Toxicological Data**
If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

**Acute Toxicity**

| Name | Route | Species | Value |
|---|---|---|---|
| Overall product | Dermal | | No data available; calculated ATE >5,000 mg/kg |
| Overall product | Inhalation-Vapor(4 hr) | | No data available; calculated ATE >50 mg/l |
| Overall product | Ingestion | | No data available; calculated ATE >5,000 mg/kg |
| Dimethyl ether | Inhalation-Gas (4 hours) | Rat | LC50 164,000 ppm |
| Methyl acetate | Dermal | Rat | LD50 > 2,000 mg/kg |
| Methyl acetate | Inhalation-Vapor (4 hours) | Rat | LC50 > 49 mg/l |
| Methyl acetate | Ingestion | Rat | LD50 > 5,000 mg/kg |
| Cyclohexane | Dermal | Rat | LD50 > 2,000 mg/kg |
| Cyclohexane | Inhalation-Vapor (4 hours) | Rat | LC50 > 32.9 mg/l |
| Cyclohexane | Ingestion | Rat | LD50 6,200 mg/kg |
| Nonvolatile components (N.J.T.S. Reg. No. 0449960-6448P) | Dermal | | LD50 estimated to be > 5,000 mg/kg |
| Nonvolatile components (N.J.T.S. Reg. No. 0449960-6448P) | Ingestion | Rat | LD50 > 34,000 mg/kg |
| Pentane | Dermal | Rabbit | LD50 3,000 mg/kg |
| Pentane | Inhalation-Vapor (4 hours) | Rat | LC50 > 18 mg/l |
| Pentane | Ingestion | Rat | LD50 > 2,000 mg/kg |
| 1,1-Difluoroethane | Inhalation- | Rat | LC50 > 437,000 ppm |

| | | | |
|---|---|---|---|
| | Gas (4 hours) | | |
| 1,1-Difluoroethane | Ingestion | Rat | LD50 > 1,500 mg/kg |

ATE = acute toxicity estimate

**Skin Corrosion/Irritation**

| Name | Species | Value |
|---|---|---|
| Methyl acetate | Rabbit | No significant irritation |
| Cyclohexane | Rabbit | Mild irritant |
| Pentane | Rabbit | Minimal irritation |

**Serious Eye Damage/Irritation**

| Name | Species | Value |
|---|---|---|
| Methyl acetate | Rabbit | Moderate irritant |
| Cyclohexane | Rabbit | Mild irritant |
| Pentane | Rabbit | Mild irritant |

**Skin Sensitization**

| Name | Species | Value |
|---|---|---|
| Methyl acetate | Human | Not classified |
| Pentane | Guinea pig | Not classified |

**Respiratory Sensitization**

For the component/components, either no data are currently available or the data are not sufficient for classification.

**Germ Cell Mutagenicity**

| Name | Route | Value |
|---|---|---|
| Dimethyl ether | In Vitro | Not mutagenic |
| Dimethyl ether | In vivo | Not mutagenic |
| Methyl acetate | In Vitro | Not mutagenic |
| Methyl acetate | In vivo | Not mutagenic |
| Cyclohexane | In Vitro | Not mutagenic |
| Cyclohexane | In vivo | Some positive data exist, but the data are not sufficient for classification |
| Pentane | In vivo | Not mutagenic |
| Pentane | In Vitro | Some positive data exist, but the data are not sufficient for classification |
| 1,1-Difluoroethane | In Vitro | Some positive data exist, but the data are not sufficient for classification |
| 1,1-Difluoroethane | In vivo | Some positive data exist, but the data are not sufficient for classification |

**Carcinogenicity**

| Name | Route | Species | Value |
|---|---|---|---|
| Dimethyl ether | Inhalation | Rat | Not carcinogenic |
| 1,1-Difluoroethane | Inhalation | Rat | Some positive data exist, but the data are not sufficient for classification |

**Reproductive Toxicity**

**Reproductive and/or Developmental Effects**

| Name | Route | Value | Species | Test Result | Exposure Duration |
|---|---|---|---|---|---|
| Dimethyl ether | Inhalation | Not classified for development | Rat | NOAEL 40,000 ppm | during organogenesis |
| Cyclohexane | Inhalation | Not classified for female reproduction | Rat | NOAEL 24 | 2 generation |

| | | | | | |
|---|---|---|---|---|---|
| | | | | mg/l | |
| Cyclohexane | Inhalation | Not classified for male reproduction | Rat | NOAEL 24 mg/l | 2 generation |
| Cyclohexane | Inhalation | Not classified for development | Rat | NOAEL 6.9 mg/l | 2 generation |
| Pentane | Ingestion | Not classified for development | Rat | NOAEL 1,000 mg/kg/day | during organogenesis |
| Pentane | Inhalation | Not classified for development | Rat | NOAEL 30 mg/l | during organogenesis |
| 1,1-Difluoroethane | Inhalation | Not classified for development | Rat | NOAEL 50,000 ppm | during organogenesis |

## Target Organ(s)

## Specific Target Organ Toxicity - single exposure

| Name | Route | Target Organ(s) | Value | Species | Test Result | Exposure Duration |
|---|---|---|---|---|---|---|
| Dimethyl ether | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Rat | LOAEL 10,000 ppm | 30 minutes |
| Dimethyl ether | Inhalation | cardiac sensitization | Some positive data exist, but the data are not sufficient for classification | Dog | NOAEL 100,000 ppm | 5 minutes |
| Methyl acetate | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human and animal | NOAEL Not available | |
| Methyl acetate | Inhalation | respiratory irritation | May cause respiratory irritation | Human and animal | NOAEL Not available | |
| Methyl acetate | Inhalation | blindness | Not classified | | NOAEL Not available | |
| Methyl acetate | Ingestion | central nervous system depression | May cause drowsiness or dizziness | | NOAEL Not available | |
| Cyclohexane | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human and animal | NOAEL Not available | |
| Cyclohexane | Inhalation | respiratory irritation | Some positive data exist, but the data are not sufficient for classification | Human and animal | NOAEL Not available | |
| Cyclohexane | Ingestion | central nervous system depression | May cause drowsiness or dizziness | Professional judgement | NOAEL Not available | |
| Pentane | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Multiple animal species | NOAEL Not available | not available |
| Pentane | Inhalation | respiratory irritation | Some positive data exist, but the data are not sufficient for classification | Not available | NOAEL Not available | not available |
| Pentane | Inhalation | cardiac sensitization | Not classified | Dog | NOAEL Not available | not available |
| Pentane | Ingestion | central nervous system depression | May cause drowsiness or dizziness | Professional judgement | NOAEL Not available | not available |
| 1,1-Difluoroethane | Inhalation | cardiac sensitization | Causes damage to organs | Human and animal | NOAEL Not available | poisoning and/or abuse |
| 1,1-Difluoroethane | Inhalation | central nervous system depression | May cause drowsiness or dizziness | Human and animal | NOAEL 100,000 ppm | |
| 1,1-Difluoroethane | Inhalation | respiratory irritation | Some positive data exist, but the data are not sufficient for classification | Not available | NOAEL Not available | not available |

**Specific Target Organ Toxicity - repeated exposure**

| Name | Route | Target Organ(s) | Value | Species | Test Result | Exposure Duration |
|---|---|---|---|---|---|---|
| Dimethyl ether | Inhalation | hematopoietic system | Not classified | Rat | NOAEL 25,000 ppm | 2 years |
| Dimethyl ether | Inhalation | liver | Not classified | Rat | NOAEL 20,000 ppm | 30 weeks |
| Methyl acetate | Inhalation | respiratory system | Some positive data exist, but the data are not sufficient for classification | Rat | NOAEL 1.1 mg/l | 28 days |
| Methyl acetate | Inhalation | endocrine system \| hematopoietic system \| liver \| immune system \| kidney and/or bladder | Not classified | Rat | NOAEL 6.1 mg/l | 28 days |
| Cyclohexane | Inhalation | liver | Not classified | Rat | NOAEL 24 mg/l | 90 days |
| Cyclohexane | Inhalation | auditory system | Not classified | Rat | NOAEL 1.7 mg/l | 90 days |
| Cyclohexane | Inhalation | kidney and/or bladder | Not classified | Rabbit | NOAEL 2.7 mg/l | 10 weeks |
| Cyclohexane | Inhalation | hematopoietic system | Not classified | Mouse | NOAEL 24 mg/l | 14 weeks |
| Cyclohexane | Inhalation | peripheral nervous system | Not classified | Rat | NOAEL 8.6 mg/l | 30 weeks |
| Pentane | Inhalation | peripheral nervous system | Not classified | Human | NOAEL Not available | occupational exposure |
| Pentane | Inhalation | heart \| skin \| endocrine system \| bone, teeth, nails, and/or hair \| hematopoietic system \| liver \| immune system \| muscles \| nervous system \| eyes \| kidney and/or bladder \| respiratory system | Not classified | Rat | NOAEL 20 mg/l | 13 weeks |
| Pentane | Ingestion | kidney and/or bladder | Not classified | Rat | NOAEL 2,000 mg/kg/day | 28 days |
| 1,1-Difluoroethane | Inhalation | hematopoietic system \| kidney and/or bladder \| respiratory system | Not classified | Rat | NOAEL 25,000 ppm | 2 years |

**Aspiration Hazard**

| Name | Value |
|---|---|
| Cyclohexane | Aspiration hazard |
| Pentane | Aspiration hazard |

**Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.**

# SECTION 12: Ecological information

## Ecotoxicological information

Please contact the address or phone number listed on the first page of the SDS for additional ecotoxicological information on this material and/or its components.

## Chemical fate information

Please contact the address or phone number listed on the first page of the SDS for additional chemical fate information on this material and/or its components.

## SECTION 13: Disposal considerations

**13.1. Disposal methods**
Dispose of contents/ container in accordance with the local/regional/national/international regulations.

Dispose of waste product in a permitted industrial waste facility. As a disposal alternative, incinerate in a permitted waste incineration facility. Facility must be capable of handling aerosol cans. The facility should be equipped to handle gaseous waste. Empty drums/barrels/containers used for transporting and handling hazardous chemicals (chemical substances/mixtures/preparations classified as Hazardous as per applicable regulations) shall be considered, stored, treated & disposed of as hazardous wastes unless otherwise defined by applicable waste regulations. Consult with the respective regulating authorities to determine the available treatment and disposal facilities.

**EPA Hazardous Waste Number (RCRA):** D001 (Ignitable)

## SECTION 14: Transport Information

For Transport Information, please visit http://3M.com/Transportinfo or call 1-800-364-3577 or 651-737-6501.

## SECTION 15: Regulatory information

**15.1. US Federal Regulations**
Contact 3M for more information.

**311/312 Hazard Categories:**

Fire Hazard - Yes Pressure Hazard - Yes Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - No

**EPCRA 311/312 Hazard Classifications (effective January 1, 2018):**

| **Physical Hazards** |
|---|
| Flammable (gases, aerosols, liquids, or solids) |
| Gas under pressure |

| **Health Hazards** |
|---|
| Serious eye damage or eye irritation |
| Simple Asphyxiant |
| Specific target organ toxicity (single or repeated exposure) |

**Section 313 Toxic Chemicals subject to the reporting requirements of that section and 40 CFR part 372 (EPCRA):**

| Ingredient | C.A.S. No | % by Wt |
|---|---|---|
| Cyclohexane | 110-82-7 | Trade Secret 7 - 13 |

**15.2. State Regulations**
Contact 3M for more information.

**15.3. Chemical Inventories**
The components of this product are in compliance with the chemical notification requirements of TSCA.

Contact 3M for more information.

**15.4. International Regulations**
Contact 3M for more information.

**This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.**

## SECTION 16: Other information

**NFPA Hazard Classification**
**Health:** 2 **Flammability:** 4 **Instability:** 0 **Special Hazards:** None
**Aerosol Storage Code:** 3

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

| | | | |
|---|---|---|---|
| **Document Group:** | 16-4935-9 | **Version Number:** | 11.00 |
| **Issue Date:** | 04/28/17 | **Supercedes Date:** | 09/23/16 |

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**3M USA SDSs are available at www.3M.com**

## ATTACHMENT 15

SDS - Sunblock Lotion

## SECTION 1 PRODUCT IDENTIFICATION

Manufacturer: CCI
Address: 417 Richard Road, Rockledge, FL 32955
Emergency Phone Number: 321-636-0717
Effective Date: March 1991
Date Last Revised: August 2009
Trade Name: Sunscreen Lotion SPF 15, 30, 33, 45
Chemical Name: None
Chemical Family: None
CAS NO. - None
MIS Hazard rating

| | | |
|---|---|---|
| Health | 1 | 4= Extreme |
| Fire | 0 | 3=High |
| Reactivity | 0 | 2=Moderate |
| | | 1=Slight |
| | | 0=Insignificant |

## SECTION II HAZARDOUS INGREDIENTS

| Ingredients | CAS NO | % | ACGIH/TWA | OSHA/STEL | OTHER |
|---|---|---|---|---|---|
| NL | NL | | None | None | None |

NE= NOT ESTABLISHED NL = NOT LISTED C = IDENTIFIED AS A CARCINOGEN BY OSHA IARC OR NTP

## SECTION III PHYSICAL DATA

| | |
|---|---|
| Boiling Point [deg f] | ND |
| Melting Point [deg f] | ND |
| Vapor pressure [mm.hg] | ND |
| Vapor Density [air=1] | ND |
| Specific Gravity [H2O=1] | .98 |
| Evaporation Rate | ND |
| Solubility in Water | Dispersible |
| Appearance/Odor | SPF 15: White lotion / mild odor |
| | SPF 30, 33: Off white lotion / mild odor |
| | SPF 45: Pale yellow lotion / mild odor |

NA = NOT APPLICABLE NV = NOT VOLATILE ND = NOT DETERMINED

## SECTION IV FIRE AND EXPLOSION HAZARD DATA

| | |
|---|---|
| Flash Point [deg f] | ND |
| Lower Explosion Limit | ND |
| Upper explosive Limit | ND |
| Extinguishing Media | CO2, dry chemical, BC/ABC extinguisher |

Special Fire Fighting Procedures None

Unusual Fire/Explosion Hazards None

ND = NOT DETERMINED

## SECTION V HEALTH HAZARD DATA

Permissible Exposure Level See section II for hazardous ingredients present in this product and their corresponding TLV's.

Effects of Over Exposure:
Eyes - Prolonged contact can cause irritation, redness, and blurred vision.
Skin - Non Irritant
Toxicity Data:
Oral Toxicity - Greater than 5g/kg
Eye Irritation - ND
Dermal Irritation - Non primary irritant
First Aid Procedures
Eye Contact - Immediately flush with copious amounts of water for at least 15 minutes. Consult physician.
Skin Contact - NA
Ingestion - Contact a physician.
Inhalation - Remove to fresh air. If necessary, give oxygen, artificial respiration. Contact physician.

## SECTION VI REACTIVITY DATA

Chemical Stability: Stable
Conditions to Avoid: Extremely high temperatures
Incompatible Materials: Strong oxidizing agents
Hazardous Decomposition Products: None known
Hazardous Polymerization: Will not occur

## SECTION VII SPILL OR LEAK PROCEDURE

For Large Spills: Flush to industrial sewer or soak up with sand or sweeping compound and dispose as solid waste.
For Small Spills: Flush to industrial sewer.
Waste Disposal: In accordance with local, state, and federal regulations.

## SECTION VIII SPECIAL PROTECTION INFORMATION

Respiratory Protection: Not required
Eye Protection: Chemical goggles
Protective Gloves: Not required
Ventilation: Not required
Other Protective Equipment: Not required

## SECTION IX SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storage: Keep container closed.
Other Precautions: Spilled material is quite slippery.

## SECTION X TRANSPORTATION REGULATORY INFORMATION

DOT Proper Shipping Name: Cosmetics
DOT Classification: None
UN/NA Number: None
Label: None

## SECTION XI OTHER REGULATORY CONTROLS

TSCA: None
SARA Title III: None
CTFA Designation: None
California Prop 65: None detectable

While the information and recommendations set forth herein are believed to be accurate as of the date hereon, we make no warranty with respect thereto and disclaim all liability from reliance thereon.

Prepared By - L Shields – August 2009

## ATTACHMENTS

1. SDS - Base Oil and Additives Mobil 2 Stroke Oil
2. SDS - Diesel Fuel
3. SDS - Four-Stroke Small Engine Oil
4. SDS - Gasoline with Ethanol
5. SDS - Liquid Propane Canister
6. SDS - Universal Bar Chain Oil
7. SDS - Vaseline Petroleum Jelly
8. SDS - WD-40-multi-use-product-aerosol

## ATTACHMENT 1

SDS - Base Oil and Additives Mobil 2 Stroke Oil

# SAFETY DATA SHEET

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT**

**Product Name:** **MOBIL 2 STROKE OIL**
**Product Description:** Base Oil and Additives
**Product Code:** 201515109510, 410449-85
**Intended Use:** Two cycle engine oil

**COMPANY IDENTIFICATION**

**Supplier:** **East Coast Lubes Pty Ltd (Queensland and Northern Territory)**
A.B.N. 37 117 203 611
Cnr North and Mort Streets
Toowoomba, Queensland 4350 Australia

**24 Hour Emergency Telephone** 1300 131 001

**Supplier General Contact** 1800 069 019

**Supplier:** **Southern Cross Lubes (Victoria and Tasmania, New South Wales and Australian Capital Territory)**
58-66 Ajax Road
Altona, Victoria 3018, Australia

**24 Hour Emergency Telephone** 1300 131 001
**Product Technical Information**
**Supplier General Contact** 1300 466 245
1300 552 861

**Supplier:** **Perkal Pty Ltd Trading as Statewide Oil (Western Australia)**
A.B.N. 43 009 283 363
14 Beete Street
Welshpool, Western Australia 6106 Australia

**24 Hour Emergency Telephone** (8:00am to 4:30pm Mon to Fri) 1300 919 904
**Product Technical Information**
**Supplier General Contact** (08) 9350 6777
(08) 9350 6777

**Supplier:** **Perkal Pty Ltd Trading as Statewide Oil (South Australia)**
A.B.N. 43 009 283 363
6-10 Streiff Rd
Wingfield, South Australia 5013 Australia

**24 Hour Emergency Telephone** (8:00am to 4:30pm Mon to Fri) 1300 919 904
**Product Technical Information**
**Supplier General Contact** (08) 8359 8995
(08) 8359 8995

## SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

**GHS CLASSIFICATION:**

Flammable liquid: Category 4.

**GHS Label Elements:**

**Pictogram:** No Pictogram

**Signal Word:** Warning

**Hazard Statements:**

Physical: H227: Combustible liquid.

**Precautionary Statements:**

General: P101: If medical advice is needed, have product container or label at hand. P102: Keep out of reach of children. P103: Read label before use.
Prevention: P210: Keep away from flames and hot surfaces. No smoking. P280: Wear protective gloves and eye / face protection.
Response: P370 + P378: In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish.
Storage: P403 + P235: Store in a well-ventilated place. Keep cool.
Disposal: P501: Dispose of contents and container in accordance with local regulations.

**Contains:** C14-16-18 ALKYL PHENOL May produce an allergic reaction.

**Other hazard information:**

**Physical / Chemical Hazards:**
Material can accumulate static charges which may cause an ignition. Material can release vapours that readily form flammable mixtures. Vapour accumulation could flash and/or explode if ignited. Combustible.

**Health Hazards:**
Excessive exposure may result in eye, skin, or respiratory irritation. Breathing of high vapour concentrations may cause dizziness, light-headedness, headache, nausea and loss of co-ordination. Continued inhalation may result in unconsciousness.

**Environmental Hazards:**
No significant hazards.

**NOTE:** This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

## SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

**Hazardous Substance(s) or Complex Substance(s) required for disclosure**

| Name | CAS# | Concentration* | GHS Hazard Codes |
|---|---|---|---|
| C14-16-18 ALKYL PHENOL | Confidential | 0.1 - < 1% | H317, H373 |
| DISTILLATES (PETROLEUM), HYDROTREATED LIGHT | 64742-47-8 | 20 - < 30% | H227, H304 |

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. Other ingredients determined not to be hazardous up to 100%.

## SECTION 4 FIRST AID MEASURES

**INHALATION**

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

**SKIN CONTACT**

Wash contact areas with soap and water.

**EYE CONTACT**

Flush thoroughly with water. If irritation occurs, get medical assistance.

**INGESTION**

First aid is normally not required. Seek medical attention if discomfort occurs.

**NOTE TO PHYSICIAN**

None

## SECTION 5 FIRE FIGHTING MEASURES

**EXTINGUISHING MEDIA**

**Appropriate Extinguishing Media:** Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

**Inappropriate Extinguishing Media:** Straight streams of water

**FIRE FIGHTING**

**Fire Fighting Instructions:** Evacuate area. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

**Unusual Fire Hazards:** Combustible. The product may form flammable mixtures and can burn only when heated above the flash point.

**Hazardous Combustion Products:** Aldehydes, Oxides of carbon, Smoke, Fume, Sulphur oxides

**FLAMMABILITY PROPERTIES**

**Flash Point [Method]:** >70°C (158°F) [ASTM D-93]
**Flammable Limits (Approximate volume % in air):** LEL: N/D UEL: N/D
**Autoignition Temperature:** N/D

## SECTION 6 ACCIDENTAL RELEASE MEASURES

**NOTIFICATION PROCEDURES**

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

**PROTECTIVE MEASURES**

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

**SPILL MANAGEMENT**

**Land Spill:** Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapour, but may not prevent ignition in enclosed spaces. Recover by pumping or with suitable absorbent.

**Water Spill:** Stop leak if you can do so without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

**ENVIRONMENTAL PRECAUTIONS**

Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

## SECTION 7 HANDLING AND STORAGE

## HANDLING

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or earthing procedures. However, bonding and earthing may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

**Static Accumulator:** This material is a static accumulator.

## STORAGE

The type of container used to store the material may affect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Keep away from incompatible materials. Storage containers should be earthed and bonded. Fixed storage containers, transfer containers and associated equipment should be earthed and bonded to prevent accumulation of static charge.

Material is defined under the National Standard [NOHSC:1015] Storage and Handling of Workplace Dangerous Goods.

## SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE LIMIT VALUES

**Exposure limits/standards (Note: Exposure limits are not additive)**

| Substance Name | Form | Limit/Standard | | | Note | Source |
|---|---|---|---|---|---|---|
| DISTILLATES (PETROLEUM), HYDROTREATED LIGHT | Vapour. | TWA | 1200 mg/m3 | 165 ppm | | ExxonMobil |

**Exposure limits/standards for materials that can be formed when handling this product:**

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

**Biological limits**

No biological limits allocated.

### ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

### PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use

with this material, as provided below, is based upon intended, normal usage.

**Respiratory Protection:** If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Particulate

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapour warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

**Hand Protection:** Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Nitrile,Viton

No protection is ordinarily required under normal conditions of use.

**Eye Protection:** If contact is likely, safety glasses with side shields are recommended.

**Skin and Body Protection:** Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

**Specific Hygiene Measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practise good housekeeping.

**ENVIRONMENTAL CONTROLS**

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

**Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.**

**GENERAL INFORMATION**

**Physical State:** Liquid
**Colour:** Blue-Green
**Odour:** Characteristic
**Odour Threshold:** N/D

**IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION**

**Relative Density:** 0.866

**Flammability (Solid, Gas):** N/A
**Flash Point [Method]:** >70°C (158°F) [ASTM D-93]
**Flammable Limits (Approximate volume % in air):** LEL: N/D UEL: N/D
**Autoignition Temperature:** N/D
**Boiling Point / Range:** > 316°C (600°F)
**Decomposition Temperature:** N/D
**Vapour Density (Air = 1):** N/D
**Vapour Pressure:** < 0.013 kPa (0.1 mm Hg) at 20 ºC
**Evaporation Rate (n-butyl acetate = 1):** N/D
**pH:** N/A
**Log Pow (n-Octanol/Water Partition Coefficient):** > 3.5
**Solubility in Water:** Negligible
**Viscosity:** 48.1 cSt (48.1 mm2/sec) at 40 ºC | 7.5 cSt (7.5 mm2/sec) at 100°C
**Oxidizing Properties:** See Hazards Identification Section.

**OTHER INFORMATION**

**Freezing Point:** N/D
**Melting Point:** N/A
**Pour Point:** -6°C (21°F)
**DMSO Extract (mineral oil only), IP-346:** < 3 %wt

## SECTION 10 STABILITY AND REACTIVITY

**STABILITY:** Material is stable under normal conditions.

**CONDITIONS TO AVOID:** Heat, sparks, flame, and build up of static electricity.

**INCOMPATIBLE MATERIALS:** Strong oxidisers

**HAZARDOUS DECOMPOSITION PRODUCTS:** Material does not decompose at ambient temperatures.

**POSSIBILITY OF HAZARDOUS REACTIONS:** Hazardous polymerization will not occur.

## SECTION 11 TOXICOLOGICAL INFORMATION

**INFORMATION ON TOXICOLOGICAL EFFECTS**

| Hazard Class | Conclusion / Remarks |
|---|---|
| **Inhalation** | |
| Acute Toxicity: No end point data for material. | Minimally Toxic. Based on assessment of the components. |
| Irritation: No end point data for material. | Elevated temperatures or mechanical action may form vapours, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. |
| **Ingestion** | |
| Acute Toxicity: No end point data for material. | Minimally Toxic. Based on assessment of the components. |
| **Skin** | |
| Acute Toxicity: No end point data for material. | Minimally Toxic. Based on assessment of the components. |
| Skin Corrosion/Irritation: No end point data | Negligible irritation to skin at ambient temperatures. Based on |

| | |
|---|---|
| for material. | assessment of the components. |
| **Eye** | |
| Serious Eye Damage/Irritation: No end point data for material. | May cause mild, short-lasting discomfort to eyes. Based on assessment of the components. |
| **Sensitisation** | |
| Respiratory Sensitization: No end point data for material. | Not expected to be a respiratory sensitizer. |
| Skin Sensitization: No end point data for material. | Not expected to be a skin sensitizer. Based on assessment of the components. |
| **Aspiration:** Data available. | Not expected to be an aspiration hazard. Based on physico-chemical properties of the material. |
| **Germ Cell Mutagenicity:** No end point data for material. | Not expected to be a germ cell mutagen. Based on assessment of the components. |
| **Carcinogenicity:** No end point data for material. | Not expected to cause cancer. Based on assessment of the components. |
| **Reproductive Toxicity:** No end point data for material. | Not expected to be a reproductive toxicant. Based on assessment of the components. |
| **Lactation:** No end point data for material. | Not expected to cause harm to breast-fed children. |
| **Specific Target Organ Toxicity (STOT)** | |
| Single Exposure: No end point data for material. | Not expected to cause organ damage from a single exposure. |
| Repeated Exposure: No end point data for material. | Not expected to cause organ damage from prolonged or repeated exposure. Based on assessment of the components. |

**OTHER INFORMATION**

**For the product itself:**

Vapour/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anaesthesia, drowsiness, unconsciousness and other central nervous system effects including death. Component concentrations in this formulation would not be expected to cause skin sensitization, based on tests of the components, this formulation, or similar formulations.

**Contains:**

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitising in test animals.

**IARC Classification:**

**The following ingredients are cited on the lists below:** None.

--REGULATORY LISTS SEARCHED--

1 = IARC 1 2 = IARC 2A 3 = IARC 2B

## SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

**ECOTOXICITY**

Material -- Not expected to be harmful to aquatic organisms.

**MOBILITY**

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

High molecular wt. component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

**PERSISTENCE AND DEGRADABILITY**

**Biodegradation:**

Majority of components -- Expected to be inherently biodegradable

**Atmospheric Oxidation:**

More volatile component -- Expected to degrade rapidly in air

**BIOACCUMULATION POTENTIAL**

Majority of components -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

## SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

**DISPOSAL RECOMMENDATIONS**

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants. Product is suitable for burning in an enclosed, controlled burner for fuel value or disposal by supervised incineration.

**Empty Container Warning** Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

## SECTION 14 TRANSPORT INFORMATION

**LAND (ADG)** : Not Regulated for Land Transport

**SEA (IMDG):** Not Regulated for Sea Transport according to IMDG-Code

**Marine Pollutant:** No

**AIR (IATA):** Not Regulated for Air Transport

## SECTION 15 REGULATORY INFORMATION

This material is considered hazardous according to Australia Model Work Health and Safety Regulations.

Product is not regulated according to Australian Dangerous Goods Code.

No Poison Schedule number allocated by the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) established under the Therapeutic Goods Act.

AS1940 COMBUSTIBLE CLASS: C1

**REGULATORY STATUS AND APPLICABLE LAWS AND REGULATIONS**

**Listed or exempt from listing/notification on the following chemical inventories (May contain substance(s) subject to notification to the EPA Active TSCA inventory prior to import to USA):** AIIC, DSL, ENCS, IECSC, KECI, PICCS, TSCA

## SECTION 16 OTHER INFORMATION

**KEY TO ABBREVIATIONS AND ACRONYMS:**

N/D = Not determined, N/A = Not applicable, STEL = Short-Term Exposure Limit, TWA = Time-Weighted Average

**KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):**
H227: Combustible liquid; Flammable Liquid, Cat 4
H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1
H317: May cause allergic skin reaction; Skin Sensitization, Cat 1
H373: May cause damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 2

**THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:**
Perkal Pty Ltd Trading as Statewide Oil (South Australia): Section 01: Supplier Mailing Address information was modified.
Perkal Pty Ltd Trading as Statewide Oil (Western Australia): Section 01: Supplier Mailing Address information was modified.
Southern Cross Lubes (Victoria and Tasmania, New South Wales and Australian Capital Territory): Section 01: Supplier Mailing Address information was modified.
Australia Storage and Handling for combustible liquids statement NOHSC:1015 information was modified.
Composition: Concentration Footnote information was modified.
Composition: Defined as statement (GHS) information was modified.
Composition: No components information was added.
Composition: No components information was deleted.
GHS Physical/Chemical Classification information was modified.
Hazard Identification: AU - Hazards Statement - GHS information was modified.
Section 01: Company Mailing Address information was modified.
Section 01: Product Code information was modified.
Section 06: Accidental Release Measures - Environmental Precautions information was modified.
Section 06: Protective Measures information was modified.
Section 08: Biological Limits - Allocation information was modified.
Section 08: Environmental Control - Note information was modified.
Section 08: Personal Protection information was modified.
Section 09: Phys/Chem Properties Note information was modified.

Section 11: Additional Health Information information was modified.
Section 11: Other Health Effects information was modified.
Section 12: Ecological Information - Acute Aquatic Toxicity information was modified.
Section 12: Ecological Information - Atmospheric Oxidation information was modified.
Section 12: Ecological Information - Bioaccumulation information was modified.
Section 12: Ecological Information - Biodegradation information was modified.
Section 12: Ecological Information - Mobility information was modified.
Section 13: Disposal Considerations - Disposal Recommendations information was modified.
Section 13: Disposal Recommendations - Note information was modified.
Section 15: Australian Dangerous Goods Code information was modified.
Section 15: Australian Poison Schedule Allocated information was modified.
Section 15: National Chemical Inventory Listing information was modified.
Section 16: HCode Key information was modified.
Section 16: MSN, MAT ID information was modified.

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DGN: 7041097DAU (1012824)

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Prepared by: Exxon Mobil Corporation
EMBSI, Clinton NJ USA
Contact Point: See Section 1 for Local Contact number

**End of (M)SDS**

## ATTACHMENT 2

SDS - Diesel Fuel

## 1. IDENTIFICATION

| | |
|---|---|
| Product Identifier | Diesel Fuel |
| Synonyms: | Diesel Fuel, Motor Vehicle Diesel Fuel, Dyed Diesel, * DieselOne®, * DieselOne® w/Platinum Plus DFX, Low Sulfur Diesel (LSD), Ultra Low Sulfur Diesel (ULSD) |
| Intended use of the product: | Fuel |
| Contact: | Global Companies LLC<br>Water Mill Center<br>800 South St.<br>Waltham, MA 02454-9161<br>www.globalp.com |
| Contact Information: | EMERGENCY TELEPHONE NUMBER (24 hrs): CHEMTREC (800) 424-9300<br>COMPANY CONTACT (business hours): 800-542-0778 |

## 2. HAZARD IDENTIFICATION

**According to OSHA 29 CFR 1910.1200 HCS**

Classification of the Substance or Mixture

Classification (GHS-US):

| | | |
|---|---|---|
| Flam. Liquid | Category 3 | H226 |
| Skin Corrosion/Irritation | Category 2 | H315 |
| Aspiration Hazard | Category 1 | H304 |
| STOT SE | Category 3 | H336 |
| Carcinogenicity | Category 2 | H350 |
| Aquatic Chronic | Category 2 | H411 |
| Serious Eye Damage/ Irritation | Category 2B | H319 |

Labeling Elements

| | |
|---|---|
| Signal Word (GHS-US): | **Danger** |
| Hazard Statements (GHS-US): | H226 – Flammable liquid and vapor.<br>H315 – Causes Skin irritation.<br>H304 – May be fatal if swallowed and enters airways.<br>H336 – May cause drowsiness or dizziness.<br>H350 – May cause cancer.<br>H411 – Toxic to aquatic life with long lasting effects.<br>H319 – May cause eye damage/irritation. |
| Precautionary Statements (GHS-US): | P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.<br>P233 - Keep container tightly closed.<br>P240 – Ground/bond container and receiving equipment. |

P241 – Use explosion-proof electrical/ventilating/lighting equipment pursuant to applicable electrical code.
P242 – Use only non-sparking tools.
P243 – Take precautionary measures against static discharge.
P261 – Avoid breathing dust/fume/gas/mist/vapors/spray.
P264 – Wash skin thoroughly after handling.
P271 – Use only outdoors or in a well-ventilated area.
P273 – Avoid release to the environment.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P303+361+353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse with water/shower.
P308+311 - If exposed or concerned: Get medical advice/attention.
P301+310 - If swallowed: Immediately call a poison center/doctor/…
P331 - Do NOT induce vomiting.
P370+P378 – In case of fire use firefighting foam or other appropriate media for Class B fires to extinguish.
P403+235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 – Dispose of contents/container in accordance with local/regional/national/international regulation.

**Other information:**

NFPA 704
Health: 1
Fire: 2
Reactivity: 0

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

**Chemical Composition Information**
Mixture

| Name | Product Identifier (CAS#) | % (w/w) | Classification |
|---|---|---|---|
| Diesel Fuel | 68476-34-6 | 100 | Flam Liq. 3, H226; Skin Irrit. 2, H315; Aspiration 1, H304; STOT SE 3, H336; Carc.2. H350; Aquatic chronic 2, H411 |
| Naphthalene | 91-20-3 | <0.1 | Carc. 2, H351; Acute Tox. 4, H302; Aquatic Acute 1, H400; Aquatic Chronic 1, H410 |

**Additional Formulation Information:**
Diesel Fuel consists of C9+ hydrocarbons resulting from distillation of crude oil.

Low Sulfur Diesel Fuel typically contains less than 500 ppm of sulfur

Ultra Low Sulfur Diesel Fuel typically contains less than 15 ppm of sulfur

## 4. FIRST AID MEASURES

| Route | Measures |
|---|---|
| Inhalation | Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately. |

| Route | Measures |
|---|---|
| Ingestion | Aspiration Hazard: DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Ingestion may cause gastrointestinal disturbances including irritation, nausea, vomiting, and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory failure, and death. |
| Eye Contact | In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention. In case of contact lenses, remove immediately. |
| Skin Contact | Remove contaminated clothing and shoes. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and of the area of the body burned. |

**Most Important Symptoms**
Contact with eyes and face may cause irritation. Long-term exposure may cause dermatitis (itching, irritation, pain and swelling).

Inhalation may cause irritation and significant or long term exposure could cause respiratory insufficiency and pulmonary edema.

Ingestion may cause aspiration, gastrointestinal disturbance, and CNS effects.

**Immediate Medical Attention and Special Treatment**
For contact with skin or eyes, immediately wash or flush contaminated eyes with gently flowing water. If possible, irrigate each eye continuously with 0.9% saline (NS). If ingested, rinse mouth. Do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

If inhaled, administer oxygen or establish a patent airway if breathing is labored. Suction if necessary. Monitor closely, anticipate seizures. Consider orotracheal or nostracheal intubation of airway control if patient is unconscious or is in severe respiratory distress.

Discard any clothing or shoes contaminated as they may be flammable.

## 5. FIRE-FIGHTING MEASURES

**Extinguishing Media**
Foam, carbon dioxide, dry chemical are most suitable

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, C02, water spray, firefighting foam, or Halon. Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment.

LARGE FIRES: Foam, carbon dioxide, dry chemical. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

**Specific Hazards / Products of Combustion**
Moderate fire hazard when exposed to heat or flame with a very low flash point. Product is flammable and easily ignited when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Combustion may produce smoke, carbon monoxide and other products of incomplete combustion.

**Special Precautions and Protective Equipment for Firefighters**
Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

**Fighting Equipment/Instructions**
Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH- approved pressure-demand self-contained breathing apparatus with full face piece and protective clothing.

**Refer to Section 9 for fire properties of this chemical including flash point, auto ignition temperature, and explosive limits.**

## 6. ACCIDENTAL RELEASE MEASURES

**ACTIVATE FACILITY SPCC, SPILL CONTINGENCY or EMERGENCY PLAN.**

**Personal Precautions**
Due to high vapor density, flammable / toxic vapors may be present in low lying areas, dikes, pits, drains, or trenches. Vapors may accumulate in low lying areas and reach ignitable concentrations. Ventilate the area. Use of non-sparking tools and intrinsically safe equipment is recommended. Potential for flammable atmosphere should be monitored using a combustible gas indicator positioned downwind of the spill area. Refer to Sections 2 and 7 for further hazard warnings and handling instructions.

Use appropriate personal protective equipment to prevent eye/skin contact and absorption. Use NIOSH approved respiratory protection, if warranted, to prevent exposures above permissible limits. Refer to Section 8. Contaminated clothing should not be near sources of ignition.

**Emergency Measures**
As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Consider wind direction. Secure all ignition sources (flame, spark, hot work, hot metal, etc.) from area. Evaluate the direction of product travel, diking sewers, etc. to confirm spill areas. Do not touch or walk-through spilled material. For large spills, isolate initial action distance downwind 1,000 ft. (300 m).

**Environmental Precautions**
Stop the spill to prevent environmental release if it can be done safely. Product is toxic to aquatic life. Take action to isolate environmental receptors including drains, storm sewers and natural water bodies. Keep on impervious surface if at all possible. Use water sparingly to prevent product from spreading. Foam and absorbents may be used to reduce / prevent airborne release.

Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Follow federal, state or local requirements for reporting environmental release where necessary. Refer to Section 15 for further information.

**Containment and Clean-Up Methods**
Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of firefighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with dry earth, sand or other non-combustible, inert oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container with clean, non-sparking tools for reclamation or disposal. Response and cleanup crews must be properly trained and must utilize proper protective equipment. Refer to Section 8 for appropriate protective equipment.

## 7. HANDLING AND STORAGE

**USE ONLY AS A FUEL.**
**DO NOT SIPHON BY MOUTH.**

**Handling Precautions**
Handle as a flammable liquid. Keep away from heat, sparks, and open flame. No smoking. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer pursuant to NFPA 70 and API RP 2003 to reduce the possibility of static-initiated fire or explosion. Follow precautions to prevent static initiated fire.

Use good personal hygiene practices. Use only with protective equipment specified in Section 8. Avoid repeated and/or prolonged skin exposure. Use only outdoors or in well ventilated areas. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this

product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API RP 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

**Storage**

Large quantities of diesel fuel are stored in tanks or portable containers at an ambient storage temperature. Separate from incompatible chemicals (Refer to Section 10) by distance or secondary containment. Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers that are clearly labeled. Label all secondary containers that this material is transferred into with the chemical name and associated hazard(s). Empty product containers or vessels may contain flammable vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Storage tanks should have a venting system. If stored in small containers, the area should be well ventilated, away from ignition sources and protected from potential damage or vehicular traffic. Post “No Smoking” signs in product storage areas. This storage area should comply with NFPA 30 “Flammable and Combustible Liquid Code” or applicable building code. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 “Cleaning Mobile Tanks in Flammable and Combustible Liquid Service” and API RP 2015 “Safe Entry and Cleaning of Petroleum Storage Tanks”.

**Incompatibles**

Keep away from strong oxidizers, ignition sources and heat.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Occupational Exposure Limits**

| Component | CAS # | List | Value |
|---|---|---|---|
| Diesel Fuel | 68476-34-6 | ACGIH TLV-TWA | 100 mg/m3* |
| Naphthalene | 91-20-3 | ACGIH TLV-TWA<br>OSHA PEL<br>ACGIH STEL | 10 ppm<br>10 ppm<br>15 ppm |

*Critical effects; Skin; A3; CNS impairment.

**Engineering Controls**

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Intrinsically safe equipment and non-sparking tools shall be used in circumstances where concentrations may exceed lower flammable limits. Grounding and bonding shall be used to prevent accumulation and discharge of static electricity. Emergency shower and eyewash should be provided in proximity to handling areas in the event of exposure to decontaminate.

**Personal Protective Equipment**

| Exposure | Equipment |
|---|---|
| Eye / Face | Wear appropriate chemical protective glasses or goggles or face shields to prevent skin and eye contact especially caused from splashing. |
| Skin | Wear appropriate personal protective clothing to prevent skin contact. Gloves constructed of nitrile, neoprene or PVC are recommended when handling this material. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. |

| Exposure | Equipment |
|---|---|
| Respiratory | A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.<br><br>Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection. |
| Thermal | Product is stored at ambient temperature. No thermal protection is required except for emergency operations involving actual or potential for fire. Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| Property | Value | |
|---|---|---|
| Appearance | Clear or straw-colored liquid. May be dyed red for distribution. | |
| Odor | Mild characteristic petroleum distillate odor. | |
| Odor Threshold | <1 ppm | |
| pH | Not available | |
| Melting Point | -22 to -0.4 ˚F (-30 to -18 ˚C) | |
| Boiling Point Range | 320 to 690 ˚F (160 to 366 ˚C) | |
| Flash Point | > 125.6 ˚F (52 ˚C) PMCC | |
| Evaporation Rate | Slow, varies with conditions | |
| Flammability | Flammable liquid (OSHA defined) | |
| Flammable Limits | 0.6 % - 6.5% | |
| Vapor Pressure | 0.009 psia @ 70 ˚F | |
| Vapor Density | > 1 | (air=1) |
| Specific Gravity | 0.83-0.86 @ 60 ˚F (16 ˚C) | (water=1) |
| Solubility | Insoluble in water; miscible with other petroleum solvents. | |
| Partition Coefficient (N-octanol/water) | Log Kow range of 3.3 to >.6.0 | |
| Autoignition Temperature | 494 ˚F (257 ˚C) | |
| Decomposition Temperature | When heated it emits acrid smoke and irritating vapors. | |
| Viscosity | <3 cSt | |
| Percent Volatiles | 100 | |

## 10. STABILITY AND REACTIVITY

**Stability**
This is a stable material that is flammable liquid (OSHA/GHS hazard category 3). Stable during transport.

**Reactivity**
Material is not self-reacting. Flammable concentrations may be present in air. Compound can react with oxidizing materials.

**Possibility of Hazardous Reactions**
Hazardous polymerization will not occur.

**Incompatibility**
Keep away from strong oxidizers such as nitric and sulfuric acids.

**Conditions to Avoid**
Avoid high temperatures, open flames, sparks, static electricity, welding, smoking and other ignition sources.

**Hazardous Decomposition Products**
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

## 11. TOXICOLOGICAL INFORMATION

**Acute Toxicity:**
Acute Toxicity (Inhalation LC50)
Diesel Fuel (68476-34-6)
LC50 Inhalation Rat >6 mg/l/4h

Acute Toxicity (Dermal LD50)
Diesel Fuel (68476-34-6)
LD50 Dermal Rabbit >5000 mg/kg

Acute Toxicity (Oral LD50)
Diesel Fuel (68476-34-6)
LD50 Oral Rabbit >5000 mg/kg

Skin Corrosion/Irritation: Prolonged and repeated contact may cause skin irritation leading to dermatitis. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

Serious Eye Damage/Irritation: Causes serious eye irritation.

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: OSHA: NO, IARC: Group 3, NTP: NO, ACGIH: NOIC:A3, NIOSH: NO

IARC: Group 3 – Not classifiable as to their carcinogenicity to humans ACGIH: A3 – Confirmed animal carcinogen with unknown relevance to humans

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

IARC classifies whole diesel fuel exhaust particulates (byproduct of combustion of this material) carcinogenic to humans (Group 1) and NIOSH regards diesel fuel exhaust particulate as a potential occupational carcinogen.

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Specific Target Organ Toxicity (Single Exposure): Inhalation exposure may cause drowsiness or dizziness by inhalation exposure.

Aspiration Hazard: The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Potential Health Effects: Vapor irritating to skin, eyes, nose, and throat. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

WARNING: The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of

combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

## 12. ECOLOGICAL INFORMATION

**Toxicity:**
This material is expected to be toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

Data for Component: Diesel Fuel (68476-34-6)

Material is toxic to aquatic organisms based on an acute basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Material is a long-term aquatic hazard based on a chronic basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Persistence and Degradation: This material is not expected to be readily biodegradable.

Bioaccumulative Potential: Not available

Mobility in Soil: Not available

Other Adverse Effects: None known

Other Information: Avoid release to the environment.

## 13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options. May be considered a hazardous waste if disposed. Direct solid waste (landfill) or incineration at a solid waste facility is not permissible. Do not discharge to sanitary or storm sewer. Personnel handling waste containers should follow precautions provided in this document.

Shipping containers must be DOT authorized packages. Follow licensure and regulations for transport of hazardous material and hazardous waste as applicable.

## 14. TRANSPORT INFORMATION

**US DOT**

| | |
|---|---|
| UN Identification Number | NA 1993 |
| Proper Shipping Name | Diesel fuel |
| Hazard Class and Packing Group | 3, PGIII |
| Shipping Label | Flammable liquid |
| Placard / Bulk Package | Flammable liquid, 1993 |
| Emergency Response Guidebook Guide Number | 128 |

This product may be re-classified as a “Combustible Liquid” meeting the definition in 49 CFR 173.120 unless transported by vessel or aircraft.
Specific placard requirements must be met for shipments of this product as a Combustible Liquid by rail (See 49 CFR 172.332).
Non-bulk packages (<= 119 gal) of Combustible Liquids in package sizes less than the product reportable quantity are not regulated as hazardous materials if the material does not meet any other hazard class.

**IATA Information**

| | |
|---|---|
| UN Identification Number | UN 1202 |
| Proper Shipping Name | Diesel fuel |
| Hazard Class and Packing Group | 3, PGIII |
| ICAO Label | 3 |
| Packing Instructions Cargo | 310 |
| Max Quantity Per Package Cargo | 220L |
| Packing Instructions Passenger | 309Y |
| Max Quantity per Package Passenger | 60L |

**ICAO**

| | |
|---|---|
| UN Identification Number | UN 1202 |
| Shipping Name / Description | Diesel fuel |
| Hazard Class and Packing Group | 3, PG III |
| IMDG Label | 3 |

**IMDG**

| | |
|---|---|
| UN Identification Number | UN 1202 |
| Shipping Name / Description | Diesel fuel |
| Hazard Class and Packing Group | 3, PGIII |
| IMDG Label | 3 |
| EmS Number | F-E-S-E |
| Marine Pollutant | Yes |

## 15. REGULATORY INFORMATION

**U.S. Federal, State, and Local Regulatory Information**
Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

**OSHA Hazard Communication Standard**
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

**Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning And Community Right-to-Know Act of 1986) Sections 311 and 312**

| | |
|---|---|
| Immediate (Acute) Health Hazard | Yes |
| Delayed (Chronic) Health Hazard | Yes |
| Fire Hazard | Yes |
| Reactive Hazard | No |
| Sudden Release of Pressure Hazard | No |

**Clean Water Act (Oil Spills)**
Any spill or release of this product to “navigable waters” (Essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

**CERCLA Section 103 and SARA Section 304 (Release to the Environment)**
The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts this material. This product does not contain any chemicals subject to the reporting requirements of CERCLA Section 103 or SARA 304.

**SARA Section 313- Supplier Notification**
This product does not contain any chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

**EPA Notification (Oil Spills)**
If the there is a discharge of more than 1,000-gallons of oil into or upon navigable waters of the United States, or if it is the second spill event of 42 gallons or more of oil into water within a twelve (12) month period, a written report must be submitted to the Regional Administrator of the EPA within sixty days of the event.

**Pennsylvania Right to Know Hazardous Substance list:**
The following product components are cited in the Pennsylvania Special Hazardous Substance List, and are present at levels which require reporting.

| Component | CAS | Amount |
|---|---|---|
| Diesel Fuel | 68476-34-6 | 100% |

**New Jersey Right to Know Hazardous Substance list:**
The following product components are cited in the New Jersey Right to Know Hazardous Substance List, and are present at levels which require reporting.

| Component | CAS | Amount |
|---|---|---|
| Diesel Fuel | 68476-34-6 | 100% |

**California Proposition 65 WARNING: This product contains chemicals known to the State of California to cause Cancer or Reproductive Toxicity.**

| Component | CAS | Amount |
|---|---|---|
| Naphthalene | 91-20-3 | <0.1% |

**U.S. Toxic Substances Control Act**
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

**CEPA - Domestic Substances List (DSL)**
All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

**Canadian Regulatory Information (WHMIS)**
Class B3 – Combustible Liquid
Class D2A – Materials causing other toxic effects. (Very Toxic)

## 16. OTHER INFORMATION

| | |
|---|---|
| Version | 5 |
| Issue Date | June 26, 2019 |
| Prior Issue Date | May 20, 2016 |

**Description of Revisions**
Update viscosity information in Section 9. Update transportation information in Section 14 to clarify US DOT re-classification option as a Combustible Liquid.

**Abbreviations**

| | |
|---|---|
| ˚F | Degrees Fahrenheit (temperature) |
| < | Less than |
| = | Equal to |
| > | Greater than |
| AP | Approximately |
| C | Centigrade (temperature) |
| kg | Kilogram |
| L | Liter |
| mg | Milligrams |
| mL | Milliliter |
| $mm^2$ | Square millimeters |
| mmHg | Millimeters of mercury (pressure) |
| N/A | Not applicable |
| N/D | Not determined |
| ppm | Parts per million |
| sec | Second |
| ug | Micrograms |

**Acronyms**

| | |
|---|---|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AIHA | American Industrial Hygiene Association |
| AL | Action Level |
| ANSI | American National Standards Institute |
| API | American Petroleum Institute |
| CAS | Chemical Abstract Service |
| CERCLA | Comprehensive Emergency Response, Compensation, and Liability Act |
| DOT | U.S. Department of Transportation |
| EC50 | Ecological concentration 50% |
| EPA | U.S. Environmental Protection Agency |
| ERPG | Emergency Response Planning Guideline |
| GHS | Global Harmonized System |

| | |
|---|---|
| HMIS | Hazardous Materials Information System |
| IARC | International Agency for Research On Cancer |
| IATA | International Air Transport Association |
| IMDG | International Maritime Dangerous Goods |
| Koc | Soil Organic Carbon |
| LC50 | Lethal concentration 50% |
| LD50 | Lethal dose 50% |
| MSHA | Mine Safety and Health Administration |
| NFPA | National Fire Protection Association |
| NIOSH | National Institute of Occupational Safety and Health |
| NOIC | Notice of Intended Change |
| NTP | National Toxicology Program |
| OPA | Oil Pollution Act of 1990 |
| OSHA | U.S. Occupational Safety & Health Administration |
| PEL | Permissible Exposure Limit (OSHA) |
| RCRA | Resource Conservation and Recovery Act Reauthorization Act of 1986 Title III |
| REL | Recommended Exposure Limit (NIOSH) |
| RVP | Reid Vapor Pressure |
| SARA | Superfund Amendments and |
| SCBA | Self Contained Breathing Apparatus |
| SPCC | Spill Prevention, Control, and Countermeasures |
| STEL | Short Term Exposure Limit (generally 15 minutes) |
| TLV | Threshold Limit Value (ACGIH) |
| TSCA | Toxic Substances Control Act |
| TWA | Time Weighted Average (8 hr.) |
| UN | United Nations |
| UNECE | United Nations Economic Commission for Europe |
| WEEL | Workplace Environmental Exposure Level (AIHA) |
| WHMIS | Canadian Workplace Hazardous Materials Information System |

**Disclaimer of Expressed and Implied Warranties**

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

** End of Safety Data Sheet **

## ATTACHMENT 3

SDS - Four-Stroke Small Engine Oil

# SAFETY DATA SHEET – PREMIUM 4-CYCLE ENGINE OIL

# 1. IDENTIFICATION

## 1.1. PRODUCT IDENTIFIER USED ON LABEL:

| Finished Product Item Number | Customer Item Number | LABEL DESCRIPTION ACTUAL | BRAND |
|---|---|---|---|
| LM0520MT | 737-0209 | PREMIUM 4-CYCLE ENGINE OIL | MTD |
| LM0512MT | OEM-737-0303 | MTD PREMIUM 4 CYCLE SNOW THROWER ENGINE OIL | MTD |
| LM1512MT | OEM-737C0303A | MTD PREMIUM SNOW THROWER ENGINE OIL | MTD |
| LM1512MT | | MTD SNOW THROWER ENGINE OIL | MTD |
| LM0520MT | | PALLET LABEL | MTD |

1.2. **RECOMMENDED USE OF THE CHEMICAL AND RESTRICTIONS ON USE;**

1.2.1. PETROLEUM LUBRICATING OIL

1.2.2. NO OTHER USES RECOMMENDED

1.3. **NAME, ADDRESS, AND TELEPHONE NUMBER OF THE CHEMICAL MANUFACTURER, IMPORTER, OR OTHER RESPONSIBLE PARTY:**

1.3.1.

### Spectrum Lubricants Corporation

500 Industrial Park Drive
Selmer, TN 38375-3276
United States of America

### Product Information

MSDS Requests: (800) 264-6457 or +17316454972
Technical Information: (800) 264-6457 or +17316454972
General Information: vswedley@spectrumcorporation.com

1.4. **EMERGENCY PHONE NUMBER:**

1.4.1.

**Emergency Response**
North America: CHEMTREC (800) 424-9300 after 5:00pm CST Or +17035273887
**Health Emergency**
USA: (800) 264-6457 or +17316454972

# 2. HAZARD(S) IDENTIFICATION

2.1. **CLASSIFICATION OF THE CHEMICAL IN ACCORDANCE WITH PARAGRAPH (d) of §1910.1200:**
2.1.1. Acute Inhalation Category 4
2.2. **Signal Word:**
2.2.1. Warning
2.3. **Symbol:**

2.4. **Hazard Statements:**
2.4.1. Harmful if Inhaled
2.5. **Precautionary Statements:**
2.5.1. Prevention:
2.5.1.1. Avoid breathing dust/fume/gas/mist/vapors/spray.
2.5.1.2. Use only outdoors or in a well-ventilated area.
2.5.2. Response:
2.5.2.1. If inhaled: Remove person to fresh air and keep comfortable for breathing.
2.5.2.2. Call a poison center/doctor if you feel unwell.

# 3. Composition/ information on ingredients

3.1. **The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200**
3.1.1.

| COMPONENTS | CAS Number | EU Number | Concentration (%) |
|---|---|---|---|
| Distillates (petroleum), hydrotreated heavy paraffinic | 64742-54-7 | 265-157-1 | 20-30 |
| Distillates (petroleum), solvent-dewaxed heavy paraffinic | 64742-65-0 | 265-169-7 | 0-60 |
| Distillates (petroleum), solvent-refined heavy paraffinic | 64741-88-4 | 265-090-8 | 0-60 |

# 4. FIRST AID MEASURES

4.1.

| | |
|---|---|
| **Skin:** | Wash skin with soap and warm water. Wash clothing before re-use. |
| **Eye:** | If splashed into eyes flush eyes with clear water for five (5) minutes. |
| **Inhalation:** | Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell |
| **Ingestion:** | If ingested, do not induce vomiting. Call a physician. |

# 5. FIRE FIGHTING MEASURES

5.1. **Flash Point:** 405°F (207°C)

5.2. **Protective Equipment/Fire Fighting Instructions:**

5.2.1. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

5.3. **Extinguishing Media:**

5.3.1. Use water fog, foam, dry chemical or carbon dioxide ($CO_2$) to extinguish flames.

5.4. **Special Firefighting Procedures:**

5.4.1. Cool exposed containers with water spray.

5.5. **Unusual Fire and Explosion Hazards:**

5.5.1. Pressure increase in over heated closed containers. Cool containers with water spray.

# 6. ACCIDENTAL RELEASE MEASURES

6.1. **Spill Procedures:**

6.1.1. Remove ignition sources. Recover Liquid. Add absorbent to spill area. Ventilate confined spaces. Advise authorities if product enters sewers, etc.

6.2. **Waste Disposal:**

6.2.1. Assure conformity with applicable disposal regulations. Dispose of absorbed material at approved waste site

6.3. **Precautionary Measures:**

6.3.1. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Wash thoroughly after handling.

6.3.2. Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

# 7. HANDLING AND STORAGE

7.1. **HANDLING**

7.1.1. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum re-conditioner or disposed of properly.

7.2. **STORAGE**

7.2.1. Keep container closed when not in use. Do not store with strong oxidizing agents. Do not store at elevated temperatures.

# 8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

8.1. **Component Exposure Limits:**

8.1.1. Distillates (petroleum), hydrotreated heavy paraffinic

8.1.1.1. ACGIH TLV: 5mg/m³ (oil mist) TWA

8.1.1.2. OSHA PEL: 5mg/m³ (oil mist) TWA

8.1.2. Distillates (petroleum), solvent-dewaxed heavy paraffinic

8.1.2.1. ACGIH TLV: 5mg/m³ (oil mist) TWA

8.1.2.2. OSHA PEL: 5mg/m³ (oil mist) TWA

8.1.3. Distillates (petroleum), solvent-refined heavy paraffinic

8.1.3.1. ACGIH TLV: 5mg/m³ (oil mist) TWA

8.1.3.2. OSHA PEL: 5mg/m³ (oil mist) TWA

8.2. **Engineering Controls:**

8.2.1. Ventilate as needed to comply with exposure limit

8.3. **Eye Protection:**

8.3.1. Use goggles/face shield to avoid eye contact

8.4. **Glove Protection:**

8.4.1. Use impervious gloves to avoid repeated/prolonged skin contact.

8.5. **Work/Hygienic Practices:**

8.5.1. If clothing becomes contaminated, change to fresh clean clothing. Do not wear until thoroughly laundered.

# 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | | |
|---|---|---|---|
| 9.1. **Appearance/Odor:** | Amber colored liquid with mild hydrocarbon odor. | 9.2. **Odor Threshold:** | No data available |
| 9.3. **pH:** | No data available | 9.4. **Boiling Point:** | Wide range |
| 9.5. **Melting Point:** | No data available | 9.6. **Solubility ($H_20$):** | Negligible |
| 9.7. **Specific Gravity:** | 0.877 @ 15.6°C | 9.8. **Density:** | 7.3 lbs/gal |
| 9.9. **Octanol/$H_20$ Coeff.:** | No data available | 9.10. **Evaporation Rate (BUAC=1):** | <1 |
| 9.11. **Molecular Weight:** | No data available | 9.12. **Decompostion Temp:** | No data available |
| 9.13. **Auto Ignition:** | No data available | 9.14. **Lower Flammability Limit:** | No data available |
| 9.15. **Flash Point:** | 395°F (202°C) | 9.16. **Upper Flammability Limit:** | No data available |
| 9.17. **Vapor Density (Air=1):** | >1 | 9.18. **Vapor Pressure:** | <1mmHg @ 20°C |
| 9.19. **VOC:** | Nill | 9.20. **Flammability Class:** | Not classified |
| 9.21. **Viscosity @ 40°C** | 70cSt (70 mm²/s) | 9.22. **Viscosity @ 100°C** | 10.5cSt (10.5 mm²/s) |

# 10.STABILITY AND REACTIVITY

10.1. **Reactivity**:
- 10.1.1. Material does not pose a significant reactivity hazard.

10.2. **Chemical Stability:**
- 10.2.1. Stable

10.3. **Incompatibility/Conditions to avoid:**
- 10.3.1. Avoid strong oxidants

10.4. **Possibility of Hazardous Reactions:**
- 10.4.1. Will not undergo hazardous polymerization.

10.5. **Hazardous Decomposition Products:**
- 10.5.1. Partial burning produces fumes, smoke and carbon monoxide

# 11. TOXICOLOGY INFORMATION

11.1. **Likely Routes of Exposure:**
- 11.1.1. Ingestion, Inhalation, Eye contact, Skin contact.

11.2. **Acute Effects:**
- 11.2.1. Inhalation: Harmful if inhaled. May cause respiratory irritation.

11.2.2. Eye Contact: Expected to be minimal/no eye irritation.
11.2.3. Skin Contact: Expected to be minimal/no skin irritation.
11.2.4. Ingestion: Expected to be low ingestion hazard.

11.3. **Component Data/ Analysis**

11.3.1. Distillates (petroleum), hydrotreated heavy paraffinic
11.3.1.1. Oral (LD50) (Rat): Acute: >5000 mg/kg
11.3.1.2. Inhalation (LC50) (Rat): Acute: 2.18 mg/l (4hr)
11.3.1.3. Dermal (LD50) (Rabbit): >5000 mg/kg

11.3.2. Distillates (petroleum), solvent-dewaxed heavy paraffinic
11.3.2.1. Oral (LD50) (Rat): Acute: >5000 mg/kg
11.3.2.2. Inhalation (LC50) (Rat): Acute: 2.18 mg/l (4hr)
11.3.2.3. Dermal (LD50) (Rabbit): >5000 mg/kg

11.3.3. Distillates (petroleum), solvent-refined heavy paraffinic
11.3.3.1. Oral (LD50) (Rat): Acute: >5000 mg/kg
11.3.3.2. Inhalation (LC50) (Rat): Acute: 2.18 mg/l (4hr)
11.3.3.3. Dermal (LD50) (Rabbit): >5000 mg/kg

11.4. **Sensitization:**

11.4.1. Based on best current information, there are no known human effects.

11.5. **Carcinogenicity:**

11.5.1. There is no known information on carcinogenic components.

11.6. **Mutagenicity:**

11.6.1. Not expected to be mutagenicic.

11.7. **Reproductive Toxicity:**

11.7.1. Based on best current information, there are no known human effects.

11.8. **Teratogenicity:**

11.8.1. Based on best current information, there are no known human effects.

# 12.ECOLOGICAL INFORMATION

12.1. **Ecotoxicity**

12.1.1. An environmental fate analysis is not available for this specific product. Plants and animals may experience harmful or fatal effects when coated with petroleum products. Petroleum-based (mineral) lubricating oils normally will float on water. In stagnant or slow-flowing waterways, an oil layer can cover a large surface area. As a result, this oil layer might limit or eliminate natural atmospheric oxygen transport into the water. With time, if not removed, oxygen depletion in the waterway may be sufficient to cause a fish kill or create an anaerobic environment.

12.2. **Environmental Fate**

12.2.1. Analysis for ecological effects has not been conducted on this product. However, if spilled, this product and any contaminated soil or water may be harmful to human, animal, and aquatic life. Also, the coating action associated with petroleum and petroleum products can be harmful or fatal to aquatic life and waterfowl.

# 13. DISPOSAL CONSIDERATIONS

13.1. **Waste Disposal**:

13.1.1. Assure conformity with applicable disposal regulations. Dispose of absorbed material at approved waste site.

# 14.TRANSPORTATION INFORMATION

**The shipping description below may not represent requirements for all modes of transportation, shipping methods or locations outside of the United States.**

14.1. **ROAD AND RAIL**
14.1.1. DOT: NOT REGULATED
14.2. **VESSEL**
14.2.1. IMDG: NOT REGULATED
14.3. **AIR**
14.3.1. IATA: NOT REGULATED

# 15.REGULATORY INFORMATION

15.1. **TSCA Inventory**
15.1.1. This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.
15.2. **SARA 302/304 Emergency Planning and Notification**
15.2.1. No components were identified.
15.3. **SARA 311/312 Hazard Identification**
15.3.1. Acute (Immediate) Health Hazard
15.4. **SARA 313 Toxic Chemical Notification and Release Reporting**
15.4.1. : No components were identified.
15.5. **CERCLA**
15.5.1. No components were identified.
15.6. **Clean Water Act (CWA)**
15.6.1. This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.
15.7. **California Proposition 65:**
15.7.1. The product does not contain chemicals known to the state of California to cause cancer, birth defects, or any other reproductive harm.
15.8. **New Jersey Right-to-Know Label**
15.8.1. Petroleum Oil

# 16.OTHER INFORMATION

16.1.

| HAZARD RANKINGS | | | |
|---|---|---|---|
| HMIS | | NFPA | |
| HEALTH HAZARD | 1 | HEALTH HAZARD | 1 |
| FIRE HAZARD | 1 | FIRE HAZARD | 1 |
| PHYSICAL HAZARD | 0 | INSTABILITY/REACTIVITY | 0 |

| | | | |
|---|---|---|---|
| Personal Protection | B | | |

16.2. **Date of preparation:** 12/9/2013

16.3. **MANUFACTURER DISCLAIMER:**

16.3.1. ***The data presented herein is based upon tests and information, which we believe to be reliable. However, users should make their own investigations to determine the suitability of the information for their particular purpose***

## ATTACHMENT 4

SDS - Gasoline with Ethanol

# SAFETY DATA SHEET

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT**

**Product Name:** (see Section 16 for Synonyms) **GASOLINE UNLEADED WITH ETHANOL (GASOHOL)**
**Product Description:** Hydrocarbons and Additives
**Product Code:** 12443
**Intended Use:** Fuel

**COMPANY IDENTIFICATION**

**Supplier:** **Canada Imperial Oil Limited, An Affiliate of Exxon Mobil Corporation**
P.O. Box 2480, Station M
Calgary, ALBERTA T2P 3M9 Canada

| | |
|---|---|
| **24 Hour Health Emergency** | 1-866-232-9563 |
| **Transportation Emergency Phone** | 1-866-232-9563 |
| **Supplier General Contact** | 1-800-567-3776 |

## SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

**CLASSIFICATION:**

Flammable liquid: Category 1.
Skin irritation: Category 2. Germ Cell Mutagen: Category 1B. Carcinogen: Category 1A. Specific target organ toxicant (central nervous system): Category 3. Specific target organ toxicant (respiratory irritant): Category 3. Aspiration toxicant: Category 1.

**LABEL:**
**Pictogram:**

**Signal Word:** Danger

**Hazard Statements:**
H224: Extremely flammable liquid and vapor. H304: May be fatal if swallowed and enters airways. H315: Causes skin irritation. H335: May cause respiratory irritation. H336: May cause drowsiness or dizziness. H340: May cause genetic defects. H350: May cause cancer.

**Precautionary Statements:**
P101: If medical advice is needed, have product container or label at hand. P102: Keep out of reach of children. P103: Read label before use.P201: Obtain special instructions before use. P202: Do not handle until all safety precautions have been read and understood. P210: Keep away from heat/sparks/open flames/hot surfaces. -- No smoking. P233: Keep container tightly closed. P240: Ground / bond container and receiving equipment. P241: Use explosion-proof electrical, ventilating, and lighting equipment. P242: Use only non-sparking tools. P243: Take precautionary measures against static discharge. P264: Wash skin thoroughly after handling. P271: Use only outdoors or in a well-ventilated area. P273: Avoid release to the environment. P280: Wear protective gloves/protective clothing/eye protection/face protection.P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P302 + P352: IF ON SKIN: Wash with plenty of soap and water. P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing. P308 + P313: IF exposed or concerned: Get medical advice/ attention. P331: Do NOT induce vomiting. P332 + P313: If skin irritation occurs: Get medical advice/ attention. P362 + P364: Take off contaminated clothing and wash it before reuse. P370 + P378: In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish. P391: Collect spillage.P403 + P235: Store in a well-ventilated place. Keep cool. P405: Store locked up.P501: Dispose of contents and container in accordance with local regulations.

**Contains:** GASOLINE; TOLUENE; XYLENES

**Other hazard information:**

**HAZARD NOT OTHERWISE CLASSIFIED (HNOC):** None as defined under 29 CFR 1910.1200.

**PHYSICAL / CHEMICAL HAZARDS**

Material can accumulate static charges which may cause an ignition. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited.

**HEALTH HAZARDS**

High-pressure injection under skin may cause serious damage. May be irritating to the eyes, nose, throat, and lungs. May cause central nervous system depression. Exposure to benzene is associated with cancer (acute myeloid leukemia and myelodysplastic syndrome), damage to the blood-producing system, and serious blood disorders (see Section 11).

**ENVIRONMENTAL HAZARDS**

Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

| | | | | | | |
|---|---|---|---|---|---|---|
| **NFPA Hazard ID:** | Health: | 2 | Flammability: | 3 | Reactivity: | 0 |
| **HMIS Hazard ID:** | Health: | 2* | Flammability: | 3 | Reactivity: | 0 |

**NOTE:** This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

## SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

**Hazardous Substance(s) or Complex Substance(s) required for disclosure**

| Name | CAS# | Concentration* | GHS Hazard Codes |
|---|---|---|---|
| ETHYL ALCOHOL | 64-17-5 | 0 - 10% | H225, H319(2A) |
| GASOLINE | 86290-81-5 | 89 - 100% | H224, H304, H336, H340(1B), H350(1B), H361(D), H315, H401, H411 |

**Hazardous Constituent(s) Contained in Complex Substance(s) required for disclosure**

| Name | CAS# | Concentration* | GHS Hazard Codes |
|---|---|---|---|
| BENZENE | 71-43-2 | 0 - 1.5% | H225, H303, H304, H340(1B), H350(1A), H315, H319(2A), H372, H401, H412 |
| CUMENE | 98-82-8 | 0 - 1% | H226, H304, H335, H351, H401, H411 |
| CYCLOHEXANE | 110-82-7 | 0 - 1.5% | H225, H304, H336, H315, H400(M factor 1), H410(M factor 1) |
| ETHYL BENZENE | 100-41-4 | 0 - 3.5% | H225, H304, H332, H373, H401, H412 |
| N-HEXANE | 110-54-3 | 0 - 5% | H225, H304, H336, H361(F), H315, H373, H401, H411 |
| NAPHTHALENE | 91-20-3 | 0 - 1% | H228(2), H302, H351, H400(M factor 1), H410(M factor 1) |
| TOLUENE | 108-88-3 | 0 - 20% | H225, H304, H336, H361(D), H315, H373, H401, H412 |
| XYLENES | 1330-20-7 | 0 - 20% | H226, H303, H304, H312, H332, H335, H315, H320(2B), H373, H401, H412 |

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

NOTE: The concentration of the components shown above may vary substantially. In certain countries, benzene content may be limited to lower levels. Oxygenates such as tertiary-amyl-methyl ether, ethanol, di-isopropyl ether, and ethyl-tertiary-butyl ether may be present. Because of volatility considerations, gasoline vapor may have concentrations of components very different from those of liquid gasoline. The major components of gasoline vapor are: butane, isobutane, pentane, and isopentane. The reportable component percentages, shown in the composition/information on ingredients section, are based on API's evaluation of a typical gasoline mixture. Motor gasoline is considered a mixture by EPA under the Toxic Substances Control Act (TSCA). The refinery streams used to blend motor gasoline are all on the TSCA Chemical Substances Inventory.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

## SECTION 4 FIRST AID MEASURES

**INHALATION**

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

**SKIN CONTACT**

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

**EYE CONTACT**

Flush thoroughly with water. If irritation occurs, get medical assistance.

**INGESTION**

Seek immediate medical attention. Do not induce vomiting.

**NOTE TO PHYSICIAN**

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately. This material, or a component, may be associated with cardiac sensitization following very high exposures (well above occupational exposure limits) or with concurrent exposure to high stress levels or heart-stimulating substances like epinephrine. Administration of such substances should be avoided.

## SECTION 5 FIRE FIGHTING MEASURES

**EXTINGUISHING MEDIA**

**Appropriate Extinguishing Media:** Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

**Inappropriate Extinguishing Media:** Straight Streams of Water

**FIRE FIGHTING**

**Fire Fighting Instructions:** Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop a leak. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

**Unusual Fire Hazards:** Extremely Flammable. Vapors are flammable and heavier than air. Vapors may travel across the ground and reach remote ignition sources causing a flashback fire danger. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

**Hazardous Combustion Products:** Aldehydes, Incomplete combustion products, Oxides of carbon, Smoke, Fume, Sulfur oxides

**FLAMMABILITY PROPERTIES**

**Flash Point [Method]:** -40°C (-40°F) [ASTM D-92]
**Flammable Limits (Approximate volume % in air):** LEL: 1.5 UEL: 7.6

**Autoignition Temperature:** N/D

## SECTION 6 ACCIDENTAL RELEASE MEASURES

### NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

### PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor and, when applicable, H2S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to aromatic hydrocarbons are recommended. Note: gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

### SPILL MANAGEMENT

**Land Spill:** Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapor; but may not prevent ignition in closed spaces.

**Water Spill:** Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. Do not confine in area of spill. Advise occupants and shipping in downwind areas of fire and explosion hazard and warn them to stay clear. Allow liquid to evaporate from the surface. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

### ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

## SECTION 7 HANDLING AND STORAGE

## HANDLING

Avoid breathing mists or vapors. Avoid all personal contact. Prevent exposure to ignition sources, for example use non-sparking tools and explosion-proof equipment. Potentially toxic/irritating fumes/vapors may be evolved from heated or agitated material. Do not siphon by mouth. Use only with adequate ventilation. Do not use as a cleaning solvent or other non-motor fuel uses. For use as a motor fuel only. It is dangerous and/or unlawful to put fuel into unapproved containers. Do not fill container while it is in or on a vehicle. Static electricity may ignite vapors and cause fire. Place container on ground when filling and keep nozzle in contact with container. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers or other electronic devices, etc.) during safety critical tasks, such as bulk fuel loading or unloading operations, or in storage areas where vapors may be present, unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

**Static Accumulator:** This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

## STORAGE

Ample fire water supply should be available. A fixed sprinkler/deluge system is recommended. The type of container used to store the material may affect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Outside or detached storage preferred. Storage containers should be grounded and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.

## SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE LIMIT VALUES

**Exposure limits/standards (Note: Exposure limits are not additive)**

| Substance Name | Form | Limit / Standard | | | NOTE | Source |
|---|---|---|---|---|---|---|
| BENZENE | | OSHA Action level | 0.5 ppm | | N/A | OSHA Sp.Reg. |
| BENZENE | | STEL | 5 ppm | | N/A | OSHA Sp.Reg. |
| BENZENE | | TWA | 1 ppm | | N/A | OSHA Sp.Reg. |
| BENZENE | | STEL | 1 ppm | | N/A | ExxonMobil |
| BENZENE | | TWA | 0.5 ppm | | N/A | ExxonMobil |
| BENZENE | | STEL | 2.5 ppm | | Skin | ACGIH |

| | | | | | | |
|---|---|---|---|---|---|---|
| BENZENE | | TWA | 0.5 ppm | | Skin | ACGIH |
| CUMENE | | TWA | 245 mg/m3 | 50 ppm | Skin | OSHA Z1 |
| CUMENE | | TWA | 5 ppm | | Skin | ExxonMobil |
| CUMENE | | TWA | 50 ppm | | N/A | ACGIH |
| CYCLOHEXANE | | TWA | 1050 mg/m3 | 300 ppm | N/A | OSHA Z1 |
| CYCLOHEXANE | | TWA | 100 ppm | | N/A | ACGIH |
| ETHYL ALCOHOL | | TWA | 1900 mg/m3 | 1000 ppm | N/A | OSHA Z1 |
| ETHYL ALCOHOL | | STEL | 1000 ppm | | N/A | ACGIH |
| ETHYL BENZENE | | TWA | 435 mg/m3 | 100 ppm | N/A | OSHA Z1 |
| ETHYL BENZENE | | TWA | 20 ppm | | N/A | ACGIH |
| GASOLINE | | STEL | 200 ppm | | N/A | ExxonMobil |
| GASOLINE | | TWA | 100 ppm | | N/A | ExxonMobil |
| GASOLINE | | STEL | 500 ppm | | N/A | ACGIH |
| GASOLINE | | TWA | 300 ppm | | N/A | ACGIH |
| N-HEXANE | | TWA | 1800 mg/m3 | 500 ppm | N/A | OSHA Z1 |
| N-HEXANE | | TWA | 50 ppm | | Skin | ACGIH |
| NAPHTHALENE | | TWA | 50 mg/m3 | 10 ppm | N/A | OSHA Z1 |
| NAPHTHALENE | | TWA | 10 ppm | | Skin | ACGIH |
| TOLUENE | | Ceiling | 300 ppm | | N/A | OSHA Z2 |
| TOLUENE | | Maximum concentration | 500 ppm | | N/A | OSHA Z2 |
| TOLUENE | | TWA | 200 ppm | | N/A | OSHA Z2 |
| TOLUENE | | TWA | 20 ppm | | N/A | ACGIH |
| XYLENES | | TWA | 435 mg/m3 | 100 ppm | N/A | OSHA Z1 |
| XYLENES | | STEL | 150 ppm | | N/A | ACGIH |
| XYLENES | | TWA | 100 ppm | | N/A | ACGIH |

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

**Biological limits**

| Substance | Specimen | Sampling Time | Limit | Determinant | Source |
|---|---|---|---|---|---|
| BENZENE | Creatinine in urine | End of shift | 25 ug/g | S-Phenylmercapturic acid | ACGIH BELs (BEIs) |
| BENZENE | Creatinine in urine | End of shift | 500 ug/g | t,t-Muconic acid | ACGIH BELs (BEIs) |
| ETHYL BENZENE | Creatinine in urine | End of shift | 0.15 g/g | Sum of mandelic acid and phenylglyoxylic acid | ACGIH BELs (BEIs) |
| N-HEXANE | Urine | End of shift | 0.5 mg/l | 2,5-Hexanedione, without hydrolysis | ACGIH BELs (BEIs) |
| NAPHTHALENE | No Biological Specimen provided | End of shift | Not Assigned | 1-Naphthol, with hydrolysis + 2-Naphthol, with hydrolysis | ACGIH BELs (BEIs) |

| | | | | | |
|---|---|---|---|---|---|
| TOLUENE | Blood | Prior to last shift of work wk | 0.02 mg/l | Toluene | ACGIH BELs (BEIs) |
| TOLUENE | Creatinine in urine | End of shift | 0.3 mg/g | o-Cresol, with hydrolysis | ACGIH BELs (BEIs) |
| TOLUENE | Urine | End of shift | 0.03 mg/l | Toluene | ACGIH BELs (BEIs) |
| XYLENES | Creatinine in urine | End of shift | 1.5 g/g | Methylhippuric acids | ACGIH BELs (BEIs) |

## ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

## PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

**Respiratory Protection:** If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

**Hand Protection:** Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Chemical resistant gloves are recommended.

**Eye Protection:** If contact is likely, safety glasses with side shields are recommended.

**Skin and Body Protection:** Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Chemical/oil resistant clothing is recommended.

**Specific Hygiene Measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

## ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and

soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

**Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.**

**GENERAL INFORMATION**

**Physical State:** Liquid
**Color:** Clear (May Be Dyed)
**Odor:** Petroleum/Solvent
**Odor Threshold:** N/D

**IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION**

**Relative Density (at 15 °C):** 0.74
**Flammability (Solid, Gas):** N/A
**Flash Point [Method]:** -40°C (-40°F) [ASTM D-92]
**Flammable Limits (Approximate volume % in air):** LEL: 1.5 UEL: 7.6
**Autoignition Temperature:** N/D
**Boiling Point / Range:** > 20°C (68°F) - 225°C (437°F)
**Decomposition Temperature:** N/D
**Vapor Density (Air = 1):** 4 at 101 kPa
**Vapor Pressure:** 45 kPa (337.5 mm Hg) at 20 C - 74 kPa (555 mm Hg) at 20 °C
**Evaporation Rate (n-butyl acetate = 1):** > 10
**pH:** N/A
**Log Pow (n-Octanol/Water Partition Coefficient):** > 3
**Solubility in Water:** Appreciable
**Viscosity:** <1 cSt (1 mm2/sec) at 40 °C | 0.8 cSt (0.8 mm2/sec) at 20°C
**Oxidizing Properties:** See Hazards Identification Section.

**OTHER INFORMATION**

**Freezing Point:** N/D
**Melting Point:** N/A
**Pour Point:** < -60°C (-76°F)

## SECTION 10 STABILITY AND REACTIVITY

**REACTIVITY:** See sub-sections below.

**STABILITY:** Material is stable under normal conditions.

**CONDITIONS TO AVOID:** Avoid heat, sparks, open flames and other ignition sources.

**MATERIALS TO AVOID:** Alkalies, Halogens, Strong Acids, Strong oxidizers

**HAZARDOUS DECOMPOSITION PRODUCTS:** Material does not decompose at ambient temperatures.

**POSSIBILITY OF HAZARDOUS REACTIONS:** Hazardous polymerization will not occur.

## SECTION 11 TOXICOLOGICAL INFORMATION

## INFORMATION ON TOXICOLOGICAL EFFECTS

| Hazard Class | Conclusion / Remarks |
|---|---|
| **Inhalation** | |
| Acute Toxicity: (Rat) 4 hour(s) Data available. | Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 403 |
| Irritation: No end point data for material. | Elevated temperatures or mechanical action may form vapors, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. |
| **Ingestion** | |
| Acute Toxicity: Data available. | Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 401 |
| **Skin** | |
| Acute Toxicity: Data available. | Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 402 |
| Skin Corrosion/Irritation: Data available. | Irritating to the skin. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 404 |
| **Eye** | |
| Serious Eye Damage/Irritation: Data available. | May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 405 |
| **Sensitization** | |
| Respiratory Sensitization: No end point data for material. | Not expected to be a respiratory sensitizer. |
| Skin Sensitization: Data available. | Not expected to be a skin sensitizer. Based on chemical structure (polymers). Test(s) equivalent or similar to OECD Guideline 406 |
| **Aspiration:** Data available. | May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material. |
| **Germ Cell Mutagenicity:** Data available. | Caused genetic effects in laboratory animals, but the relevance to humans is uncertain. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 471 475 476 |
| **Carcinogenicity:** Data available. | Caused cancer from prolonged, high exposure. Based on human epidemiology studies. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 451 |
| **Reproductive Toxicity:** Data available. | Not expected to be a reproductive toxicant. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 416 421 |
| **Lactation:** No end point data for material. | Not expected to cause harm to breast-fed children. |
| **Specific Target Organ Toxicity (STOT)** | |
| Single Exposure: No end point data for material. | May cause drowsiness or dizziness. May be irritating to the respiratory tract. |
| Repeated Exposure: Data available. | Not expected to cause organ damage from prolonged or repeated exposure. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 410 412 453 |

## TOXICITY FOR SUBSTANCES

| NAME | ACUTE TOXICITY |
|---|---|
| ETHYL BENZENE | Inhalation Lethality: 4 hour(s) LC50 17.8 mg/l (Vapor) (Rat); Oral Lethality: LD50 3.5 g/kg (Rat) |
| NAPHTHALENE | Inhalation Lethality: 4 hour(s) LC50 > 0.4 mg/l (Max attainable vapor conc.) (Rat); Oral Lethality: LD50 533 mg/kg (Mouse) |

**OTHER INFORMATION**

**For the product itself:**

Laboratory animal studies have shown that prolonged and repeated inhalation exposure to light hydrocarbon vapors in the same boiling range as this product can produce adverse kidney effects in male rats. However, these effects were not observed in similar studies with female rats, male and female mice, or in limited studies with other animal species. Additionally, in a number of human studies, there was no clinical evidence of such effects at normal occupational levels. In 1991, The U.S. EPA determined that the male rat kidney is not useful for assessing human risk.

Vapor concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.

Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema. Exposure to this material, or one of its components, in situations where there is the potential for high levels, such as in confined spaces or with abuse, may result in abnormal heart rhythm (arrhythmia). High-level exposure to hydrocarbons (above occupational exposure limits) may initiate arrhythmia in a worker that is undergoing stress or is taking a heart-stimulating substance such as epinephrine, a nasal decongestant, or an asthma or cardiovascular drug.

**Contains:**

BENZENE: Caused cancer (acute myeloid leukemia and myelodysplastic syndrome), damage to the blood-producing system, and serious blood disorders in human studies. Caused genetic effects and effects on the immune system in laboratory animal and some human studies. Caused toxicity to the fetus and cancer in laboratory animal studies.

CUMENE: Repeated inhalation exposure of cumene vapor produced damage in the kidney of male rats only. These effects are believed to be species specific and are not relevant to humans.

ETHANOL: Prolonged or repeated exposure to high concentrations of ethanol vapor or overexposure by ingestion may produce adverse effects to brain, kidney, liver, and reproductive organs, birth defects in offspring, and developmental toxicity in offspring.

Gasoline unleaded: Caused cancer in animal tests. Chronic inhalation studies resulted in liver tumors in female mice and kidney tumors in male rats. Neither result considered significant for human health risk assessment by the United States EPA and others. Did not cause mutations In Vitro or In Vivo. Negative in inhalation developmental studies and reproductive tox studies.Inhalation of high concentrations in animals resulted in reversible central nervous system depression, but no persistent toxic effect on the nervous system. Non-sensitizing in test animals. Caused nerve damage in humans from abusive use (sniffing).

NAPHTHALENE: Exposure to high concentrations of naphthalene may cause destruction of red blood cells, anemia, and cataracts. Naphthalene caused cancer in laboratory animal studies, but the relevance of these findings to humans is uncertain.

N-HEXANE: Prolonged and/or repeated exposures to n-Hexane can cause progressive and potentially irreversible damage to the peripheral nervous system (e.g. fingers, feet, arms, legs, etc.). Simultaneous exposure to Methyl Ethyl Ketone (MEK) or Methyl Isobutyl Ketone (MIBK) and n-Hexane can potentiate the risk of adverse effects from n-Hexane on the peripheral nervous system. n-Hexane has been shown to cause testicular damage at high doses in male rats. The relevance of this effect for humans is unknown.

TOLUENE : Concentrated, prolonged or deliberate inhalation may cause brain and nervous system damage. Prolonged and repeated exposure of pregnant animals (> 1500 ppm) have been reported to cause adverse fetal developmental effects.

ETHYLBENZENE: Caused cancer in laboratory animal studies. The relevance of these findings to humans is uncertain.

**The following ingredients are cited on the lists below:**

| Chemical Name | CAS Number | List Citations |
|---|---|---|
| BENZENE | 71-43-2 | 1, 3, 6 |
| CUMENE | 98-82-8 | 2, 5 |

| | | |
|---|---|---|
| ETHYL BENZENE | 100-41-4 | 5 |
| GASOLINE | 86290-81-5 | 5 |
| NAPHTHALENE | 91-20-3 | 2, 5 |

--REGULATORY LISTS SEARCHED--

1 = NTP CARC
2 = NTP SUS
3 = IARC 1
4 = IARC 2A
5 = IARC 2B
6 = OSHA CARC

## SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

**ECOTOXICITY**

Material -- Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

**MOBILITY**

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Less volatile component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

**PERSISTENCE AND DEGRADABILITY**

**Biodegradation:**

Majority of components -- Expected to be inherently biodegradable

**Atmospheric Oxidation:**

More volatile component -- Expected to degrade rapidly in air

**BIOACCUMULATION POTENTIAL**

Majority of components -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

## SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

**DISPOSAL RECOMMENDATIONS**

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

**REGULATORY DISPOSAL INFORMATION**

RCRA Information: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP). Potential RCRA characteristics: IGNITABILITY. TCLP (BENZENE)

**Empty Container Warning** Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

## SECTION 14 TRANSPORT INFORMATION

**LAND (DOT)**

**Proper Shipping Name:** GASOLINE
**Hazard Class & Division:** 3
**ID Number:** 1203
**Packing Group:** II
**ERG Number:** 128
**Label(s):** 3
**Transport Document Name:** UN1203, GASOLINE, 3, PG II

**LAND (TDG)**

**Proper Shipping Name:** GASOLINE
**Hazard Class & Division:** 3
**UN Number:** 1203
**Packing Group:** II
**Marine Pollutant:** Yes
**Special Provisions:** 17, 88, 98, 150

Footnote: Marine Pollutant designation is applicable only if shipped over water.

**SEA (IMDG)**

**Proper Shipping Name:** MOTOR SPIRIT or GASOLINE or PETROL
**Hazard Class & Division:** 3
**EMS Number:** F-E, S-E
**UN Number:** 1203
**Packing Group:** II
**Marine Pollutant:** No
**Label(s):** 3
**Transport Document Name:** UN1203, MOTOR SPIRIT or GASOLINE or PETROL, 3, PG II, (-40°C c.c.)

**AIR (IATA)**

**Proper Shipping Name:** MOTOR SPIRIT or GASOLINE or PETROL
**Hazard Class & Division:** 3
**UN Number:** 1203
**Packing Group:** II
**Label(s) / Mark(s):** 3
**Transport Document Name:** UN1203, GASOLINE, 3, PG II

## SECTION 15 REGULATORY INFORMATION

**OSHA HAZARD COMMUNICATION STANDARD:** This material is considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

**Listed or exempt from listing/notification on the following chemical inventories:** AIIC, DSL, ENCS, KECI, PICCS, TSCA

**SARA 302:** No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

**CERCLA:** This material is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Contact local authorities to determine if other reporting requirements apply.

**SARA (311/312) REPORTABLE GHS HAZARD CLASSES:** None.

**SARA (313) TOXIC RELEASE INVENTORY:**

| Chemical Name | CAS Number | Typical Value |
|---|---|---|
| BENZENE | 71-43-2 | 0 - 1.5% |
| CUMENE | 98-82-8 | 0 - 1% |
| CYCLOHEXANE | 110-82-7 | 0 - 1.5% |
| ETHYL BENZENE | 100-41-4 | 0 - 3.5% |
| N-HEXANE | 110-54-3 | 0 - 5% |
| NAPHTHALENE | 91-20-3 | 0 - 1% |
| TOLUENE | 108-88-3 | 0 - 20% |
| XYLENES | 1330-20-7 | 0 - 20% |

**The following ingredients are cited on the lists below:**

| Chemical Name | CAS Number | List Citations |
|---|---|---|
| BENZENE | 71-43-2 | 1, 2, 4, 10, 11, 13, 15, 16, 17, 18, 19 |
| CUMENE | 98-82-8 | 1, 4, 10, 13, 16, 17, 18, 19 |
| CYCLOHEXANE | 110-82-7 | 1, 4, 13, 16, 17, 18, 19 |
| ETHYL ALCOHOL | 64-17-5 | 1, 4, 13, 16, 17, 18 |
| ETHYL BENZENE | 100-41-4 | 1, 4, 10, 13, 16, 17, 18, 19 |
| GASOLINE | 86290-81-5 | 1, 18 |
| N-HEXANE | 110-54-3 | 1, 4, 13, 16, 17, 18, 19 |
| NAPHTHALENE | 91-20-3 | 1, 4, 10, 13, 16, 17, 18, 19 |
| TOLUENE | 108-88-3 | 1, 4, 11, 13, 15, 16, 17, 18, 19 |
| XYLENES | 1330-20-7 | 1, 4, 13, 15, 16, 17, 18, 19 |

--REGULATORY LISTS SEARCHED--

| | | | |
|---|---|---|---|
| 1 = ACGIH ALL | 6 = TSCA 5a2 | 11 = CA P65 REPRO | 16 = MN RTK |
| 2 = ACGIH A1 | 7 = TSCA 5e | 12 = CA RTK | 17 = NJ RTK |
| 3 = ACGIH A2 | 8 = TSCA 6 | 13 = IL RTK | 18 = PA RTK |
| 4 = OSHA Z | 9 = TSCA 12b | 14 = LA RTK | 19 = RI RTK |
| 5 = TSCA 4 | 10 = CA P65 CARC | 15 = MI 293 | |

Code key: CARC=Carcinogen; REPRO=Reproductive

## SECTION 16 OTHER INFORMATION

**WARNING:** Cancer and Reproductive Harm - www.P65Warnings.ca.gov. Chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm are created by the combustion of this product.

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission or a waiver of rights.

N/D = Not determined, N/A = Not applicable

**KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):**
H224: Extremely flammable liquid and vapor; Flammable Liquid, Cat 1
H225: Highly flammable liquid and vapor; Flammable Liquid, Cat 2
H226: Flammable liquid and vapor; Flammable Liquid, Cat 3
H302: Harmful if swallowed; Acute Tox Oral, Cat 4
H303: May be harmful if swallowed; Acute Tox Oral, Cat 5
H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1
H312: Harmful in contact with skin; Acute Tox Dermal, Cat 4
H315: Causes skin irritation; Skin Corr/Irritation, Cat 2
H319(2A): Causes serious eye irritation; Serious Eye Damage/Irr, Cat 2A
H320(2B): Causes eye irritation; Serious Eye Damage/Irr, Cat 2B
H332: Harmful if inhaled; Acute Tox Inh, Cat 4
H335: May cause respiratory irritation; Target Organ Single, Resp Irr
H336: May cause drowsiness or dizziness; Target Organ Single, Narcotic
H340(1B): May cause genetic defects; Germ Cell Mutagenicity, Cat 1B
H350(1A): May cause cancer; Carcinogenicity, Cat 1A
H350(1B): May cause cancer; Carcinogenicity, Cat 1B
H351: Suspected of causing cancer; GHS Carcinogenicity, Cat 2
H361(D): Suspected of damaging the unborn child; Repro Tox, Cat 2 (Develop)
H361(F): Suspected of damaging fertility; Repro Tox, Cat 2 (Fertility)
H372: Causes damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 1
H373: May cause damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 2
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1
H401: Toxic to aquatic life; Acute Env Tox, Cat 2
H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1
H411: Toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 2
H412: Harmful to aquatic life with long lasting effects; Chronic Env Tox, Cat 3

**THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:**
GHS Health Symbol information was modified.
GHS Physical/Chemical Symbol information was modified.
Section 15: National Chemical Inventory Listing information was modified.
Section 16: Synonyms information was modified.
**SYNONYMS:** GASOLINE REGULAR UNLEADED RUL87 DCA WITH ETHANOL, EXXON MIDGRADE GASOLINE WITH ETHANOL, EXXON PREMIUM GASOLINE WITH ETHANOL, EXXON REGULAR GASOLINE WITH ETHANOL, OXYGENATED AUTOMOTIVE GASOLINE CONTAINING ETHANOL, GASOLINE REGULAR UNLEADED RUL87 DYED WITH ETHANOL, GASOLINE PREMIUM UNLEADED PUL91 DCA WITH ETHANOL, GASOLINE SUPER PREMIUM UNLEADED PUL91 DCA WITH ETHANOL, ESSO REGULAR GASOLINE WITH ETHANOL, ESSO EXTRA GASOLINE WITH ETHANOL, ESSO MIDGRADE GASOLINE WITH ETHANOL, ESSO PREMIUM GASOLINE WITH

ETHANOL, ESSO SUPREME GASOLINE WITH ETHANOL, ESSO SUPER-PREMIUM GASOLINE WITH ETHANOL, ESSO SUPREME+ GASOLINE WITH ETHANOL, GASOLINE REGULAR UNLEADED RUL87 WITH ETHANOL, GASOLINE REGULAR UNLEADED RUL87 DCA DYED WITH ETHANOL, GASOLINE REGULAR UNLEADED RUL87 LDCA WITH ETHANOL, GASOLINE MIDGRADE UNLEADED MUL89 LDCA WITH ETHANOL, GASOLINE MIDGRADE UNLEADED MUL89 DCA WITH ETHANOL, GASOLINE REGULAR UNLEADED RUL87 LDCA DYED WITH ETHANOL

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MHC: 1A, 0, 0, 0, 4, 1 PPEC: CF

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## ATTACHMENT 5

SDS - Liquid Propane Canister

# SAFETY DATA SHEET

Propane

Airgas
an Air Liquide company

## Section 1. Identification

**GHS product identifier** : Propane

**Chemical name** : propane

**Other means of identification** : Propyl hydride; n-Propane; Dimethyl methane; Bottled gas; propane in gaseous state; propane liquefied, n-Propane; Dimethylmethane; Freon 290; Liquefied petroleum gas; Lpg; Propyl hydride; R 290; C3H8; UN 1075; UN 1978; A-108; Hydrocarbon propellant.

**Product type** : Liquefied gas

**Product use** : Synthetic/Analytical chemistry.

**Synonym** : Propyl hydride; n-Propane; Dimethyl methane; Bottled gas; propane in gaseous state; propane liquefied, n-Propane; Dimethylmethane; Freon 290; Liquefied petroleum gas; Lpg; Propyl hydride; R 290; C3H8; UN 1075; UN 1978; A-108; Hydrocarbon propellant.

**SDS #** : 001045

**Supplier's details** : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

**24-hour telephone** : 1-866-734-3438

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

**GHS label elements**

**Hazard pictograms** :

**Signal word** : Danger

**Hazard statements** : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.

**Precautionary statements**

**General** : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

**Prevention** : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

**Response** : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

**Storage** : Protect from sunlight. Store in a well-ventilated place.

## Section 2. Hazards identification

**Disposal** : Not applicable.

**Hazards not otherwise classified** : Liquid can cause burns similar to frostbite.

## Section 3. Composition/information on ingredients

**Substance/mixture** : Substance

**Chemical name** : propane

**Other means of identification** : Propyl hydride; n-Propane; Dimethyl methane; Bottled gas; propane in gaseous state; propane liquefied, n-Propane; Dimethylmethane; Freon 290; Liquefied petroleum gas; Lpg; Propyl hydride; R 290; C3H8; UN 1075; UN 1978; A-108; Hydrocarbon propellant.

**Product code** : 001045

### CAS number/other identifiers

**CAS number** : 74-98-6

| Ingredient name | % | CAS number |
|---|---|---|
| Propane | 100 | 74-98-6 |

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

**Occupational exposure limits, if available, are listed in Section 8.**

## Section 4. First aid measures

### Description of necessary first aid measures

**Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

**Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

**Skin contact** : Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.

**Ingestion** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

**Eye contact** : Liquid can cause burns similar to frostbite.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

# Section 4. First aid measures

**Frostbite** : Try to warm up the frozen tissues and seek medical attention.

**Ingestion** : Ingestion of liquid can cause burns similar to frostbite.

## Over-exposure signs/symptoms

**Eye contact** : Adverse symptoms may include the following:, frostbite

**Inhalation** : No specific data.

**Skin contact** : Adverse symptoms may include the following:, frostbite

**Ingestion** : Adverse symptoms may include the following:, frostbite

## Indication of immediate medical attention and special treatment needed, if necessary

**Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

**Specific treatments** : No specific treatment.

**Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

**See toxicological information (Section 11)**

# Section 5. Fire-fighting measures

## Extinguishing media

**Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.

**Unsuitable extinguishing media** : None known.

**Specific hazards arising from the chemical** : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion.

**Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

**Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

# Section 6. Accidental release measures

## Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel** : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

# Section 6. Accidental release measures

**For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

**Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

## Methods and materials for containment and cleaning up

**Small spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

**Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

# Section 7. Handling and storage

## Precautions for safe handling

**Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

**Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

**Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

# Section 8. Exposure controls/personal protection

## Control parameters

### Occupational exposure limits

| Ingredient name | Exposure limits |
|---|---|
| Propane | **NIOSH REL (United States, 10/2016).**<br>TWA: 1800 mg/m³ 10 hours.<br>TWA: 1000 ppm 10 hours.<br>**OSHA PEL (United States, 6/2016).**<br>TWA: 1800 mg/m³ 8 hours.<br>TWA: 1000 ppm 8 hours.<br>**OSHA PEL 1989 (United States, 3/1989).**<br>TWA: 1800 mg/m³ 8 hours.<br>TWA: 1000 ppm 8 hours.<br>**ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].** |

## Section 8. Exposure controls/personal protection

**Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

**Individual protection measures**

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

**Skin protection**

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

**Thermal hazards** : If there is a risk of contact with the liquid, all protective equipment worn should be suitable for use with extremely low temperature materials.

## Section 9. Physical and chemical properties

**Appearance**

**Physical state** : Gas. [Compressed gas.]

**Color** : Colorless.

**Odor** : Odorless.BUT MAY HAVE SKUNK ODOR ADDED.

**Odor threshold** : Not available.

**pH** : Not available.

**Melting point** : -187.6°C (-305.7°F)

**Boiling point** : -161.48°C (-258.7°F)

## Section 9. Physical and chemical properties

| | | |
|---|---|---|
| **Critical temperature** | : | 96.55°C (205.8°F) |
| **Flash point** | : | Closed cup: -104°C (-155.2°F)<br>Open cup: -104°C (-155.2°F) |
| **Evaporation rate** | : | Not available. |
| **Flammability (solid, gas)** | : | Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials. |
| **Lower and upper explosive (flammable) limits** | : | Lower: 1.8%<br>Upper: 8.4% |
| **Vapor pressure** | : | 109 (psig) |
| **Vapor density** | : | 1.6 (Air = 1) |
| **Specific Volume ($ft^3/lb$)** | : | 8.6206 |
| **Gas Density ($lb/ft^3$)** | : | 0.116 (25°C / 77 to °F) |
| **Relative density** | : | Not applicable. |
| **Solubility** | : | Not available. |
| **Solubility in water** | : | 0.02 g/l |
| **Partition coefficient: n-octanol/water** | : | 1.09 |
| **Auto-ignition temperature** | : | 287°C (548.6°F) |
| **Decomposition temperature** | : | Not available. |
| **Viscosity** | : | Not applicable. |
| **Flow time (ISO 2431)** | : | Not available. |
| **Molecular weight** | : | 44.11 g/mole |
| **Aerosol product** | | |
| **Heat of combustion** | : | -46012932 J/kg |

## Section 10. Stability and reactivity

| | | |
|---|---|---|
| **Reactivity** | : | No specific test data related to reactivity available for this product or its ingredients. |
| **Chemical stability** | : | The product is stable. |
| **Possibility of hazardous reactions** | : | Under normal conditions of storage and use, hazardous reactions will not occur. |
| **Conditions to avoid** | : | Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow gas to accumulate in low or confined areas. |
| **Incompatible materials** | : | Oxidizers |
| **Hazardous decomposition products** | : | Under normal conditions of storage and use, hazardous decomposition products should not be produced. |
| **Hazardous polymerization** | : | Under normal conditions of storage and use, hazardous polymerization will not occur. |

# Section 11. Toxicological information

## Information on toxicological effects

### Acute toxicity

Not available.

### Irritation/Corrosion

Not available.

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

Not available.

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

## Potential acute health effects

**Eye contact** : Liquid can cause burns similar to frostbite.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

**Ingestion** : Ingestion of liquid can cause burns similar to frostbite.

## Symptoms related to the physical, chemical and toxicological characteristics

**Eye contact** : Adverse symptoms may include the following:, frostbite

**Inhalation** : No specific data.

**Skin contact** : Adverse symptoms may include the following:, frostbite

**Ingestion** : Adverse symptoms may include the following:, frostbite

## Delayed and immediate effects and also chronic effects from short and long term exposure

### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

# Section 11. Toxicological information

## Potential chronic health effects

Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

## Numerical measures of toxicity

### Acute toxicity estimates

Not available.

# Section 12. Ecological information

## Toxicity

Not available.

## Persistence and degradability

Not available.

## Bioaccumulative potential

| Product/ingredient name | $LogP_{ow}$ | BCF | Potential |
|---|---|---|---|
| Propane | 1.09 | - | low |

## Mobility in soil

**Soil/water partition coefficient ($K_{OC}$)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

# Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

# Section 14. Transport information

| | DOT | TDG | Mexico | IMDG | IATA |
|---|---|---|---|---|---|
| **UN number** | UN1978 | UN1978 | UN1978 | UN1978 | UN1978 |
| **UN proper shipping name** | PROPANE | PROPANE | PROPANE | PROPANE | PROPANE |
| **Transport hazard class(es)** | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| **Packing group** | - | - | - | - | - |
| **Environmental hazards** | No. | No. | No. | No. | No. |

**"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."**

**Additional information**

**DOT Classification** : **Limited quantity**
Yes.

**Packaging instruction**
**Passenger aircraft**
Quantity limitation: Forbidden.

**Cargo aircraft**
Quantity limitation: 150 kg

**Special provisions**
19, T50

For domestic transportation only, UN1075 may be substituted for the UN number shown as long as the substitution is consistent on package markings, shipping papers, and emergency response information. See 49 CFR 172.102 Special Provision 19.
Containers of NON-ODORIZED liquefied petroleum gas must be marked either NON-ODORIZED or NOT ODORIZED as of September 30, 2006. [49 CFR 172.301(f), 326(d), 330(c) and 338(e)]

**TDG Classification** : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
**Explosive Limit and Limited Quantity Index** 0.125
**ERAP Index** 3000
**Passenger Carrying Ship Index** 65
**Passenger Carrying Road or Rail Index** Forbidden
**Special provisions** 29, 42

**IATA** : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL and the IBC Code** : Not available.

# Section 15. Regulatory information

**U.S. Federal regulations** : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

**Clean Air Act (CAA) 112 regulated flammable substances**: propane

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Not listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

**SARA 302/304**

**Composition/information on ingredients**

No products were found.

**SARA 304 RQ** : Not applicable.

**SARA 311/312**

**Classification** : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

**State regulations**

**Massachusetts** : This material is listed.

**New York** : This material is not listed.

**New Jersey** : This material is listed.

**Pennsylvania** : This material is listed.

**International regulations**

**Chemical Weapon Convention List Schedules I, II & III Chemicals**

Not listed.

**Montreal Protocol (Annexes A, B, C, E)**

Not listed.

**Stockholm Convention on Persistent Organic Pollutants**

Not listed.

**Rotterdam Convention on Prior Informed Consent (PIC)**

Not listed.

**UNECE Aarhus Protocol on POPs and Heavy Metals**

Not listed.

**Inventory list**

**Australia** : This material is listed or exempted.

**Canada** : This material is listed or exempted.

**China** : This material is listed or exempted.

**Europe** : This material is listed or exempted.

**Japan** : **Japan inventory (ENCS)**: This material is listed or exempted.
**Japan inventory (ISHL)**: This material is listed or exempted.

**Malaysia** : This material is listed or exempted.

**New Zealand** : This material is listed or exempted.

**Philippines** : This material is listed or exempted.

**Republic of Korea** : This material is listed or exempted.

## Section 15. Regulatory information

**Taiwan** : This material is listed or exempted.

**Thailand** : Not determined.

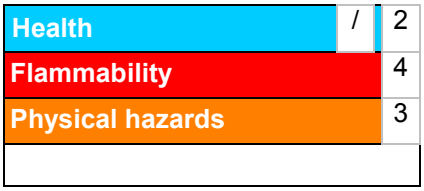
**Turkey** : This material is listed or exempted.

**United States** : This material is listed or exempted.

**Viet Nam** : Not determined.

## Section 16. Other information

### Hazardous Material Information System (U.S.A.)




**Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.**

**The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.**

### National Fire Protection Association (U.S.A.)

**Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.**

**Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.**

### Procedure used to derive the classification

| Classification | Justification |
|---|---|
| FLAMMABLE GASES - Category 1<br>GASES UNDER PRESSURE - Liquefied gas | Expert judgment<br>Expert judgment |

### History

**Date of printing** : 5/6/2018

**Date of issue/Date of revision** : 5/6/2018

**Date of previous issue** : 6/28/2017

**Version** : 1

**Key to abbreviations** : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973

# Section 16. Other information

as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

**References** : Not available.

**Other special considerations** : The information below is given to call attention to the issue of “Naturally occurring radioactive materials”. Although Radon-222 levels in the product represented by this MSDS do not present any direct Radon exposure hazard, customers should be aware of the potential for Radon daughter build up within their processing systems, whatever the source of their product streams. Radon-222 is a naturally occurring radioactive gas which can be a contaminant in natural gas. During subsequent processing , Radon tends to be concentrated in Liquefied Petroleum Gas streams and in product streams having a similar boiling point range. Industry experience has shown that this product may contain small amounts of Radon-222 and its radioactive decay products, called Radon “daughters”. The actual concentration of Radon-222 and radioactive daughters in the delivered product is dependent on the geographical source of the natural gas and storage time prior to delivery. Process equipment (i.e. lines, filters, pumps and reaction units) may accumulate significant levels of radioactive daughters and show a gamma radiation reading during operation. A potential external radiation hazard exists at or near any pipe valve or vessel containing a Radon enriched stream, or containing internal deposits of radioactive material due to the transmission of gamma radiation through its wall. Field studies reported in the literature have not shown any conditions that subject workers to cumulative exposures in excess of general population limits. Equipment emitting gamma radiation should be presumed to be internally contaminated with alpha emitting decay products which may be a hazard if inhaled or ingested. Protective equipment such as coveralls, gloves, and respirator (NIOSH/MHSA approved for high efficiency particulates and radionuclides, or supplied air) should be worn by personnel entering a vessel or working on contaminated process equipment to prevent skin contamination, ingestion, or inhalation of any residues containing alpha radiation. Airborne contamination may be minimized by handling scale and/or contaminated materials in a wet state.

## Notice to reader

**To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.**
**Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.**

## ATTACHMENT 6

SDS - Universal Bar Chain Oil

# Safety Data Sheet

According to OSHA HCS 2012 (29 CFR 1910.1200)

Universal Oil SDS No: 16 21 68 A

## SECTION 1: Identification

**Product Identifier** **Universal Bar & Chain Oil**
**Other means of identification** **None**

**SDS Number** **16 21 68 A**
**Relevant identified uses** Bar and chain oil
**Uses Advised Against** All others
**24 Hour Emergency Phone Number** CHEMTREC 1-800-424-9300

**Manufacturer/Supplier**
**Universal Oil**
**265 Jefferson Ave**
**Cleveland, Oh 44113**

**SDS Information**
Phone: 216-771-4300
Email:
sales@universaloil.com
www.universaloil.com

**Customer Service**
U.S.: 800-362-1530
**Technical Information** 800-362-1530

## SECTION 2: Hazard identification

**Classified Hazards**
This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

**Other Hazards**
None Known

**Label Elements**

No classified hazards

## SECTION 3: Composition/information on ingredients

| Chemical Name | CASRN | Concentration[1] |
|---|---|---|
| Distillates, petroleum, hydrotreated heavy paraffinic | 64742-54-7 | 0-100 |
| Residual oils, petroleum, solvent-dewaxed | 64742-62-7 | 0-40 |
| Non-Hazardous Materials | VARIOUS | <10 |

[1] All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

## SECTION 4: First aid measures

**Eye Contact:** If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

**Skin Contact:** Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention.

**Inhalation:** First aid is not normally required. If breathing difficulties develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. Seek immediate medical attention.

**Ingestion:** First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

**Most important symptoms and effects, both acute and delayed:** Inhalation of oil mists or vapors generated at elevated temperatures may cause respiratory irritation. Accidental ingestion can result in minor irritation of the digestive tract, nausea and diarrhea. Dry skin and possible irritation with repeated or prolonged exposure.

**Notes to Physician:** Acute aspirations of large amounts of oil-laden material may produce a serious aspiration pneumonia. Patients who aspirate these oils should be followed for the development of long-term sequelae. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities.

## SECTION 5: Firefighting measures

**NFPA 704 Hazard Class**

**Health:** 0 **Flammability:** 1 **Instability:** 0

0 (Minimal)
1 (Slight)
2 (Moderate)
3 (Serious)
4 (Severe)

**Extinguishing Media:** Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F / 100°C. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

**Specific hazards arising from the chemical**

**Unusual Fire & Explosion Hazards:** This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

**Hazardous Combustion Products:** Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of sulfur, nitrogen or phosphorus may also be formed.

**Special protective actions for firefighters:** For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

**See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits**

## SECTION 6: Accidental release measures

**Personal precautions, protective equipment and emergency procedures:** This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

**Environmental Precautions:** Stop and contain spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

**Methods and material for containment and cleaning up:** Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken. See Section 13 for information on appropriate disposal.

## SECTION 7: Handling and storage

**Precautions for safe handling:** Keep away from flames and hot surfaces. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8). Spills will produce very slippery surfaces. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and29CFR 1910.146. Do not wear contaminated clothing or shoes.

**Conditions for safe storage:** Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

## SECTION 8: Exposure controls/personal protection

| Chemical Name | ACGIH | OSHA | Other |
|---|---|---|---|
| Distillates, petroleum, hydrotreated heavy paraffinic | TWA: 5mg/m³<br>STEL: 10 mg/m³<br>as Oil Mist, if Generated | TWA: 5mg/m³<br>as Oil Mist, if Generated | --- |
| Residual oils, petroleum, solvent-dewaxed | TWA: 5mg/m³<br>STEL: 10 mg/m³<br>as Oil Mist, if Generated | TWA: 5mg/m³<br>as Oil Mist, if Generated | --- |

**Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.**

**Engineering controls:** If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

**Eye/Face Protection:** The use of eye/face protection is not normally required; however, good industrial hygiene practice suggests the use of eye protection that meets or exceeds ANSI Z.87.1 whenever working with chemicals.

**Skin/Hand Protection:** The use of skin protection is not normally required; however, good industrial hygiene practice suggests the use of gloves or other appropriate skin protection whenever working with chemicals. Suggested protective materials: Nitrile

**Respiratory Protection:** Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with R or P95 filters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

**Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.**

## SECTION 9: Physical and chemical properties

**Note:** Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

**Appearance:** Red, Transparent
**Physical Form:** Liquid
**Odor:** Petroleum
**Odor Threshold:** No data
**pH:** Not applicable
**Vapor Density (air=1):** >1
**Upper Explosive Limits (vol % in air):** No data
**Lower Explosive Limits (vol % in air):** No data

**Flash Point:** > 302 °F / > 150 °C
**Test Method:** Pensky-Martens Closed Cup (PMCC), ASTM D93, EPA 1010
**Initial Boiling Point/Range:** No data
**Vapor Pressure:** <1 mm Hg
**Partition Coefficient (n-octanol/water) (Kow):** No data
**Melting/Freezing Point:** No data
**Auto-ignition Temperature:** No data
**Decomposition Temperature:** No data

**Evaporation Rate (nBuAc=1):** No data
**Particle Size:** Not applicable
**Percent Volatile:** No data
**Flammability (solid, gas):** Not applicable

**Specific Gravity (water=1):** 0.87 - 0.91 @ 60°F (15.6°C)
**Bulk Density:** 7.3-7.6 lbs/gal
**Viscosity:** 9 - 22 cSt @ 100°C; 62 - 242 cSt @ 40°C
**Solubility in Water:** Negligible

## SECTION 10: Stability and reactivity

**Reactivity:** Not chemically reactive.

**Chemical stability:** Stable under normal ambient and anticipated conditions of use.

**Possibility of hazardous reactions:** Hazardous reactions not anticipated.

**Conditions to avoid:** Extended exposure to high temperatures can cause decomposition. Avoid all possible sources of ignition.

**Incompatible materials:** Avoid contact with strong oxidizing agents and strong reducing agents.

**Hazardous decomposition products:** Not anticipated under normal conditions of use.

## SECTION 11: Toxicological information

**Information on Toxicological Effects**

**Substance / Mixture**

| Acute Toxicity | Hazard | Additional Information | LC50/LD50 Data |
|---|---|---|---|
| | | | |
| **Inhalation** | Unlikely to be harmful | | >5 mg/L (mist, estimated) |
| | | | |
| **Dermal** | Unlikely to be harmful | | > 2 g/kg (estimated) |
| | | | |
| **Oral** | Unlikely to be harmful | | > 5 g/kg (estimated) |
| | | | |

**Aspiration Hazard:** Not expected to be an aspiration hazard.

**Skin Corrosion/Irritation:** Not expected to be irritating. Repeated exposure may cause skin dryness or cracking.

**Serious Eye Damage/Irritation:** Not expected to be irritating.

**Skin Sensitization:** No information available on the mixture, however none of the components have been classified for skin sensitization (or are below the concentration threshold for classification).

**Respiratory Sensitization:** No information available.

**Specific Target Organ Toxicity (Single Exposure):** No information available on the mixture, however none of the components have been classified for target organ toxicity (or are below the concentration threshold for classification).

**Specific Target Organ Toxicity (Repeated Exposure):** No information available on the mixture, however none of the components have been classified for target organ toxicity (or are below the concentration threshold for classification).

**Carcinogenicity:** No information available on the mixture, however none of the components have been classified for carcinogenicity (or are below the concentration threshold for classification).

**Germ Cell Mutagenicity:** No information available on the mixture, however none of the components have been classified for germ cell mutagenicity (or are below the concentration threshold for classification).

**Reproductive Toxicity:** No information available on the mixture, however none of the components have been classified for reproductive toxicity (or are below the concentration threshold for classification).

**Information on Toxicological Effects of Components**

**Lubricant Base Oil (Petroleum)**

***Carcinogenicity:*** The petroleum base oils contained in this product have been highly refined by a variety of processes including severe hydrocracking/hydroprocessing to reduce aromatics and improve performance characteristics. All of the oils meet the IP-346 criteria of less than 3 percent PAH's and are not considered carcinogens by NTP, IARC, or OSHA.

## SECTION 12: Ecological information

**GHS Classification:**
**No classified hazards**

**Toxicity:** All acute aquatic toxicity studies on samples of lubricant base oils show acute toxicity values greater than 100 mg/L for invertebrates, algae and fish. These tests were carried out on water accommodated fractions and the results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions.

**Persistence and Degradability:** The base oil constituents of greases are expected to be inherently, but not readily biodegradable. Some of the thickening agents may be readily biodegradable.

**Bioaccumulative Potential:** Log Kow values measured for the hydrocarbon components of this material range from 4 to greater than 6, and therefore are regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

**Mobility in Soil:** Volatilization to air is not expected to be a significant fate process due to the low vapor pressure of this material. Components may behave differently in the aquatic environment with soaps dispersing and dissolving to some extent in water while the hydrocarbons will float on the surface due to their low water solubility. The hydrocarbon portion would be expected to show low mobility in soil and water. The major environmental fate would be expected to be biodegradation.

**Other adverse effects:** None anticipated.

## SECTION 13: Disposal considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations. This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the SDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.This material under most intended uses would become "Used Oil" due to contamination by physical or chemical impurities. Whenever possible, Recycle used oil in accordance with applicable federal and state or local regulations. Container contents should be completely used and containers should be emptied prior to discard.

## SECTION 14: Transport information

**UN Number:** Not regulated
**UN proper shipping name:** None
**Transport hazard class(es):** None
**Packing Group:** None
**Environmental Hazards:** This product does not meet the DOT/UN/IMDG/IMO criteria of a marine pollutant
**Special precautions for user:** If shipped by land in a packaging having a capacity of 3,500 gallons or more, the provisions of 49 CFR, Part 130 apply. (Contains oil)
**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:** Not applicable

## SECTION 15: Regulatory information

**CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):**
This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

**CERCLA/SARA - Section 311/312 (Title III Hazard Categories)**

| | |
|---|---|
| **Acute Health Hazard:** | No |
| **Chronic Health Hazard:** | No |
| **Fire Hazard:** | No |
| **Pressure Hazard:** | No |
| **Reactive Hazard:** | No |

**CERCLA/SARA - Section 313 and 40 CFR 372:**
This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

**EPA (CERCLA) Reportable Quantity (in pounds):**
This material does not contain any chemicals with CERCLA Reportable Quantities.

**California Proposition 65:**
This material does not contain any chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

**International Hazard Classification**

**Canada:**
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations.

**WHMIS Hazard Class:**
None

**International Inventories**
All components are either listed on the US TSCA Inventory, or are not regulated under TSCA.
All components are either on the DSL, or are exempt from DSL listing requirements.

**U.S. Export Control Classification Number:** EAR99

## SECTION 16: Other information

| Issue Date: | Previous Issue Date: | SDS Number | Status: |
|---|---|---|---|
| 09/09/15 | 04/04/11 | 16 21 68 A | FINAL |

**Revised Sections or Basis for Revision:**
Product Name / Synonyms (Section 1); Periodic review and update

**Guide to Abbreviations:**
ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

**Disclaimer of Expressed and implied Warranties:**
The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

## ATTACHMENT 7

SDS - Vaseline Petroleum Jelly

# MATERIAL SAFETY DATA SHEET

NOTE: This Material Safety Data Sheet (MSDS) is prepared for industrial / commercial use situations. The preparation of this MSDS may be required by law, but this is not an assertion that this product presents a risk in the normal consumer use situation.

## SECTION I. PRODUCT & COMPANY IDENTIFICATION

PRODUCT NAME: **Vaseline Petroleum Jelly – All Variants**
MSDS NUMBER: 4056
CORPORATE ADDRESS: Unilever
700 Sylvan Avenue
Englewood Cliffs, NJ 07632

| | |
|---|---|
| PHONE #: | 800-457-7084 Monday thru Friday (8:30 AM – 6:00 PM EST) |
| EMERGENCY #: | 800-745-9269 (24 Hours) |
| POISON CONTROL #: | 800-949-7866 (24 Hours) |
| CHEMTREC #: | 800-424-9300 (24 Hours, Transportation Emergencies) |

All written inquiries should be sent to:
Unilever Consumer Services, 920 Sylvan Avenue, Englewood Cliffs, NJ 07632 or Fax to: 201-227-5859

## SECTION II. HAZARDS IDENTIFICATION

**Warnings: For external use only. Keep out of reach of children.**

EXPOSURE EFFECTS: This is a personal care product that is safe for consumers when used according to the label directions. Like many consumer products, a small number of individuals may experience reactions such as redness, rash and /or swelling upon prolonged or repeated skin contact or eye contact.

HAZARD RATINGS: Health: 0, Fire: 1, Physical Hazards: 0
Ratings are based on a 0-4 scale, with 0 representing minimal and 4 representing significant hazards or risks.

## SECTION III. COMPOSITION/INFORMATION ON INGREDIENTS

This product is not manufactured to contain a reportable component as defined in 29 CFR § 1910.1200:

## SECTION IV. FIRST AID MEASURES

EYE CONTACT: Rinse thoroughly with water.
SKIN CONTACT: Rinse with water.
INGESTION: Do not induce vomiting. Drink a glass of milk or water.
INHALATION: Move individual to fresh air.
NOTE: If symptoms persist, seek medical attention.

## SECTION V. FIRE FIGHTING MEASURES

| | |
|---|---|
| HAZARD CLASSIFICATION: | Not flammable |
| FLASHPOINT: | Expected to be ≥212ºF/100ºC based on composition |
| EXTINGUISHING MEDIA: | Water mist, carbon dioxide, foams or dry chemicals |
| SPECIAL FIREFIGHTING PROCEDURES: | Use water spray or fog, direct stream may produce foam |
| HAZARDOUS COMBUSTION PRODUCTS: | Oxides of carbon, nitrogen; hydrocarbons & derivatives |
| CONTENTS UNDER PRESSURE: | No |
| EXPLOSIVE: | No |

## SECTION VI. ACCIDENTAL RELEASE MEASURES

SPILLS, LEAKS: Small or household quantities may be cleaned up and disposed of in household trash. For large (industrial) releases, prevent spill from entering a waterway. Absorbent materials may be used. Material may be slippery if spilled.

## SECTION VII. HANDLING & STORAGE

| | |
|---|---|
| HANDLING PRECAUTIONS: | No special precautions necessary |
| STORAGE REQUIREMENTS: | Store in a dry area at normal temperatures |

## SECTION VIII. EXPOSURE CONTROLS / PERSONAL PROTECTION

| CHEMICAL NAME | CAS # | ACGIH TLV | OSHA PEL |
|---|---|---|---|
| Not applicable | N/A | N/A | N/A |

PERSONAL PROTECTION

| | |
|---|---|
| FOR ROUTINE CONSUMER USE: | No special precautions necessary |
| FOR INDUSTRIAL ACTIVITIES: | Use protective eyewear, gloves, clothing and general ventilation |

## SECTION IX. PHYSICAL & CHEMICAL PROPERTIES

| | | | |
|---|---|---|---|
| FORM: | Semi-solid | COLOR: | Slight yellowish tint |
| ODOR: | Characteristic | SOLUBILITY: | Not soluble in water |
| SPECIFIC GRAVITY: | Not available | VAPOR PRESSURE: | Not available |
| MELTING POINT: | Not available | VISCOSITY: | Not available |
| pH: | Not applicable | EVAPORATION RATE: | Not available |
| PERCENT VOLATILE: | Not available | PERCENT VOC: | Not available |

## SECTION X. STABILITY & REACTIVITY

| | |
|---|---|
| STABLE: | Yes |
| HAZARDOUS DECOMPOSITION PRODUCTS: | None known |
| INCOMPATIBLE WITH: | Strong oxidizers, acids or bases |
| SPECIAL CONDITIONS TO AVOID: | Extreme heat |
| CORROSIVE TO STEEL, ALUMINUM: | No |

## SECTION XI. TOXICOLOGY INFORMATION

ACUTE EFFECTS

| | |
|---|---|
| EYE CONTACT: | May cause redness or irritation |
| SKIN CONTACT: | Overexposure may cause a skin reaction such as redness |
| INGESTION: | May cause nausea, vomiting and diarrhea. |
| RESPIRATORY: | Not an expected route of exposure |

CHRONIC EFFECTS: None expected

CARCINOGEN CLASSIFICATIONS

| | |
|---|---|
| NTP: | None |
| IARC: | None |
| OSHA: | None |

## SECTION XII. ECOLOGICAL INFORMATION

This product is safe for the environment at the concentrations predicted under normal use conditions.

## SECTION XIII. DISPOSAL CONSIDERATIONS

RCRA: Non- hazardous waste pursuant to federal standards. Does not meet the federal characteristic definition of ignitable, corrosive, reactive or toxic. Not listed in 40 CFR § 261.33.
Disposal should be in accordance with all applicable local, state and federal regulations.

## SECTION XIV. TRANSPORT INFORMATION

| FOR NON-BULK SHIPMENTS ONLY | DOMESTIC – ALL MODES (US DOT) | INTERNATIONAL - AIR (IATA/ICAO) | INTERNATIONAL - WATER (IMO/IMDG) |
|---|---|---|---|
| PROPER SHIPPING NAME: | Not applicable | Not applicable | Not applicable |
| HAZARD CLASS: | " | " | " |
| UN/ID #: | " | " | " |
| PACKING GROUP: | " | " | " |
| LABEL REQUIRED: | " | " | " |

| | |
|---|---|
| EMERGENCY GUIDE NUMBER: | Not applicable |
| DOT HAZARDOUS SUBSTANCE RQ: | None/no reportable quantities |
| DOT MARINE POLLUTANTS: | None/no reportable quantities |
| IATA FORBIDDEN SUBSTANCES: | None/no reportable quantities |

## SECTION XV. REGULATORY INFORMATION

TSCA: Not applicable
RCRA: See Section XIII. Disposal Considerations
CAA HAPS or Ozone Depletors: None/no reportable quantities
CERCLA/SARA 302 Hazardous Substances: None/no reportable quantities
CERCLA/SARA 311/312 Hazard Categories: None/no reportable quantities
CERCLA/SARA 313 Emissions Reporting: None/no reportable quantities

CA 22 CCR Hazardous Wastes: None/no reportable quantities
CA Proposition 65 Listed Chemicals: None/no reportable quantities
IL, MA, NJ, PA, RI State RTK & Hazardous Notifications: None/no reportable quantities

## SECTION XVI. OTHER INFORMATION

LEGEND:

| | | | |
|---|---|---|---|
| ACGIH | American Conference of Governmental & Industrial Hygienists | N/A | Not Applicable |
| CAA | Clean Air Act | NFPA | National Fire Protection Association |
| CAS | Chemical Abstract Service | NTP | National Toxicology Program |
| CCR | California Code of Regulations | OSHA | Occupation Safety & Health Administration |
| CERCLA | Comprehensive Environmental Response, Compensation & Liability Act | PEL | Permissible Exposure Limit |
| CFR | Code of Federal Regulations | RCRA | Resource Conservation & Recovery Act |
| DOT | Department of Transportation | RQ | Reportable Quantity |
| EPCRA | Emergency Planning and Community Right-To-Know Act | RTK | Right-To-Know |
| EST | Eastern Standard Time | SARA | Superfund Amendments & Reauthorization Act |
| HAPS | Hazardous Air Pollutants | STEL | Short-Term Exposure Limit |
| HMIS | Hazardous Materials Information System | TBD | To Be Determined |
| HON | Hazardous Organic NESHAP (National Emission Standards for Hazardous Air Pollutants) | TCC | Tagliabue Closed Cup |
| IARC | International Agency for the Research of Cancer | TLV | Threshold Limit Value |
| IATA | International Air Traffic Association | TSCA | Toxic Substances Control Act |
| ICAO | International Civil Aviation Organization | TWA | Time Weighted Average |
| IMDG | International Maritime Dangerous Goods | TCLP | Toxicity Characteristic Leaching Procedure |
| IMO | International Maritime Organization | VOC | Volatile Organic Compounds |

Unilever
Regulatory Affairs
40 Merritt Boulevard
Trumbull, CT 06611

Formulation, Date & Clearance: 83142385-3, 5/7/2010, 58034
MSDS Date: 8/19/2010 3:09 PM

The information contained in this MSDS is based on data which is believed to be accurate. While Unilever believes that the data contained herein comply with 29 CFR 1910.1200, they are not to be taken as a warranty or representation for which Unilever assumes legal responsibility. They are offered solely for your consideration and verification. This MSDS is not prepared for consumer use.

## ATTACHMENT 8

SDS - WD-40-multi-use-product-aerosol

# Safety Data Sheet
## *California CARB Compliant*

**1 - Identification**

| | |
|---|---|
| **Product Name: WD-40 Multi-Use Product Aerosol**<br><br>**Product Use: Lubricant, Penetrant, Drives Out Moisture, Removes and Protects Surfaces From Corrosion**<br><br>**Restrictions on Use: None identified**<br><br>**SDS Date Of Preparation: March 5, 2019** | **Manufacturer: WD-40 Company**<br>**Address: 9715 Businesspark Avenue San Diego, California, USA 92131**<br>**Telephone:**<br>**Emergency: 1-888-324-7596**<br>**Information: 1-888-324-7596**<br>**Chemical Spills: 1-800-424-9300 (Chemtrec)**<br>**1-703-527-3887 (International Calls)** |

**2 – Hazards Identification**

**Hazcom 2012/GHS Classification:**
Flammable Aerosol Category 1
Gas Under Pressure: Compressed Gas
Aspiration Toxicity Category 1
Specific Target Organ Toxicity Single Exposure Category 3 (nervous system effects)

Note: This product is a consumer product and is labeled in accordance with the US Consumer Product Safety Commission regulations which take precedence over OSHA Hazard Communication labeling. The actual container label will not include the label elements below. The labeling below applies to industrial/professional products.

**Label Elements:**

**DANGER!**
Extremely Flammable Aerosol.
Contains gas under pressure; may explode if heated.
May be fatal if swallowed and enters airways.
May cause drowsiness or dizziness.
**Prevention**
Keep away from heat, sparks, open flames, hot surfaces. – No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.
Avoid breathing vapors or mists.
Use only outdoors or in a well-ventilated area.
**Response**
IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell.
**Storage**
Store locked up.
Protect from sunlight. Do not expose to temperatures exceeding 50°C/122°F. Store in a well-ventilated place.
**Disposal**
Dispose of contents and container in accordance with local and national regulations.

**3 - Composition/Information on Ingredients**

| Ingredient | CAS # | Weight Percent | US Hazcom 2012/ GHS Classification |
|---|---|---|---|
| LVP Aliphatic Hydrocarbon | 64742-47-8 | 45-50% | Aspiration Toxicity Category 1 |
| Petroleum Base Oil | 64742-56-9<br>64742-65-0<br>64742-53-6<br>64742-54-7<br>64742-71-8 | <35% | Not Hazardous |
| Aliphatic Hydrocarbon | 64742-47-8 | <25% | Flammable Liquid Category 3<br>Aspiration Toxicity Category 1<br>Specific Target Organ Toxicity Single Exposure Category 3 (nervous system effects) |
| Carbon Dioxide | 124-38-9 | 2-3% | Simple Asphyxiant<br>Gas Under Pressure, Compressed Gas |

Note: The specific chemical identity and exact percentages are a trade secret.

**4 – First Aid Measures**

**Ingestion (Swallowed):** Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.
**Eye Contact:** Flush thoroughly with water. Remove contact lenses if present after the first 5 minutes and continue flushing for several more minutes. Get medical attention if irritation persists.
**Skin Contact:** Wash with soap and water. If irritation develops and persists, get medical attention.
**Inhalation (Breathing):** If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.
**Signs and Symptoms of Exposure:** Harmful or fatal if swallowed. Aspiration of liquid into the lungs during swallowing or vomiting may cause lung damage. May cause eye and respiratory irritation. Inhalation of mists or vapors may cause drowsiness, dizziness and other nervous system effects. Skin contact may cause drying of the skin.
**Indication of Immediate Medical Attention/Special Treatment Needed:** Immediate medical attention is needed for ingestion.

**5 – Fire Fighting Measures**

**Suitable (and unsuitable) Extinguishing Media:** Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.
**Specific Hazards Arising from the Chemical:** Extremely flammable aerosol. Contents under pressure. Keep away from ignition sources and open flames. Exposure of containers to extreme heat and flames can cause them to rupture often with violent force. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back. Combustion will produce oxides of carbon and hydrocarbons.
**Special Protective Equipment and Precautions for Fire-Fighters:** Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.

**6 – Accidental Release Measures**

**Personal Precautions, Protective Equipment and Emergency Procedures:** Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area.
**Methods and Materials for Containment/Cleanup:** Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

## 7 – Handling and Storage

**Precautions for Safe Handling:** Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use only with adequate ventilation. Keep away from heat, sparks, pilot lights, hot surfaces and open flames. Unplug electrical tools, motors and appliances before spraying or bringing the can near any source of electricity. Electricity can burn a hole in the can and cause contents to burst into flames. To avoid serious burn injury, do not let the can touch battery terminals, electrical connections on motors or appliances or any other source of electricity. Wash thoroughly with soap and water after handling. Keep containers closed when not in use. Keep out of the reach of children. Do not puncture, crush or incinerate containers, even when empty.

**Conditions for Safe Storage:** Store in a cool, well-ventilated area, away from incompatible materials. Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol. Store away from oxidizers.

## 8 – Exposure Controls/Personal Protection

| Chemical | Occupational Exposure Limits |
|---|---|
| LVP Aliphatic Hydrocarbon | 1200 mg/m3 TWA (manufacturer recommended) |
| Petroleum Base Oil | 5 mg/m3 TWA (Inhalable) ACGIH TLV (as Mineral oil)<br>5 mg/m3 TWA OSHA PEL (as Oil mist, mineral) |
| Aliphatic Hydrocarbon | 1200 mg/m3 TWA (manufacturer recommended) |
| Carbon Dioxide | 5000 ppm TWA, 30,000 ppm STEL ACGIH TLV<br>5000 ppm TWA OSHA PEL |

**The Following Controls are Recommended for Normal Consumer Use of this Product**
**Appropriate Engineering Controls:** Use in a well-ventilated area.
**Personal Protection:**
**Eye Protection:** Avoid eye contact. Always spray away from your face.
**Skin Protection:** Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
**Respiratory Protection:** None needed for normal use with adequate ventilation.

**For Bulk Processing or Workplace Use the Following Controls are Recommended**
**Appropriate Engineering Controls:** Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.
**Personal Protection:**
**Eye Protection:** Safety goggles recommended where eye contact is possible.
**Skin Protection:** Wear chemical resistant gloves.
**Respiratory Protection:** None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.
**Work/Hygiene Practices:** Wash with soap and water after handling.

## 9 – Physical and Chemical Properties

| | | | |
|---|---|---|---|
| Appearance: | Light amber liquid | Flammable Limits: (Solvent Portion) | LEL: 0.6% UEL: 8% |
| Odor: | Mild petroleum odor | Vapor Pressure: | 95-115 PSI @ 70°F |
| Odor Threshold: | Not established | Vapor Density: | Greater than 1 (air=1) |
| pH: | Not Applicable | Relative Density: | 0.8 – 0.82 @ 60°F |
| Melting/Freezing Point: | Not established | Solubilities: | Insoluble in water |
| Boiling Point/Range: | 361 - 369°F (183 - 187°C) | Partition Coefficient; n-octanol/water: | Not established |
| Flash Point: | 138°F (59°C) Tag Closed Cup (liquid) | Autoignition Temperature: | Not established |

| | | | |
|---|---|---|---|
| Evaporation Rate: | Not established | Decomposition Temperature: | Not established |
| Flammability (solid, gas): | Flammable Aerosol | Viscosity: | 2.79-2.96 cSt @ 100°F |
| VOC: | 24.1%<br>MIR=0.43gO3/gVOC | Pour Point: | -63°C (-81.4°F ) ASTM D-97 |

**10 – Stability and Reactivity**

**Reactivity:** Not reactive under normal conditions
**Chemical Stability:** Stable
**Possibility of Hazardous Reactions:** May react with strong oxidizers generating heat.
**Conditions to Avoid:** Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.
**Incompatible Materials:** Strong oxidizing agents.
**Hazardous Decomposition Products:** Carbon monoxide and carbon dioxide.

**11 – Toxicological Information**

**Symptoms of Overexposure:**
**Inhalation:** High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.
**Skin Contact:** Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.
**Eye Contact:** Contact may be irritating to eyes. May cause redness and tearing.
**Ingestion:** This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. This product is an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis, severe lung damage and death.
**Chronic Effects:** None expected.
**Carcinogen Status:** None of the components are listed as a carcinogen or suspect carcinogen by IARC, NTP, ACGIH or OSHA.
**Reproductive Toxicity**: None of the components is considered a reproductive hazard.
**Numerical Measures of Toxicity:**
Acute Toxicity Estimates: Oral > 5,000 mg/kg; Dermal >2,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.

**12 – Ecological Information**

**Ecotoxicity:** No specific aquatic toxicity data is currently available; however components of this product are not expected to be harmful to aquatic organisms
**Persistence and Degradability:** Components are readily biodegradable.
**Bioaccumulative Potential:** Bioaccumulation is not expected based on an assessment of the ingredients.
**Mobility in Soil:** No data available
**Other Adverse Effects:** None known

**13 - Disposal Considerations**

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Do not puncture or incinerate containers, even empty. Dispose in accordance with federal, state, and local regulations.

**14 – Transportation Information**

DOT Surface Shipping Description: UN1950, Aerosols, 2.1 Ltd. Qty
(Note: Shipping Papers are not required for Limited Quantities unless transported by air or vessel – each package must be marked with the Limited Quantity Mark)
IMDG Shipping Description: UN1950, Aerosols, 2.1, LTD QTY
ICAO Shipping Description: UN1950, Aerosols, flammable, 2.1

NOTE: WD-40 Company does not test aerosol cans to assure that they meet the pressure and other requirements for transport by air. We do not recommend that our aerosol products be transported by air.

**15 – Regulatory Information**

**U.S. Federal Regulations:**
**CERCLA 103 Reportable Quantity:** This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.
**SARA TITLE III:**
**Hazard Category For Section 311/312:** Acute Health, Fire Hazard, Sudden Release of Pressure
**Section 313 Toxic Chemicals:** This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
**Section 302 Extremely Hazardous Substances (TPQ):** None
**EPA Toxic Substances Control Act (TSCA) Status:** All of the components of this product are listed on the TSCA inventory.
**California Safe Drinking Water and Toxic Enforcement Act (Proposition 65):** This product does not require a California Proposition 65 warning.
**VOC Regulations:** This product complies with the consumer product VOC limits of CARB, the US EPA and states adopting the OTC VOC rules.
**Canadian Environmental Protection Act:** All of the ingredients are listed on the Canadian Domestic Substances List or exempt from notification

**16 – Other Information**

**HMIS Hazard Rating:**
**Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Physical Hazard – 0 (minimal hazard)**

Revision Date: March 5, 2019 Supersedes: July 19, 2018

Revision Summary: Section 9 update VOC data

Prepared by: Industrial Health & Safety Consultants, Inc. Shelton, CT, USA

Reviewed by: I. Kowalski Regulatory Affairs Dept.

1012200/No.0084704

## ATTACHMENTS

1. Ammonium Chloride MSDS
2. Ammonium Phosphate Dibasic MSDS
3. Ascorbic Acid MSDS
4. Hydrochloric Acid MSDS (1)
5. Methanol MSDS
6. Nitric Acid MSDS
7. Sodium Bisulfate MSDS
8. Sodium Hydroxide MSDS
9. Sodium Thiosulfate 1.0M MSDS
10. Sulfuric Acid MSDS
11. Trizma MSDS
12. Zinc Acetate MSDS

## ATTACHMENT 1

Ammonium Chloride MSDS

**Ammonium Chloride,Lab Grade**

## SECTION 1 : Identification of the substance/mixture and of the supplier

**Product name** : **Ammonium Chloride,Lab Grade**

**Manufacturer/Supplier Trade name**:

**Manufacturer/Supplier Article number**: **S25168C**

**Recommended uses of the product and uses restrictions on use**:

**Manufacturer Details**:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

**Supplier Details**:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

**Emergency telephone number**:

Fisher Science Education Emergency Telephone No.: 800-535-5053

## SECTION 2 : Hazards identification

**Classification of the substance or mixture**:

**Irritant**
Acute toxicity (oral, dermal, inhalation), category 4
Eye irritation, category 2A

**Environmentally Damaging**
Chronic hazards to the aquatic environment, category 2

AcTox. Oral 4
Eye Irrit 2A
Aq. AcTox. 2
Aq. ChrTox. 2

**Signal word** :Warning

**Hazard statements**:
Harmful if swallowed
Causes serious eye irritation
Toxic to aquatic life with long lasting effects
**Precautionary statements**:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Do not eat, drink or smoke when using this product
Wash skin thoroughly after handling
Avoid release to the environment
Wear protective gloves/protective clothing/eye protection/face protection
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing
If eye irritation persists get medical advice/attention

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Collect spillage
Dispose of contents and container to an approved waste disposal plant

**Combustible Dust Hazard: :**
May form combustible dust concentrations in air (during processing).

**Other Non-GHS Classification**:

**WHMIS**

D2B

**NFPA/HMIS**

NFPA SCALE (0-4)

HMIS RATINGS (0-4)

## SECTION 3 : Composition/information on ingredients

| **Ingredients:** | | |
|---|---|---|
| CAS 12125-02-9 | Ammonium Chloride | 100 % |
| | | Percentages are by weight |

## SECTION 4 : First aid measures

**Description of first aid measures**

**After inhalation:** Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.Give artificial respiration if necessary. Get medical assistance if cough or other symptoms appear.

**After skin contact:** Wash affected area with soap and water. Seek medical advice if discomfort or irritation persists.

**After eye contact:** Protect unexposed eye. Rinse or flush exposed eye gently using water for 15-20 minutes. Remove contact lenses while rinsing.Continue rinsing eyes for an additional 15 minutes.Immediately get medical assistance.

**After swallowing:** Rinse mouth thoroughly. Do not induce vomiting. Get medical assistance.

**Most important symptoms and effects, both acute and delayed:**

Shortness of breath.Irritation.Nausea.Headache.;

**Indication of any immediate medical attention and special treatment needed:**

If seeking medical attention provide SDS document to physician. Physician should treat symptomatically.

## SECTION 5 : Firefighting measures

**Extinguishing media**

**Suitable extinguishing agents:** Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

**For safety reasons unsuitable extinguishing agents:**

**Special hazards arising from the substance or mixture:**

Thermal decomposition can lead to release of irritating gases and vapors.

**Advice for firefighters:**

**Protective equipment:** Wear protective eyeware, gloves, and clothing.

**Additional information (precautions):** Ensure adequate ventilation.Avoid contact with skin, eyes, and clothing.

## SECTION 6 : Accidental release measures

**Personal precautions, protective equipment and emergency procedures:**

Ensure adequate ventilation.Ensure that air-handling systems are operational.

**Environmental precautions:**

Should not be released into environment. Prevent from reaching drains, sewer, or waterway.

**Methods and material for containment and cleaning up:**

Keep in suitable closed containers for disposal. If necessary use trained response staff or contractor. Absorb with suitable material. Wear protective eyeware, gloves, and clothing. Refer to Section 8.Always obey local regulations.Evacuate personnel to safe areas. Containerize for disposal. Refer to Section 13.

**Reference to other sections:**

## SECTION 7 : Handling and storage

**Precautions for safe handling:**

Wash hands after handling. Follow proper disposal methods. Refer to Section 13. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

**Conditions for safe storage, including any incompatibilities:**

Store in a cool location. Keep away from food and beverages. Provide ventilation for containers. Keep container tightly sealed. Store away from incompatible materials. Protect from freezing and physical damage.

## SECTION 8 : Exposure controls/personal protection

**Control Parameters:**

12125-02-9, Ammonium Chloride, ACGIH TLV: 10mg/m3
12125-02-9, Ammonium Chloride, TWA 10 mg/m3 USA. NIOSH
12125-02-9, Ammonium Chloride, TWA 10 mg/m3 USA. OSHA

**Appropriate Engineering controls:** Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling. Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor and mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.

**Respiratory protection:** Not required under normal conditions of use. Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. When necessary use NIOSH approved breathing equipment.

**Protection of skin:** Select glove material impermeable and resistant to the substance.Select glove material based on rates of diffusion and degradation. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves. Wear protective clothing.

**Eye protection:** Safety glasses with side shields or goggles.Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**General hygienic measures:** Before rewearing wash contaminated clothing. Wash hands and exposed skin with soap and plenty of water. Perform routine housekeeping.Avoid contact with skin, eyes, and clothing.

## SECTION 9 : Physical and chemical properties

| | | | |
|---|---|---|---|
| **Appearance (physical state,color)**: | White solid | **Explosion limit lower**:<br>**Explosion limit upper**: | Non Explosive<br>Non Explosive |
| **Odor**: | Odorless | **Vapor pressure**: | Not Determined |
| **Odor threshold**: | Not Determined | **Vapor density**: | Not Determined |
| **pH-value**: | 5.0-5.5 (1-10%) aqueous solution | **Relative density**: | Not Determined |
| **Melting/Freezing point**: | Approx 338°C | **Solubilities**: | Partially soluble in water |
| **Boiling point/Boiling range**: | Approx 520°C | **Partition coefficient (n-octanol/water)**: | Not Determined |
| **Flash point (closed cup)**: | Not Determined | **Auto/Self-ignition temperature**: | Not Determined |
| **Evaporation rate**: | Not Determined | **Decomposition temperature**: | Not Determined |
| **Flammability (solid,gaseous)**: | Not Determined | **Viscosity**: | a. Kinematic:Not Determined<br>b. Dynamic: Not Determined |
| **Density**: Not Determined | | | |

## SECTION 10 : Stability and reactivity

**Reactivity:**Nonreactive under normal conditions.
**Chemical stability:**Stable under normal conditions.
**Possible hazardous reactions:**Reacts explosively with potassium chlorate or bromine trifluoride. Reacts

violently with bromide pentafluoride, ammonium compounds, nitrates, and iodine heptafluoride.
**Conditions to avoid:**Incompatible materials.
**Incompatible materials:**Strong acids.Strong bases.Strong oxidizing agents.
**Hazardous decomposition products:**Ammonia.Hydrogen chloride.

## SECTION 11 : Toxicological information

| | | |
|---|---|---|
| **Acute Toxicity**: | | |
| **Oral**: | LD50:1650 mg/kg (rat) | Ammonium Chloride (12125-02-9) |
| **Chronic Toxicity**: No additional information. | | |
| **Corrosion Irritation**: | | |
| **Ocular**: | 12125-02-9 | Eyes - Rabbit Result: Eye irritation |
| **Sensitization**: | | No additional information. |
| **Single Target Organ (STOT)**: | | No additional information. |
| **Numerical Measures**: | | No additional information. |
| **Carcinogenicity**: | | No additional information. |
| **Mutagenicity**: | | No additional information. |
| **Reproductive Toxicity**: | | No additional information. |

## SECTION 12 : Ecological information

**Ecotoxicity**

**12125-02-9**: LC50 - Cyprinus carpio (Carp) - 209.00 mg/l - 96 h

**12125-02-9**: LC50 - Oncorhynchus mykiss (rainbow trout) - 3.98 mg/l - 96 h

**12125-02-9**: NOEC - Oncorhynchus mykiss (rainbow trout) - 57 mg/l - 96 h

**12125-02-9**: LC50 - Daphnia magna (Water flea) - 161 mg/l - 48 h

**12125-02-9**: Growth inhibition NOEC - Daphnia magna (Water flea) - 0.1 mg/l - 216 h

**Persistence and degradability**:
**Bioaccumulative potential**:
**Mobility in soil**:
**Other adverse effects**:

## SECTION 13 : Disposal considerations

**Waste disposal recommendations**:

Dilute with water and flush to sewer. Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations. Ensure complete and accurate classification.

## SECTION 14 : Transport information

**UN-Number**

3077

**UN proper shipping name**

Environmentally hazardous substance, solid, n.o.s. (Ammonium chloride)

**Transport hazard class(es)**

**Class:**
9 Miscellaneous dangerous substances and articles

**Packing group**:III
**Environmental hazard**:
**Transport in bulk**:
**Special precautions for user**:

## SECTION 15 : Regulatory information

**United States (USA)**

**SARA Section 311/312 (Specific toxic chemical listings)**:

Acute

**SARA Section 313 (Specific toxic chemical listings)**:

None of the ingredients is listed

**RCRA (hazardous waste code)**:

None of the ingredients is listed

**TSCA (Toxic Substances Control Act)**:

All ingredients are listed.

**CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act)**:

None of the ingredients is listed

**Proposition 65 (California)**:

**Chemicals known to cause cancer**:

None of the ingredients is listed

**Chemicals known to cause reproductive toxicity for females**:

None of the ingredients is listed

**Chemicals known to cause reproductive toxicity for males**:

None of the ingredients is listed

**Chemicals known to cause developmental toxicity**:

None of the ingredients is listed

**Canada**

**Canadian Domestic Substances List (DSL)**:

12125-02-9 Not Regulated.

**Canadian NPRI Ingredient Disclosure list (limit 0.1%)**:

None of the ingredients is listed

**Canadian NPRI Ingredient Disclosure list (limit 1%)**:

None of the ingredients is listed

## SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the

SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

**GHS Full Text Phrases**:

**Abbreviations and acronyms**:
IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

**Effective date** : 01.06.2015
**Last updated** : 03.19.2015

## ATTACHMENT 2

# Ammonium Phosphate Dibasic MSDS

ISO9001:2000 Certified

# Material Safety Data Sheet
# Ammonium Phosphate, Dibasic, ACS

## Section 1 - Chemical Product and Company Identification

**MSDS Name:**
Ammonium Phosphate, Dibasic, ACS
**Catalog Numbers:**
LC11285
**Synonyms:**
Diammonium hydrogen phosphate
**Company Identification:**
LabChem Inc
200 William Pitt Way
Pittsburgh, PA 15238
**Company Phone Number:**
(412) 826-5230
**Emergency Phone Number:**
(800) 424-9300
**CHEMTREC Phone Number:**
(800) 424-9300

## Section 2 – Composition, Information on Ingredients

| CAS# | Chemical Name: | Percent |
|---|---|---|
| 7783-28-0 | Ammonium phosphate, dibasic | 100 |

## Section 3 - Hazards Identification

### Emergency Overview

***Appearance:*** *White crystalline powder*
**Caution.** May cause eye, skin, and respiratory tract irritation.
***Target Organs:*** *None known.*

### Potential Health Effects

**Eye:**
May cause eye irritation.
**Skin:**
May cause skin irritation.
**Ingestion:**
May cause gastrointestinal irritation with nausea, vomiting, and diarrhea.
**Inhalation:**
May cause respiratory tract irritation.
**Chronic:**
No information found.

## Section 4 - First Aid Measures

**Eyes:**
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:**
Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.

**Ingestion:**
Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:**
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

**Notes to Physician:**
Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:**
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.

**Extinguishing Media:**
Use extinguishing media most appropriate for the surrounding fire.

**Autoignition Temperature:**
Not applicable.

**Flash Point:**
Not applicable.

**NFPA Rating:**
Not available.

**Explosion Limits:**
Lower: n/a Upper: n/a

## Section 6 - Accidental Release Measures

**General Information:**
Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:**
Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:**

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid breathing dust.

**Storage:**

Store in a tightly closed container in a cool, dry, well-ventilated area away from incompatible substances.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:**

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits:**

| Chemical Name: | ACGIH | NIOSH | OSHA |
|---|---|---|---|
| Ammonium phosphate, dibasic | none listed | none listed | none listed |

**OSHA Vacated PELs:**

Diammonium hydrogen phosphate: No OSHA Vacated PELs are listed for this chemical.

### Personal Protective Equipment

**Eyes:**

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:**

Wear appropriate gloves to prevent skin exposure.

**Clothing:**

Wear appropriate protective clothing to prevent skin exposure.

**Respirators:**

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

| | |
|---|---|
| **Physical State:** | Crystalline powder |
| **Color:** | White |
| **Odor:** | Odorless |
| **pH:** | 8 (5% soln) |
| **Vapor Pressure:** | Not available |
| **Vapor Density:** | Not available |
| **Evaporation Rate:** | Negligible |
| **Viscosity:** | Not available |
| **Boiling Point:** | Decomposes |
| **Freezing/Melting Point:** | 235°C |

# Material Safety Data Sheet
# Ammonium Phosphate, Dibasic, ACS

| | |
|---|---|
| **Decomposition Temperature:** | >280° C |
| **Solubility in water:** | Soluble |
| **Specific Gravity/Density:** | 1.619 |
| **Molecular Formula:** | (NH4)2HPO4 |
| **Molecular Weight:** | 132.06 |

## Section 10 - Stability and Reactivity

**Chemical Stability:**
Stable under normal temperatures and pressures. Gradually loses about 8% NH3 on exposure to air.

**Conditions to Avoid:**
Dust generation, excess heat, prolonged exposure to air.

**Incompatibilities with Other Materials:**
No significant incompatibilities identified with common materials and contaminants.

**Hazardous Decomposition Products:**
Oxides of phosphorus, nitrogen oxides (NOx) and ammonia (NH3).

**Hazardous Polymerization:**
Has not been reported.

## Section 11 - Toxicological Information

**RTECS:**
CAS# 7783-28-0: unlisted.

**LD50/LC50:**
CAS# 7783-28-0: Not available.

**Carcinogenicity:**
CAS# 7783-28-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:**
No information found

**Teratogenicity:**
No information found

**Reproductive:**
No information found

**Mutagenicity:**
No information found

**Neurotoxicity:**
No information found

## Section 12 - Ecological Information

No information available.

## Section 13 - Disposal Considerations

**Dispose of in accordance with Federal, State, and local regulations.**

# Material Safety Data Sheet
# Ammonium Phosphate, Dibasic, ACS

## Section 14 - Transport Information

**US DOT**

**Shipping Name:** Not regulated
**Hazard Class:**
**UN Number:**
**Packing Group:**

## Section 15 - Regulatory Information

### US Federal

**TSCA:**

CAS# 7783-28-0 is listed on the TSCA inventory.

**SARA Reportable Quantities (RQ):**

None of the chemicals in this material have an RQ.

**CERCLA/SARA Section 313:**

No chemicals are reportable under Section 313.

**OSHA - Highly Hazardous:**

None of the chemicals in this product are considered highly hazardous by OSHA.

### US State

**State Right to Know:**

CAS# 7783-28-0 is not present on state lists from California, Pennsylvania, Minnesota, Massachusetts, Florida, or New Jersey.

**California Regulations:**

None.

### European/International Regulations

**Canadian DSL/NDSL:**

CAS# 7783-28-0 is listed on Canada's DSL List.

**Canada Ingredient Disclosure List:**

CAS# 7783-28-0 is not listed on the Canadian Ingredient Disclosure List.

## Section 16 - Other Information

MSDS Creation Date: October 8, 2007
Revision Date: None

*Information in this MSDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc. assumes no liability resulting from the use of this MSDS. The user must determine suitability of this information for his application.*

## ATTACHMENT 3

Ascorbic Acid MSDS

# Ascorbic Acid

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 01/28/2014 Revision date: 12/06/2016 Supersedes: 01/28/2014 Version: 1.1

## SECTION 1: Identification

### 1.1. Identification

Product form : Substance

Substance name : Ascorbic Acid

CAS No : 50-81-7

Product code : LC11530

Formula : C6H8O6

Synonyms : L-ascorbic acid

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : For laboratory and manufacturing use only.

Restrictions on use : Not for food, drug or household use

### 1.3. Details of the supplier of the safety data sheet

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Not classified

### 2.2. Label elements

No labeling obligation.

### 2.3. Other hazards

Other hazards not contributing to the classification : None under normal conditions.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substance

Substance type : Mono-constituent

| Name | Product identifier | % | GHS-US classification |
|---|---|---|---|
| Ascorbic Acid (Main constituent) | (CAS No) 50-81-7 | 100 | Not classified |

Full text of hazard classes and H-statements : see section 16

### 3.2. Mixture

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persist.

First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : Not expected to present a significant hazard under anticipated conditions of normal use.

### 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

### 5.2. Special hazards arising from the substance or mixture

No additional information available

### 5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

Protective equipment : Safety glasses.

Emergency procedures : Evacuate unnecessary personnel.

#### 6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

### 6.3. Methods and material for containment and cleaning up

Methods for cleaning up : On land, sweep or shovel into suitable containers. Minimize generation of dust. Store away from other materials.

### 6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.

### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Light sensitive. Keep container closed when not in use.

Incompatible products : Strong bases. Strong oxidizers.

Incompatible materials : Sources of ignition. Direct sunlight.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

No additional information available

### 8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation.

| | | |
|---|---|---|
| Personal protective equipment | : | Avoid all unnecessary exposure. Gloves. Safety glasses. |

| | | |
|---|---|---|
| Hand protection | : | Wear protective gloves. |
| Eye protection | : | Chemical goggles or safety glasses. |
| Respiratory protection | : | Wear appropriate mask. |
| Other information | : | Do not eat, drink or smoke during use. |

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| | | |
|---|---|---|
| Physical state | : | Solid |
| Color | : | Colorless |
| Odor | : | characteristic |
| Odor threshold | : | No data available |
| pH | : | 2.1 - 2.6 5% solution |
| Melting point | : | 190 °C |
| Freezing point | : | No data available |
| Boiling point | : | No data available |
| Flash point | : | No data available |
| Relative evaporation rate (butyl acetate=1) | : | No data available |
| Flammability (solid, gas) | : | Non flammable. |
| Vapor pressure | : | No data available |
| Relative vapor density at 20 °C | : | No data available |
| Relative density | : | No data available |
| Specific gravity / density | : | 1.65 g/cm³ |
| Molecular mass | : | 176.13 g/mol |
| Solubility | : | Soluble in water. |
| Log Pow | : | No data available |
| Auto-ignition temperature | : | No data available |
| Decomposition temperature | : | No data available |
| Viscosity, kinematic | : | No data available |
| Viscosity, dynamic | : | No data available |
| Explosion limits | : | No data available |
| Explosive properties | : | No data available |
| Oxidizing properties | : | No data available |

### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No additional information available

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

Not established.

### 10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

### 10.5. Incompatible materials

Strong oxidizers. Strong bases.

### 10.6. Hazardous decomposition products

fume. Carbon monoxide. Carbon dioxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Likely routes of exposure : Skin and eye contact; Inhalation

Acute toxicity : Not classified

| Ascorbic Acid (50-81-7) | |
|---|---|
| LD50 oral rat | 11900 mg/kg |
| ATE US (oral) | 11900.000 mg/kg body weight |

Skin corrosion/irritation : Not classified
pH: 2.1 - 2.6 5% solution

Serious eye damage/irritation : Not classified
pH: 2.1 - 2.6 5% solution

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

## SECTION 12: Ecological information

### 12.1. Toxicity

No additional information available

### 12.2. Persistence and degradability

| Ascorbic Acid (50-81-7) | |
|---|---|
| Persistence and degradability | Not established. |

### 12.3. Bioaccumulative potential

| Ascorbic Acid (50-81-7) | |
|---|---|
| Bioaccumulative potential | Not established. |

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

Other information : Avoid release to the environment.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations.

Ecology - waste materials : Avoid release to the environment.

## SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

Not regulated

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

| **Ascorbic Acid (50-81-7)** |
|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory |

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

### 15.2. International regulations

**CANADA**

| **Ascorbic Acid (50-81-7)** | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

**EU-Regulations**

No additional information available

**National regulations**

| **Ascorbic Acid (50-81-7)** |
|---|
| Not listed on the Canadian IDL (Ingredient Disclosure List) |

### 15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

## SECTION 16: Other information

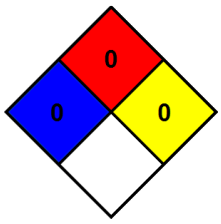
Revision date : 12/06/2016

Other information : None.

NFPA health hazard : 0 - Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.




HMIS III Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : A

A - Safety glasses

SDS US LabChem

*Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.*

## ATTACHMENT 4

Hydrochloric Acid MSDS (1)

# Safety Data Sheet

## Section 01 Identification

| | |
|---|---|
| **Product Identifier** | Hydrochloric Acid 10-35% Solution<br>Hydrochloric Acid 10% NSF® - 60<br>Hydrochloric Acid 12.5%<br>Hydrochloric Acid 15% NSF® - 60<br>Hydrochloric Acid 17% NSF® - 60<br>Hydrochloric Acid 20% NSF® - 60<br>Hydrochloric Acid 21% NSF® - 60<br>Hydrochloric Acid 27% NSF® - 60<br>Hydrochloric Acid 28% NSF® - 60<br>Hydrochloric Acid 31% NSF® - 60<br>Hydrochloric Acid 31.45% NSF® - 60<br>Hydrochloric Acid 35% NSF® - 60 |
| **Other Means of Identification** | Aqueous hydrogen chloride, muriatic acid, hydrogen chloride, HCl, chlorohydric acid. |
| **Product Use and Restrictions on Use** | Acidizing (activation) of petroleum wells, scale removal, ore reduction, metal cleaning, pH adjustment, industrial acidizing, generation of chlorine dioxide, regeneration of ion exchange resins. |
| **Initial Supplier Identifier** | ClearTech Industries Inc<br>1500 Quebec Avenue<br>Saskatoon, SK. Canada<br>S7K 1V7<br><br>Phone: 800.387.7503<br>Fax: 888.281.8109<br>www.cleartech.ca |
| **Prepared By** | ClearTech Industries Inc. technical writer |
| **24-Hour Emergency Phone** | 306.664.2522 |

## Section 02 Hazard Identification

**Physical Hazards**

| | |
|---|---|
| **Corrosive to metals** | Category 1 |

**Health Hazards**

| | |
|---|---|
| **Acute toxicity - inhalation** | Category 4 |
| **Acute toxicity - oral** | Category 4 |
| **Skin corrosion / irritation** | Category 1B |
| **Serious eye damage / eye irritation** | Category 1 |
| **Specific target organ toxicity - single exposure** | Category 3 |

**Signal Word**

**Danger**

## Hazard Statements

H290 May be corrosive to metals.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.

## Pictograms

## Precautionary Statements

### Prevention

P234 Keep only in original packaging.
P260 Do not breathe vapours, fumes, and mists.
P264 Wash affected body parts thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves, protective clothing, eye protection, face protection

### Response

P301 P312 P330 P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Call a POISON CENTER or doctor if you feel unwell.
P303 P361 P353 P363 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse.
P304 P340 P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor.
P305 P351 P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P390 Absorb spillage to prevent material damage.

### Storage

P403 Store in a well-ventilated place.
P233 Keep container tightly closed.
P405 Store locked up.

### Disposal

P501 Dispose of contents / container in accordance with all federal, provincial and / or local regulations including the Canadian Environmental Protection Act.

## Hazards Not Otherwise Classified

Not available

## Supplemental Information

Not available

## Section 03 Composition / Information on Ingredients

**Hazardous Ingredients:**

| Chemical name | Common name(s) | CAS number | Concentration (w/w%) |
|---|---|---|---|
| Hydrogen Chloride | Hydrochloric Acid | 7647-01-0 | 10-36% |

## Section 04 First-Aid Measures

**Description of necessary first-aid measures**

**Inhalation** Remove source of exposure or move person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor. If breathing has stopped, trained personnel should begin rescue breathing or if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Avoid mouth to mouth contact by using a barrier device. Call a POISON CENTER or doctor if you feel unwell.

**Ingestion** Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor. If vomiting occurs naturally, lie on your side, in the recovery position.

**Skin contact** Avoid direct contact. Wear chemical protective clothing, if necessary. Take off immediately contaminated clothing, shoes and leather goods. Rinse skin with lukewarm, gently flowing water / shower for 30 minutes. Immediately call a POISON CENTER or doctor. Wash contaminated clothing before re-use, or discard.

**Eye contact** Avoid direct contact. Wear chemical protective gloves, if necessary. Remove source of exposure or move person to fresh air. Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing for 30 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately call a POISON CENTER or doctor.

**Most important symptoms and effects, both acute and delayed**

| | |
|---|---|
| **Inhalation** | Causes severe burns to the mouth and throat (mist). May cause respiratory irritation. |
| **Ingestion** | Causes burns to the mouth and throat. Harmful if swallowed. |
| **Skin contact** | Causes severe skin burns. |
| **Eye contact** | Causes serious eye damage. |
| **Further information** | For further information see Section 11 Toxicological Information. |

## Section 05 Fire Fighting Measures

| | |
|---|---|
| **Suitable extinguishing media** | Extinguish fire using extinguishing agents suitable for the surrounding fire. |
| **Unsuitable extinguishing media** | Not available |
| **Specific hazards arising from the chemical** | Reacts with many metals to liberate hydrogen gas that can form explosive mixtures. Heat may liberate corrosive and toxic Hydrogen Chloride gas. Hydrogen Chloride is denser than air and will accumulate in low lying areas. |
| **Special protective equipment for fire-fighters** | Wear NIOSH-approved self-contained breathing apparatus and chemical-protective clothing. |

## Section 06 Accidental Release Measures

| | |
|---|---|
| **Personal Precautions / Protective Equipment / Emergency Procedures** | Wear appropriate personal protective equipment (See Section 08 Exposure Controls and Personal Protection). Stay upwind, ventilate area. Do not breathe vapours, fumes, and mists. Do not use material handling equipment with exposed metal surfaces. |
| **Environmental Precautions** | Prevent material from entering waterways, sewers or confined spaces. Notify local health and wildlife officials. Notify operators of nearby water intakes. |

| | |
|---|---|
| **Methods and Materials for Containment and Cleaning Up** | SMALL SPILLS: Stop or reduce leak if safe to do so. Clean up spill with non-reactive absorbent and place in suitable, covered, labeled containers. Flush area with water. Contaminated absorbent material may pose the same hazards as the spilled product.<br>LARGE SPILLS: Contact fire and emergency services and supplier for advice. |

## Section 07 Handling and Storage

| | |
|---|---|
| **Precautions for Safe Handling** | Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. Prevent the release of vapours, fumes, and mists into the workplace air.<br>Inspect containers for damage or leaks before handling. If the original label is damaged or missing replace with a workplace label. Have suitable emergency equipment for fires, spills and leaks readily available.<br>Never add water to a corrosive. Always add corrosives to water. When mixing with water, stir small amounts in slowly. Use cold water to prevent excessive heat generation. Never return contaminated material to its original container. |
| **Conditions for Safe Storage** | Store in a cool, dry, well-ventilated area, out of direct sunlight, away from heat sources and incompatible materials. Always store in original labeled container. Keep containers tightly closed when not in use and when empty. Empty containers may contain hazardous residues. Protect label and keep it visible. Do not transfer to metal containers. |
| **Incompatibilities** | Bases, such as potassium hydroxide, sodium hydroxide, calcium hydroxide (slaked lime), ammonia, carbonates.<br>Metals, such as aluminum, steel, and brass. |

## Section 08 Exposure Controls and Personal Protection

### Exposure limits

| Component | Regulation | Type of listing | Value |
|---|---|---|---|
| Hydrogen Chloride | ACGIH | TLV-Ceiling | 2 ppm |

### Engineering controls

| | |
|---|---|
| **Ventilation Requirements** | Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions should be provided in accordance with all fire codes and regulatory requirements. Supply sufficient replacement air to make up for air removed by exhaust systems. |
| **Other** | An emergency shower and eyewash station should be available, tested, and be in close proximity to the product being handled in accordance with provincial regulations. |

### Protective equipment

The following are recommendations only. It is the responsibility of the employer / user to conduct a hazard assessment of the process in which this product being used and determine the proper engineering controls and PPE for their process. Additional regulatory and safety information should be sought from local authorities and, if needed, a professional industrial hygienist.

| | |
|---|---|
| **Eye and face protection** | Where there is potential eye or face exposure, tightly fitting safety goggles and a face shield or a full face respirator or similar protective equipment which protects the wearer's face and eyes are recommended. Contact lenses are not recommended; they may contribute to severe eye injury. |

| | |
|---|---|
| **Hand and body protection** | Disposable latex or nitrile gloves are recommended to prevent incidental contact. Butyl rubber, neoprene, or PVC skin protection is recommended for extended contact. Leather gloves are not recommended for chemical protection. Refer to manufacturer's specifications for breakthrough times and permeability information; note that breakthrough times and permeability vary with temperature, application and age of material. Continued use of contaminated safety gear or clothing is not recommended; wash before reuse or discard. |
| **Respiratory protection** | In case of insufficient ventilation wear suitable respiratory equipment.<br><br>**NIOSH respirator recommendations for: Hydrogen Chloride**<br><br>**Up to: 50 ppm**<br>(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against Hydrogen Chloride<br>(APF = 10) Any supplied-air respirator<br>(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against Hydrogen Chloriden<br>(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Hydrogen Chloride<br>(APF = 50) Any self-contained breathing apparatus with a full facepiece.<br><br>**Emergency or planned entry into unknown concentrations or IDLH conditions:**<br>(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode<br>(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus<br><br>**Escape:**<br>(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Hydrogen Chloride<br>Any appropriate escape-type, self-contained breathing apparatus |
| **Thermal hazards** | Not available |

## Section 09 Physical and Chemical Properties

| | |
|---|---|
| **Appearance** | |
| **Physical state** | Liquid |
| **Colour** | Colourless to straw coloured |
| **Odour** | Pungent |
| **Odour threshold** | 1-5 ppm |
| **Property** | |
| **pH** | <1.0 |
| **Melting point / freezing point** | For product concentration range: -57 to -27 °C |
| **Initial boiling point and boiling range** | For product concentration range: 62-90 °C |
| **Flash point** | Not applicable |
| **Evaporation rate** | Not available |
| **Flammability** | Not applicable |

| | |
|---|---|
| **Upper flammable limit** | Not applicable |
| **Lower flammable limit** | Not applicable |
| **Vapour pressure** | For product concentration range: negligible to 200 mmHg @ 20 °C |
| **Vapour density** | 1.268 |
| **Relative density** | Not applicable |
| **Solubility** | Soluble in water |
| **Partition coefficient: n-octanol/water** | Not available |
| **Auto-ignition temperature** | Not applicable |
| **Decomposition temperature** | Not available |
| **Viscosity** | Not available |
| **Specific gravity** | For product concentration range: 1.046-1.188 g/mL @ 20 °C |
| **Formula** | HCl |
| **Molecular weight** | 34.46 g/mol |

## Section 10 Stability and Reactivity

| | |
|---|---|
| **Reactivity** | May be corrosive to metals. Reacts with many metals to liberate hydrogen gas that can form explosive mixtures. Reacts with water to generate heat. Reacts violently with bases. |
| **Stability** | This product is stable if stored according to the recommendations in Section 07. |
| **Possibility of hazardous reactions** | Hazardous polymerization is not known to occur. |
| **Conditions to avoid** | Avoid contact with incompatible materials. |
| **Incompatible materials** | Bases, such as potassium hydroxide, sodium hydroxide, calcium hydroxide (slaked lime), ammonia, carbonates.<br>Metals, such as aluminum, steel, and brass. |
| **Hazardous decomposition products** | Not available |

## Section 11 Toxicological Information

**Acute Toxicity (LD50 values)**

| Component | Route | Species | Value | Exposure time |
|---|---|---|---|---|
| Hydrogen Chloride | Oral | Rat | 238-277 mg/kg | |
| | Dermal | Mouse | 1449 mg/kg | |
| | Inhalation (gas) | Mouse | 1108 ppm | 1 hour |
| | Inhalation (mist) | Guinea pig | 2.0 mg/L | 30 minutes |

**Toxic Health Effect Summary**

| | |
|---|---|
| **Chemical characteristics** | Hydrogen chloride rapidly dissociates and most of it's toxic effects are thought to be the result of pH change. |
| **Skin** | Causes severe skin burns. |
| **Ingestion** | Causes burns to the mouth and throat. Harmful if swallowed. |
| **Inhalation** | Causes severe burns to the mouth and throat (mist). May cause respiratory irritation. Hydrogen chloride gas is severely irritating to all mucous membranes. |

| | |
|---|---|
| **Eye contact** | Causes serious eye damage. |
| **Sensitization** | This product and its components at their listed concentration have no known sensitizing effects. |
| **Mutagenicity** | This product and its components at their listed concentration have no known mutagenic effects. |
| **Carcinogenicity** | IARC has classified this product or one or more of its components as group 3, not classifiable as to its carcinogenicity to humans. |
| **Reproductive toxicity** | This product and its components at their listed concentration have no known reproductive effects. |
| **Specific organ toxicity** | Frequent contact may lead to dermatitus. Dental decay, with changes in tooth structure, yellowing, softening and breaking of teeth, and related digestive diseases are frequent after exposures to hydrochloric acid |
| **Aspiration hazard** | Not available |
| **Synergistic materials** | Not available |

## Section 12 Ecological Information

**Ecotoxicity**

| Component | Type | Species | Value | Exposure Time |
|---|---|---|---|---|
| Hydrogen Chloride | EC50 | Green algae | 0.0482 mg/L | 72 hours |
| | LC50 | Cyprinus carpio | 4.92 mg/L | 96 hours |
| | LC50 | Shrimp | 100-300 ppm | 48 hours |

| | |
|---|---|
| **Biodegradability** | The domestic substance list categorizes hydrochloric acid as persistent. |
| **Bioaccumulation** | The domestic substance list categorizes hydrochloric acid as non-bioaccumulative. |
| **Mobility** | This product is water soluble, is not predicted to adsorb to soil and may contaminate ground water. This product will evaporate and may be spread via wind. |
| **Other adverse effects** | Not available |

## Section 13 Disposal Considerations

| | |
|---|---|
| **Waste From Residues / Unused Products** | Dispose in accordance with all federal, provincial, and local regulations including the Canadian Environmental Protection Act. |
| **Contaminated Packaging** | Do not remove label, follow label warnings even after the container is empty. Empty containers should be recycled or disposed of at an approved waste handling facility. |

## Section 14 Transport Information

| | |
|---|---|
| **UN number** | UN1789 |
| **UN proper shipping name and description** | HYDROCHLORIC ACID |
| **Transport hazard class(es)** | 8 |
| **Packing group** | II |
| **Excepted quantities** | 1 L |
| **Environmental hazards** | Not listed as a marine pollutant under Canadian TDG Regulations, schedule III. |
| **Special precautions** | No special provisions |
| **Transport in bulk** | ERAP index: 3000 L<br><br>MARPOL 73/78 and IBC Code: |

| | |
|---|---|
| Product name: | Hydrochloric Acid |
| Pollution category: | Z |
| Hazards: | the product is included in the Code because of both its safety and pollution hazards. |
| Ship type: | ship type 3 |
| Tank type: | independent gravity tank |
| Tank vents: | controlled venting |
| Tank environmental control: | no special requirements under this Code |
| Electrical equipment: | Temperature classes |
| | Apparatus group |
| | Flash point non-flammable product |
| Gauging: | restricted gauging |
| Vapour detection: | toxic vapours |
| Fire protection: | no special requirements under this Code |
| Emergency equipment | see 14.3.1 |
| Specific and operational requirements | 15.11 |

**Additional information** Secure containers (full or empty) during shipment and ensure all caps, valves, or closures are secured in the closed position.

**TDG PRODUCT CLASSIFICATION: This product has been classified on the preparation date specified at section 16 of this SDS, for transportation in accordance with the requirements of part 2 of the Transportation of Dangerous Goods Regulations. If applicable, testing and published test data regarding the classification of this product are listed in the references at section 16 of this SDS.**

## Section 15 Regulatory Information.

**NOTE: THE PRODUCT LISTED ON THIS SAFETY DATA SHEET HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN HAZARDOUS PRODUCTS REGULATIONS. THIS SAFETY DATA SHEET CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.**

All components of this product appear on the domestic substance list.

NSF Certification: Product is certified under NSF / ANSI Standard 60 for pH adjustment and as a descalter at a maximum dosage of 45 mg/L for the concentration of 31.45%. NSF product use restrictions based on requirements obtained from the NSF website; consult NSF website for current requirements.

Hydrochloric Acid (>1%) is listed in the National Pollutant Release Inventory (NPRI). Reporting threshold: 10 tonnes manufactured, processed or otherwise used.

Hydrchloric Acid is listed in the Environmental Emergency Regulations, Schedule 1. Concentration: 30% w/w Minimum Quantity: 6.8 tonnes Hazard Category: Inhalation hazard

## Section 16 Other Information

**Date of latest revision: February 06, 2020**

**Note:** The responsibility to provide a safe workplace remains with the buyer / user. The buyer / user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the buyer / user to comply with all applicable laws and regulations regarding handling, using, reselling and shipping this product.

**Attention: Receiver of the chemical goods / SDS coordinator**

As part of our commitment to the RDC Responsible Distribution® initiative, ClearTech Industries Inc. and its associated companies require, as a condition of sale, that you forward the attached Safety Data Sheet(s) to all affected employees, customers, and end-users. ClearTech will send any available supplementary handling, health, and safety information to you at your request.

If you have any questions or concerns please call our customer service center.

**References:**

1) CHEMINFO
2) TOXNET
3) eChemPortal
4) ECHA
5) Transportation of Dangerous Goods Canada
6) HSDB
7) PAN

## ATTACHMENT 5

Methanol MSDS

# Methanol

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Issue date: 07/03/2013 Revision date: 07/21/2020 Supersedes: 03/08/2019 Version: 1.4

## SECTION 1: Identification

### 1.1. Identification

| | | |
|---|---|---|
| Product form | : | Substance |
| Substance name | : | Methanol |
| CAS-No. | : | 67-56-1 |
| Product code | : | VT430 |
| Formula | : | CH4O |
| Synonyms | : | acetone alcohol / alcohol C1 / alcohol, methyl / carbinol / colonial spirits / columbian spirits / green wood spirits / manhattan spirits / methyl alcohol / methyl hydrate / methyl hydroxide / methylen / methylol / monohydroxymethane / pyroligneous spirit / pyroxylic spirit / wood alcohol / wood naphtha |

### 1.2. Recommended use and restrictions on use

| | | |
|---|---|---|
| Use of the substance/mixture | : | Solvent |
| Recommended use | : | Laboratory chemicals |
| Restrictions on use | : | Not for food, drug or household use |

### 1.3. Supplier

Val Tech Diagnostics, A Division of LabChem Inc
Jackson's Pointe Commerce Park Building 1000
1010 Jackson's Pointe Court
Zelienople, PA 16063
T 412-826-5230
F 724-473-0647

### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or +1-703-741-5970

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS US classification**

| | |
|---|---|
| Flammable liquids Category 2 | H225 Highly flammable liquid and vapor |
| Acute toxicity (oral) Category 3 | H301 Toxic if swallowed |
| Acute toxicity (dermal) Category 3 | H311 Toxic in contact with skin |
| Acute toxicity (inhalation) Category 3 | H331 Toxic if inhaled |
| Specific target organ toxicity (single exposure) Category 1 | H370 Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral) |

Full text of H statements : see section 16

### 2.2. GHS Label elements, including precautionary statements

**GHS US labeling**

Hazard pictograms (GHS US) :

Signal word (GHS US) : Danger

Hazard statements (GHS US) : H225 - Highly flammable liquid and vapor
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H370 - Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral)

Precautionary statements (GHS US) : P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking.
P233 - Keep container tightly closed.
P240 - Ground/bond container and receiving equipment.
P241 - Use explosion-proof electrical, ventilating, lighting equipment.
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P260 - Do not breathe mist, vapors, spray.

P264 - Wash exposed skin thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective gloves, protective clothing, eye protection, face protection.
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P330 - If swallowed, rinse mouth
P363 - Wash contaminated clothing before reuse.
P370+P378 - In case of fire: Use carbon dioxide ($CO_2$), powder, alcohol-resistant foam to extinguish
P403+P235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 - Dispose of contents/container to comply with local, state and federal regulations.

### 2.3. Other hazards which do not result in classification

Other hazards not contributing to the classification : None.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Substance type : Mono-constituent

| Name | Product identifier | % | GHS US classification |
|---|---|---|---|
| Methanol<br>(Main constituent) | (CAS-No.) 67-56-1 | 100 | Flam. Liq. 2, H225<br>Acute Tox. 3 (Oral), H301<br>Acute Tox. 3 (Dermal), H311<br>Acute Tox. 3 (Inhalation), H331<br>STOT SE 1, H370 |

Full text of hazard classes and H-statements : see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First-aid measures

### 4.1. Description of first aid measures

First-aid measures general : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with labored breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain.

First-aid measures after inhalation : Remove the victim into fresh air. Immediately consult a doctor/medical service.

First-aid measures after skin contact : Wash immediately with lots of water. Soap may be used. Do not apply (chemical) neutralizing agents. Remove clothing before washing. Consult a doctor/medical service.

First-aid measures after eye contact : Rinse with water. Remove contact lenses, if present and easy to do. Continue rinsing. Take victim to an ophthalmologist if irritation persists.

First-aid measures after ingestion : Rinse mouth with water. Immediately after ingestion, give alcohol to drink. Give nothing to drink. Do not induce vomiting. Immediately consult a doctor/medical service. Take the container/vomit to the doctor/hospital. Call Poison Information Centre (www.big.be/antigif.htm).

### 4.2. Most important symptoms and effects (acute and delayed)

Potential Adverse human health effects and symptoms : Toxic in contact with skin. Toxic if swallowed. Toxic if inhaled.

Symptoms/effects after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Symptoms similar to those listed under ingestion.

Symptoms/effects after skin contact : Symptoms similar to those listed under ingestion.

Symptoms/effects after eye contact : Redness of the eye tissue. Lacrimation.

| | |
|---|---|
| Symptoms/effects after ingestion | : Nausea. Vomiting. AFTER ABSORPTION OF LARGE QUANTITIES: FOLLOWING SYMPTOMS MAY APPEAR LATER: Change in the blood composition. Headache. Feeling of weakness. Abdominal pain. Muscular pain. Central nervous system depression. Dizziness. Mental confusion. Drunkenness. Coordination disorders. Disturbed motor response. Disturbances of consciousness. Visual disturbances. Blindness. Respiratory difficulties. Cramps/uncontrolled muscular contractions. |
| Chronic symptoms | : Red skin. Dry skin. Skin rash/inflammation. Headache. Disturbed tactile sensibility. Visual disturbances. Sleeplessness. Gastrointestinal complaints. Cardiac and blood circulation effects. |

### 4.3. Immediate medical attention and special treatment, if necessary

Immediately after ingestion, give a glass of strong drink, beer or wine to drink. Hospitalize at once for treatment with the right antidotes.

## SECTION 5: Fire-fighting measures

### 5.1. Suitable (and unsuitable) extinguishing media

| | |
|---|---|
| Suitable extinguishing media | : Quick-acting ABC powder extinguisher. Quick-acting BC powder extinguisher. Quick-acting class B foam extinguisher. Quick-acting CO2 extinguisher. Class B foam (alcohol-resistant). Water spray if puddle cannot expand. |
| Unsuitable extinguishing media | : Water (quick-acting extinguisher, reel); risk of puddle expansion. Water; risk of puddle expansion. |

### 5.2. Specific hazards arising from the chemical

| | |
|---|---|
| Fire hazard | : DIRECT FIRE HAZARD. Highly flammable liquid and vapour. Gas/vapor flammable with air within explosion limits. INDIRECT FIRE HAZARD. May be ignited by sparks. |
| Explosion hazard | : DIRECT EXPLOSION HAZARD. Gas/vapour explosive with air within explosion limits. INDIRECT EXPLOSION HAZARD. may be ignited by sparks. Reactions with explosion hazards: see "Reactivity Hazard". |
| Hazardous decomposition products in case of fire | : Upon combustion: CO and CO2 are formed. |

### 5.3. Special protective equipment and precautions for fire-fighters

| | |
|---|---|
| Firefighting instructions | : Cool tanks/drums with water spray/remove them into safety. Do not move the load if exposed to heat. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it. |
| Protection during firefighting | : Do not enter fire area without proper protective equipment, including respiratory protection. |

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

| | |
|---|---|
| General measures | : No flames, no sparks. Eliminate all sources of ignition. No naked lights. No smoking. Dike and contain spill. |

#### 6.1.1. For non-emergency personnel

| | |
|---|---|
| Protective equipment | : Gas-tight suit. |
| Emergency procedures | : Keep upwind. Mark the danger area. Consider evacuation. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosion-proof appliances and lighting equipment. Keep containers closed. Wash contaminated clothes. |

#### 6.1.2. For emergency responders

| | |
|---|---|
| Protective equipment | : Equip cleanup crew with proper protection. |
| Emergency procedures | : Stop leak if safe to do so. Ventilate area. |

### 6.2. Environmental precautions

Prevent soil and water pollution. Prevent spreading in sewers.

### 6.3. Methods and material for containment and cleaning up

| | |
|---|---|
| For containment | : Contain released substance, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Try to reduce evaporation. Measure the concentration of the explosive gas-air mixture. Dilute combustible/toxic gases/vapours with water spray. Take account of toxic/corrosive precipitation water. Provide equipment/receptacles with earthing. Do not use compressed air for pumping over spills. |
| Methods for cleaning up | : Take up liquid spill into a non combustible material e.g.: sand, earth, vermiculite slaked lime or soda ash. Scoop absorbed substance into closing containers. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling. |

### 6.4. Reference to other sections

No additional information available

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the concentration in the air regularly. Work under local exhaust/ventilation. Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Handle uncleaned empty containers as full ones. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Do not use compressed air for pumping over. Keep container tightly closed.

Hygiene measures : Do not eat, drink or smoke when using this product. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse.

### 7.2. Conditions for safe storage, including any incompatibilities

Incompatible products : Strong oxidizers. Strong bases. Strong acids. Acid anhydrides. Acid chlorides.

Incompatible materials : Direct sunlight. Heat sources. Sources of ignition.

Heat-ignition : KEEP SUBSTANCE AWAY FROM: heat sources. ignition sources.

Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: combustible materials. oxidizing agents. strong acids. (strong) bases. halogens. amines. water/moisture.

Storage area : Store in a cool area. Store in a dry area. Keep container in a well-ventilated place. Fireproof storeroom. Keep locked up. Provide for a tub to collect spills. Provide the tank with earthing. Unauthorized persons are not admitted. Aboveground. Meet the legal requirements.

Special rules on packaging : SPECIAL REQUIREMENTS: closing. dry. clean. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.

Packaging materials : SUITABLE MATERIAL: steel. stainless steel. iron. glass. MATERIAL TO AVOID: lead. aluminium. zinc. polyethylene. PVC.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

| Methanol (67-56-1) | |
|---|---|
| **USA - ACGIH - Occupational Exposure Limits** | |
| Local name | Methanol |
| ACGIH TWA (ppm) | 200 ppm |
| ACGIH STEL (ppm) | 250 ppm |
| Remark (ACGIH) | TLV® Basis: Headache; eye dam; dizziness; nausea. Notations: Skin; BEI |
| **USA - ACGIH - Biological Exposure Indices** | |
| Biological Exposure Indices (BEI) | 15 mg/l Parameter: Methanol - Medium: urine - Sampling time: End of shift - Notations: B, Ns |
| **USA - OSHA - Occupational Exposure Limits** | |
| Local name | Methyl alcohol |
| OSHA PEL (TWA) (mg/m³) | 260 mg/m³ |
| OSHA PEL (TWA) (ppm) | 200 ppm |
| **USA - IDLH - Occupational Exposure Limits** | |
| US IDLH (ppm) | 6000 ppm |
| **USA - NIOSH - Occupational Exposure Limits** | |
| NIOSH REL (TWA) (mg/m³) | 250 mg/m³ |
| NIOSH REL (TWA) (ppm) | 200 ppm |
| NIOSH REL (STEL) (mg/m³) | 325 mg/m³ |
| NIOSH REL (STEL) (ppm) | 250 ppm |
| Remark (NIOSH) | Skin |

### 8.2. Appropriate engineering controls

Appropriate engineering controls : Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure. Keep concentrations well below lower explosion limits.

### 8.3. Individual protection measures/Personal protective equipment

**Personal protective equipment:**

Safety glasses. Protective clothing. Gloves. Full protective flameproof clothing. Face shield.

**Materials for protective clothing:**

GIVE GOOD RESISTANCE: polyethylene/ethylenevinylalcohol. styrene-butadiene rubber. viton. GIVE LESS RESISTANCE: chloroprene rubber. chlorinated polyethylene. natural rubber. nitrile rubber/PVC. GIVE POOR RESISTANCE: leather. neoprene. nitrile rubber. polyethylene. PVA. PVC. polyurethane

**Hand protection:**

Protective gloves against chemicals (EN 374)

**Eye protection:**

Safety glasses

**Skin and body protection:**

Head/neck protection. Protective clothing

**Respiratory protection:**

Full face mask with filter type AX at conc. in air > exposure limit. High vapour/gas concentration: self-contained respirator

**Personal protective equipment symbol(s):**

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| | | |
|---|---|---|
| Physical state | : | Liquid |
| Appearance | : | Liquid. |
| Color | : | Colourless |
| Odor | : | Characteristic odour Mild odour Pleasant odour Alcohol odour Commercial/unpurified substance: irritating/pungent odour |
| Odor threshold | : | No data available |
| pH | : | No data available |
| Melting point | : | -97.8 °C |
| Freezing point | : | No data available |
| Boiling point | : | 64.7 °C (1013 hPa) |
| Critical temperature | : | 240 °C |
| Critical pressure | : | 79547 hPa |
| Flash point | : | 9.7 °C (Closed cup, 1013 hPa, EU Method A.9: Flash-Point) |
| Relative evaporation rate (butyl acetate=1) | : | 4.1 |
| Relative evaporation rate (ether=1) | : | 6.3 |
| Flammability (solid, gas) | : | No data available |
| Vapor pressure | : | 128 hPa (20 °C) |
| Vapor pressure at 50 °C | : | 552 hPa |
| Relative vapor density at 20 °C | : | 1.1 |
| Relative density | : | 0.79 – 0.8 (20 °C) |
| Relative density of saturated gas/air mixture | : | 1 |
| Specific gravity / density | : | 790 – 800 kg/m³ (20 °C) |
| Molecular mass | : | 32.04 g/mol |

| | |
|---|---|
| Solubility | : Soluble in water. Soluble in ethanol. Soluble in ether. Soluble in acetone. Soluble in chloroform.<br>Water: 100 g/100ml (20 °C)<br>Ethanol: complete<br>Ether: complete<br>Acetone: complete |
| Log Pow | : -0.77 (Experimental value) |
| Auto-ignition temperature | : 455 °C (1013 hPa, DIN 51794: Self-ignition temperature) |
| Decomposition temperature | : No data available |
| Viscosity, kinematic | : No data available |
| Viscosity, dynamic | : 0.544 – 0.59 mPa·s (25 °C) |
| Explosion limits | : 5.5 – 36.5 vol % |
| Explosive properties | : No data available |
| Oxidizing properties | : No data available |

### 9.2. Other information

| | |
|---|---|
| Minimum ignition energy | : 0.14 mJ |
| Saturation concentration | : 166 g/m³ |
| VOC content | : 100 % |
| Other properties | : Clear. Hygroscopic. Volatile. Neutral reaction. |

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Violent to explosive reaction with (some) metal powders and with (strong) oxidizers. Violent exothermic reaction with (some) acids and with (some) halogens compounds.

### 10.2. Chemical stability

Hygroscopic.

### 10.3. Possibility of hazardous reactions

No additional information available

### 10.4. Conditions to avoid

Direct sunlight. High temperature. Incompatible materials. Open flame. Sparks. Overheating.

### 10.5. Incompatible materials

Strong oxidizers. Strong bases. Strong acids. Peroxides. Acid anhydrides. Acid chlorides.

### 10.6. Hazardous decomposition products

Carbon dioxide. Carbon monoxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity (oral) : Toxic if swallowed.
Acute toxicity (dermal) : Toxic in contact with skin.
Acute toxicity (inhalation) : Toxic if inhaled.

| Methanol (67-56-1) | |
|---|---|
| LD50 oral rat | 1187 – 2769 mg/kg body weight (BASF test, Rat, Male / female, Weight of evidence, Aqueous solution, Oral, 7 day(s)) |
| LD50 dermal rabbit | 17100 mg/kg (Rabbit, Inconclusive, insufficient data, Dermal) |
| LC50 inhalation rat (mg/l) | 128.2 mg/l air (BASF test, 4 h, Rat, Male / female, Experimental value, Inhalation (vapours)) |
| ATE US (oral) | 100 mg/kg body weight |
| ATE US (dermal) | 300 mg/kg body weight |
| ATE US (gases) | 700 ppmV/4h |
| ATE US (vapors) | 3 mg/l/4h |
| ATE US (dust, mist) | 0.5 mg/l/4h |

Skin corrosion/irritation : Not classified
Serious eye damage/irritation : Not classified
Respiratory or skin sensitization : Not classified

| | | |
|---|---|---|
| Germ cell mutagenicity | : | Not classified |
| Carcinogenicity | : | Not classified |
| Reproductive toxicity | : | Not classified |
| STOT-single exposure | : | Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral). |
| STOT-repeated exposure | : | Not classified |
| Aspiration hazard | : | Not classified |
| Viscosity, kinematic | : | No data available |
| Potential Adverse human health effects and symptoms | : | Toxic in contact with skin. Toxic if swallowed. Toxic if inhaled. |
| Symptoms/effects after inhalation | : | EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Symptoms similar to those listed under ingestion. |
| Symptoms/effects after skin contact | : | Symptoms similar to those listed under ingestion. |
| Symptoms/effects after eye contact | : | Redness of the eye tissue. Lacrimation. |
| Symptoms/effects after ingestion | : | Nausea. Vomiting. AFTER ABSORPTION OF LARGE QUANTITIES: FOLLOWING SYMPTOMS MAY APPEAR LATER: Change in the blood composition. Headache. Feeling of weakness. Abdominal pain. Muscular pain. Central nervous system depression. Dizziness. Mental confusion. Drunkenness. Coordination disorders. Disturbed motor response. Disturbances of consciousness. Visual disturbances. Blindness. Respiratory difficulties. Cramps/uncontrolled muscular contractions. |
| Chronic symptoms | : | Red skin. Dry skin. Skin rash/inflammation. Headache. Disturbed tactile sensibility. Visual disturbances. Sleeplessness. Gastrointestinal complaints. Cardiac and blood circulation effects. |

## SECTION 12: Ecological information

### 12.1. Toxicity

| | | |
|---|---|---|
| Ecology - general | : | Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008. |
| Ecology - air | : | Not included in the list of substances which may contribute to the greenhouse effect (IPCC). Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014). Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009). |
| Ecology - water | : | Not harmful to crustacea. Not harmful to fishes. Groundwater pollutant. Inhibition of activated sludge. Nitrification of activated sludge is inhibited. Not harmful to algae. Not harmful to bacteria. |

| Methanol (67-56-1) | |
|---|---|
| LC50 fish 1 | 15400 mg/l (EPA 660/3 - 75/009, 96 h, Lepomis macrochirus, Flow-through system, Fresh water, Experimental value, Lethal) |
| EC50 Daphnia 1 | 18260 mg/l (OECD 202: Daphnia sp. Acute Immobilisation Test, 96 h, Daphnia magna, Semi-static system, Fresh water, Experimental value, Locomotor effect) |
| ErC50 (algae) | 22000 mg/l (OECD 201: Alga, Growth Inhibition Test, 96 h, Pseudokirchneriella subcapitata, Static system, Fresh water, Experimental value) |

### 12.2. Persistence and degradability

| Methanol (67-56-1) | |
|---|---|
| Persistence and degradability | Readily biodegradable in the soil. Readily biodegradable in water. |
| Biochemical oxygen demand (BOD) | 0.6 – 1.12 g $O_2$/g substance |
| Chemical oxygen demand (COD) | 1.42 g $O_2$/g substance |
| ThOD | 1.5 g $O_2$/g substance |

### 12.3. Bioaccumulative potential

| Methanol (67-56-1) | |
|---|---|
| BCF fish 1 | 1 – 4.5 (72 h, Cyprinus carpio, Static system, Fresh water, Experimental value) |
| Log Pow | -0.77 (Experimental value) |
| Bioaccumulative potential | Low potential for bioaccumulation (BCF < 500). |

### 12.4. Mobility in soil

| Methanol (67-56-1) | |
|---|---|
| Surface tension | 0.023 N/m (20 °C) |

| Methanol (67-56-1) | |
|---|---|
| Log Koc | 0.088 (log Koc, SRC PCKOCWIN v2.0, Calculated value) |
| Ecology - soil | Highly mobile in soil. |

### 12.5. Other adverse effects

No additional information available

## SECTION 13: Disposal considerations

### 13.1. Disposal methods

Waste disposal recommendations : Do not discharge into drains or the environment. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle by distillation. Incinerate under surveillance with energy recovery. Obtain the consent of pollution control authorities before discharging to wastewater treatment plants.

Additional information : Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.

## SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

Transport document description : UN1230 Methanol, 3, II

UN-No.(DOT) : UN1230

Proper Shipping Name (DOT) : Methanol

Transport hazard class(es) (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

Packing group (DOT) : II - Medium Danger

Hazard labels (DOT) : 3 - Flammable liquid

DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

DOT Symbols : D - Proper shipping name for domestic use only, or to and from Canada

DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
T7 - 4 178.274(d)(2) Normal..... 178.275(d)(3)
TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.

DOT Packaging Exceptions (49 CFR 173.xxx) : 150

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 1 L

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 60 L

DOT Vessel Stowage Location : B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.

| | | |
|---|---|---|
| DOT Vessel Stowage Other | : | 40 - Stow "clear of living quarters" |
| Other information | : | No supplementary information available. |

### Transportation of Dangerous Goods

| | | |
|---|---|---|
| Transport document description | : | UN1230 METHANOL, 3 (6.1), II |
| UN-No. (TDG) | : | UN1230 |
| Proper Shipping Name (Transportation of Dangerous Goods) | : | METHANOL |
| TDG Primary Hazard Classes | : | 3 - Class 3 - Flammable Liquids |
| Packing group | : | II - Medium Danger |
| TDG Subsidiary Classes | : | 6.1 |
| TDG Special Provisions | : | 43 - Despite section 2.1 of Part 2 (Classification), these dangerous goods are assigned to this classification based on human experience. |
| Explosive Limit and Limited Quantity Index | : | 1 L |
| Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index | : | 1 L |

### Transport by sea

| | | |
|---|---|---|
| Transport document description (IMDG) | : | UN 1230 methanol, 3 (6.1), II |
| UN-No. (IMDG) | : | 1230 |
| Proper Shipping Name (IMDG) | : | methanol |
| Class (IMDG) | : | 3 - Flammable liquids |
| Packing group (IMDG) | : | II - substances presenting medium danger |
| Subsidiary risks (IMDG) | : | 6.1 - Toxic substances |
| EmS-No. (1) | : | F-E |
| EmS-No. (2) | : | S-D |
| MFAG-No | | 19 |

### Air transport

| | | |
|---|---|---|
| Transport document description (IATA) | : | UN 1230 Methanol, 3 (6.1), II |
| UN-No. (IATA) | : | 1230 |
| Proper Shipping Name (IATA) | : | Methanol |
| Class (IATA) | : | 3 - Flammable Liquids |
| Packing group (IATA) | : | II - Medium Danger |

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

| Methanol (67-56-1) | |
|---|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 | |
| RQ (Reportable quantity, section 304 of EPA's List of Lists) | 5000 lb |
| SARA Section 311/312 Hazard Classes | Physical hazard - Flammable (gases, aerosols, liquids, or solids)<br>Health hazard - Acute toxicity (any route of exposure)<br>Health hazard - Specific target organ toxicity (single or repeated exposure) |

### 15.2. International regulations

**CANADA**

| Methanol (67-56-1) |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

**EU-Regulations**

No additional information available

**National regulations**

No additional information available

### 15.3. US State regulations

| Methanol (67-56-1) | |
|---|---|
| U.S. - California - Proposition 65 - Carcinogens List | No |
| U.S. - California - Proposition 65 - Developmental Toxicity | Yes |
| U.S. - California - Proposition 65 - Reproductive Toxicity - Female | No |
| U.S. - California - Proposition 65 - Reproductive Toxicity - Male | No |

## SECTION 16: Other information

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Revision date : 07/21/2020

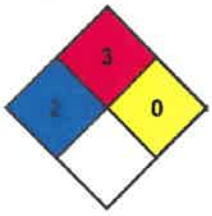
Full text of H-phrases: see section 16:

| | |
|---|---|
| H225 | Highly flammable liquid and vapor |
| H301 | Toxic if swallowed |
| H311 | Toxic in contact with skin |
| H331 | Toxic if inhaled |
| H370 | Causes damage to organs |

NFPA health hazard : 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

NFPA fire hazard : 3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.




Hazard Rating

Health : 2 Moderate Hazard - Temporary or minor injury may occur

Flammability : 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : H

H - Splash goggles, Gloves, Synthetic apron, Vapor respirator

SDS US ValTech

*Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.*

## ATTACHMENT 6

Nitric Acid MSDS

RICCA CHEMICAL COMPANY®

# Safety Data Sheet

Classified According to OSHA Hazard Communication Standard (HCS)

## SECTION 1: Identification

### 1.1. Product Identifier

**Trade Name or Designation:** Nitric Acid, 50% (v/v)

**Product Number:** 5350

**Other Identifying Product Numbers:** 5350-16, 5350-32, 5350-5PT

### 1.2. Recommended Use and Restrictions on Use

General Laboratory Reagent

### 1.3. Details of the Supplier of the Safety Data Sheet

**Company:** Ricca Chemical Company
**Address:** 448 West Fork Drive

Arlington, TX 76012 USA
**Telephone:** 888-467-4222

### 1.4. Emergency Telephone Number (24 hours)

| | |
|---|---|
| CHEMTREC (USA) | 800-424-9300 |
| CHEMTREC (International) | 1+ 703-527-3887 |

# Safety Data Sheet

## SECTION 2: Hazard(s) Identification

### 2.1. Classification of the Substance or Mixture

For the full text of the Hazard and Precautionary Statements listed below, see Section 16.

| Hazard Class | Category | Hazard Statements | Precautionary Statements: |
|---|---|---|---|
| Acute Toxicity - Inhalation | Category 1 | H330 | P260, P271, P285, P304+P340, P310, P320, P403+P233, P405, P501 |
| Skin Corrosion / Irritation | Category 1A | H314 | P260, P264, P280, P301+P330+P331, P303+P361+P353, P363, P304+P340, P310, P321, P305+P351+P338, P405, P501 |
| Eye Damage / Irritation | Category 1 | H318 | P280, P305+P351+P338, P310 |
| Specific Target Organs/Systemic Toxicity Following Single Exposure | Category 1 | H370 | P260, P264, P270, P307+P311, P321, P405, P501 |
| Specific Target Organs/Systemic Toxicity Following Repeated Exposure | Category 1 | H372 | P260, P264, P270, P314, P501 |
| Aspiration Hazard | Category 1 | H304 | P301+P310, P331, P405, P501 |
| Corrosive to Metals | Category 1 | H290 | P234, P390, P406 |
| Hazardous to the Aquatic Environment (Chronic) | Category 3 | H402 | P273, P501 |

### 2.2. GHS Label Elements

**Pictograms:**

**Signal Word:** **Danger**

**Hazard Statements:**

| Hazard Number | Hazard Statement |
|---|---|
| H290 | May be corrosive to metals. |
| H304 | May be fatal if swallowed and enters airways. |
| H314 | Causes severe skin burns and eye damage. |
| H318 | Causes serious eye damage. |
| H330 | Fatal if inhaled. |
| H370 | Causes damage to organs. |
| H372 | Causes damage to organs through prolonged or repeated exposure. |
| H402 | Harmful to aquatic life. |

**Precautionary Statements:**

| Precautionary Number | Precautionary Statement |
|---|---|
| P234 | Keep only in original container. |
| P260 | Do not breathe fumes, mist, vapors, or spray. |
| P264 | Wash arms, hands and face thoroughly after handling. |
| P270 | Do not eat, drink or smoke when using this product. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves and eye protection. |
| P285 | In case of inadequate ventilation wear respiratory protection. |
| P301+P310 | IF SWALLOWED: Immediately call a POISON CENTER or physician. |
| P301+P330+P331 | IF SWALLOWED: rinse mouth. Do NOT induce vomiting. |
| P303+P361+P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. |
| P304+P340 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. |
| P305+P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to |
| P307+P311 | IF exposed: Call a POISON CENTER or physician. |
| P310 | Immediately call a POISON CENTER or physician. |
| P314 | Get medical attention if you feel unwell. |
| P320 | Specific treatment is urgent (Wash areas of contact with water immediately). |
| P321 | Specific treatment (Wash areas of contact with water immediately). |
| P331 | Do NOT induce vomiting. |
| P363 | Wash contaminated clothing before reuse. |
| P390 | Absorb spillage to prevent material damage. |
| P403+P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P405 | Store locked up. |
| P406 | Store in corrosive resistant container with a resistant inner liner. |
| P501 | Dispose of contents in accordance with local, state, federal and international regulations. |

### 2.4. Hazards not Otherwise Classified or Covered by GHS

Data not available.

## SECTION 3: Composition / Information on Ingredients

### 3.1. Components of Substance or Mixture

| Chemical Name | Formula | Molecular Weight | CAS Number | Weight% |
|---|---|---|---|---|
| Water | $H_2O$ | 18.01 g/mol | 7732-18-5 | 60.29 |
| Nitric Acid | $HNO_3$ | 63.01 g/mol | 7697-37-2 | 39.71 |

## SECTION 4: First-Aid Measures

### 4.1. General First Aid Information

**Eye Contact:** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. May cause irritation, redness, pain, and tearing.

**Inhalation:** IF INHALED: Remove person to fresh air and keep comfortable for breathing.

**Skin Contact:** IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Causes severe burns. Contact will discolor skin yellow-brown depending on exposure which will wear off after a period of time.

**Ingestion:** IF SWALLOWED: rinse mouth. Do NOT induce vomiting. Do not induce vomiting. Give large quantity of water. Call a physician immediately.

### 4.2. Most Important Symptoms and Effects, Acute and Delayed

May be fatal if swallowed and enters airways. Causes severe skin burns and eye damage. Causes serious eye damage. Fatal if inhaled. Causes damage to organs. Causes damage to organs through prolonged or repeated exposure. Corrosive Liquid. May be fatal if swallowed. Avoid contact with skin, eyes, and clothing. Avoid breathing vapor. If swallowed, do not induce vomiting. Dilute with water and call a physician. Wash areas of contact with plenty of water. Potential symptoms of overexposure are irritation of the eyes, mucous membranes and skin, dental erosion, bronchitis, pneumonitis, delayed pulmonary edema. EYE CONTACT: May cause irritation, redness, pain, and tearing. SKIN CONTACT: Causes severe burns. Contact will discolor skin yellow-brown depending on exposure which will wear off after a period of time.

### 4.3. Medical Attention or Special Treatment Needed

Immediately call a POISON CENTER or physician. Specific treatment is urgent (Wash areas of contact with water immediately). Specific treatment (Wash areas of contact with water immediately).

## SECTION 5: Fire-Fighting Measures

### 5.1. Extinguishing Media

Does not burn. Use extinguishing media appropriate for surrounding fire.

### 5.2. Specific Hazards Arising from the Substance or Mixture

Strong oxidizer. Contact of concentrated nitric acid with combustible materials may increase the hazard from fire and may lead to an explosion. Decomposes at fire temperature with release of oxides of nitrogen. Releases hydrogen gas on contact with many metals.

### 5.3. Special Protective Equipment for Firefighters

Wear special protective clothing and positive pressure self-contained breathing apparatus. Butyl rubber, natural rubber, Neoprene, nitrile rubber, or polyvinyl alcohol barrier recommended.

## SECTION 6: Accidental Release Measures

### 6.1. Personal Precautions, Protective Equipment and Emergency Procedures

Wear protective gloves and eye protection. In case of inadequate ventilation wear respiratory protection.

### 6.2. Cleanup and Containment Methods and Materials

Releases may require isolation or evacuation. Approach release from upwind. Stop or control the leak, if this can be done without undue risk. Use water spray to cool and disperse vapors and protect personnel. Avoid solid stream on pooled liquids. Prompt cleanup and removal are necessary. Control runoff and isolate discharged material for proper disposal.

## SECTION 7: Handling and Storage

### 7.1. Precautions for Safe Handling and Storage Conditions

Store in corrosive resistant container with a resistant inner liner. As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials.

## SECTION 8: Exposure Controls / Personal Protection

### 8.1 Control Parameters

| Chemical Name | Limit Type | Country | Exposure Limit | Information Source |
|---|---|---|---|---|
| Nitric Acid (7697-37-2) | TWA | USA | 2 ppm TWA; 5 mg/m³ TWA | U.S. - OSHA - Final PELs - Time Weighted Averages (TWAs) |
| Nitric Acid (7697-37-2) | TLV-STEL | USA | 4 ppm STEL | ACGIH - Threshold Limit Values - Short Term Exposure Limits (TLV-STEL) |
| Nitric Acid (7697-37-2) | TLV-TWA | USA | 2 ppm TWA | ACGIH - Threshold Limit Values - Time Weighted Averages (TLV-TWA) |

### 8.2. Exposure Controls

**Engineering Controls:** Use only outdoors or in a well-ventilated area. A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limit.

**Respiratory Protection:** In case of inadequate ventilation wear respiratory protection. If the TLV is exceeded, a full-face chemical cartridge respirator may be worn up to 50 times the TLV or the maximum use concentration specified by the respirator supplier, whichever is less.

**Skin Protection:** Wear protective gloves and eye protection. Chemical resistant gloves.

**Eye Protection:** Wear protective gloves and eye protection. Safety glasses or goggles.

### 8.3. Personal Protective Equipment

Wear protective gloves and eye protection. In case of inadequate ventilation wear respiratory protection. If the TLV is exceeded, a full-face chemical cartridge respirator may be worn up to 50 times the TLV or the maximum use concentration specified by the respirator supplier, whichever is less. Chemical resistant gloves. Safety glasses or goggles.

# Safety Data Sheet

## SECTION 9: Physical and Chemical Properties

### 9.1. Basic Physical and Chemical Properties

**Appearance:** Colorless to light yellow liquid
**Physical State:** Liquid
**Odor:** Acrid
**Odor Threshold:** Data not available.
**pH:** < 1
**Melting/Freezing Point:** Approximately 0°C
**Initial Boiling Point/Range:** Approximately 100°C - Approximately 100°C
**Flash Point:** Data not available.
**Evaporation Rate:** Data not available.
**Flammability:** Data not available.
**Flammability/Explosive Limits:** Data not available.
**Vapor Pressure:** Data not available.
**Vapor Density:** Data not available.
**Relative Density:** 1.25
**Solubility:** Miscible
**Partition Coefficient:** Data not available.
**Auto-Ignition Temperature:** Data not available.
**Decomposition Temperature:** Data not available.
**Viscosity:** Data not available.
**Explosive Properties:** Data not available.
**Oxidizing Properties:** Data not available.

## SECTION 10: Stability and Reactivity

### 10.1. Reactivity and Chemical Stability

Data not available.

### 10.2. Possibility of Hazardous Reactions

Data not available.

### 10.3. Conditions to Avoid and Incompatible Materials

Keep only in original container. Strong bases, metallic powders, Carbides, Hydrogen Sulfide, Turpentine and combustible organics.

### 10.4. Hazardous Decomposition Products

Will not occur.

# Safety Data Sheet

## SECTION 11: Toxicological Information

### 11.1. Information on Toxicological Effects

**Acute Toxicity - Oral Exposure:**

Not applicable.

**Acute Toxicity - Dermal Exposure:**

Not applicable.

**Acute Toxicity - Inhalation Exposure:**

Fatal if inhaled. Do not breathe fumes, mist, vapors, or spray. Use only outdoors or in a well-ventilated area. In case of inadequate ventilation wear respiratory protection. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. Specific treatment is urgent (Wash areas of contact with water immediately). Store in a well- ventilated place. Keep container tightly closed. Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

**Acute Toxicity - Other Information:**

LDLo, Oral, Human: 430 mg/kg (Nitric Acid), details of toxic effects not reported other than lethal dose value.

**Skin Corrosion and Irritation:**

Causes severe skin burns and eye damage. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Wear protective gloves and eye protection. IF SWALLOWED: rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Wash contaminated clothing before reuse. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water immediately). IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

**Serious Eye Damage and Irritation:**

Causes serious eye damage. Wear protective gloves and eye protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

**Respiratory Sensitization:**

Not applicable.

**Skin Sensitization:**

Not applicable.

**Germ Cell Mutagenicity:**

Not applicable.

**Carcinogenicity:**

Not applicable.

**Reproductive Toxicity:**

Not applicable.

**Specific Target Organ Toxicity from Single Exposure:**

Causes damage to organs. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. IF exposed: Call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water immediately). Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

**Specific Target Organ Toxicity from Repeated Exposure:**

Causes damage to organs through prolonged or repeated exposure. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Get medical attention if you feel unwell. Dispose of contents in accordance with local, state, federal and international regulations.

**Aspiration Hazard:**

May be fatal if swallowed and enters airways. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

**Additional Toxicology Information:**

Data not available.

## SECTION 12: Ecological Information

### 12.1. Ecotoxicity

Harmful to aquatic life. Avoid release to the environment. Dispose of contents in accordance with local, state, federal and international regulations.

### 12.2. Persistence and Degradability

Data not available.

### 12.3. Bioaccumulative Potential

Data not available.

### 12.4. Mobility in Soil

Data not available.

### 12.5. Other Adverse Ecological Effects

Data not available.

## SECTION 13: Disposal Considerations

### 13.1. Waste Treatment Methods

Neutralize with Soda Ash or Calcium Carbonate. Wash resulting solution down the drain. Treat the solid residue as normal refuse. Always dispose of in accordance with local, state and federal regulations.

## SECTION 14: Transportation Information

### 14.1. Transportation by Land-Department of Transportation (DOT, United States of America)

**Sizes:** 1 L, 2.5 L, 500 mL

**UN Number:** UN2031

**Proper Shipping Name:** Nitric Acid Solution

**Hazard Class:** 8

**Packing Group:** II

**Hazard Label(s):**

### 14.2. Transportation by Air - International Air Transport Association (IATA)

**Sizes:** 1 L, 2.5 L, 500 mL

**UN Number:** UN2031

**Proper Shipping Name:** Nitric Acid Solution

**Hazard Class:** 8

**Packing Group:** II

**Hazard Label(s):**

### 14.3 Transportation of Dangerous Goods (TDG, Canada)

**Sizes:** 1 L, 2.5 L, 500 mL

**UN Number:** UN2031

**Proper Shipping Name:** NITRIC ACID SOLUTION

**Hazard Class:** 8

**Packing Group:** II

**Hazard Label(s):**

## SECTION 15: Regulatory Information

### 15.1. Occupational Safety and Health Administration (OSHA) Hazards

Not listed.

### 15.2. Superfund Amendments and Reauthorization Act (SARA) 302 Extremely Hazardous Substances

Nitric Acid (CAS # 7697-37-2): 1000 lb EPCRA RQ

Nitric Acid (CAS # 7697-37-2): 1000 lb TPQ

### 15.3. Superfund Amendments and Reauthorization Act (SARA) 311/312 Hazardous Chemicals

Nitric Acid (CAS # 7697-37-2): 1000 lb final RQ; 454 kg final RQ

### 15.4. Superfund Amendments and Reauthorization Act (SARA) 313 Toxic Release Inventory (TRI)

Nitric Acid (CAS # 7697-37-2): 1.0 % de minimis concentration

### 15.5. Massachusetts Right-to-Know Substance List

Nitric Acid (CAS # 7697-37-2): Extraordinarily hazardous

### 15.6. Pennsylvania Right-to-Know Hazardous Substances

Nitric Acid (CAS # 7697-37-2): Environmental hazard
Nitric Acid (CAS # 7697-37-2): Present
Water (CAS # 7732-18-5): Present

### 15.7. New Jersey Worker and Community Right-to-Know Components

Nitric Acid (CAS # 7697-37-2): corrosive; reactive - second degree
Nitric Acid (CAS # 7697-37-2): sn 1356
Nitric Acid (CAS # 7697-37-2): SN 1356 500 lb TPQ
Nitric Acid (CAS # 7697-37-2): sn 3722
Nitric Acid (CAS # 7697-37-2): SN 3722 500 lb TPQ (water dissociable, Category Code N511)

### 15.8. California Proposition 65

Not listed.

### 15.9. Canada Domestic Substances List / Non-Domestic Substances List (DSL/NDSL)

Nitric Acid (CAS # 7697-37-2): Present (DSL)
Water (CAS # 7732-18-5): Present (DSL)

### 15.10. United States of America Toxic Substances Control Act (TSCA) List

Nitric Acid (CAS # 7697-37-2): Present
Water (CAS # 7732-18-5): Present

### 15.11. European Inventory of Existing Commercial Chemical Substances (EINECS), European List of Notified Chemical Substances (ELINCS), and No Longer Polymers (NLP)

Not listed.

## SECTION 16: Other Information

### 16.1. Full Text of Hazard Statements and Precautionary Statements

May be corrosive to metals. May be fatal if swallowed and enters airways. Causes severe skin burns and eye damage. Causes serious eye damage. Fatal if inhaled. Causes damage to organs. Causes damage to organs through prolonged or repeated exposure. Harmful to aquatic life.

Keep only in original container. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves and eye protection. In case of inadequate ventilation wear respiratory protection.

IF SWALLOWED: Immediately call a POISON CENTER or physician. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF exposed: Call a POISON CENTER or physician. Get medical attention if you feel unwell. Specific treatment is urgent (Wash areas of contact with water immediately). Wash contaminated clothing before reuse. Absorb spillage to prevent material damage.

Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in corrosive resistant container with a resistant inner liner.

Dispose of contents in accordance with local, state, federal and international regulations.

# Safety Data Sheet

## 16.2. Miscellaneous Hazard Classes

**Canadian Carcinogenicity Hazard Class:** Not Applicable.

**Physical Hazards Not Otherwise Classified (PHNOC):** Not Applicable.

**Health Hazards Not Otherwise Classified (HHNOC):** Not Applicable.

**Biohazardous Infectious Materials Hazard Class:** Not Applicable.

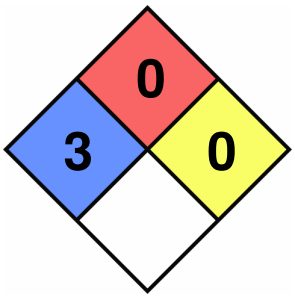
## 16.3. National Fire Protection Association (NFPA) Rating

**Health:** 3

**Flammability:** 0

**Reactivity:** 0

**Special Hazard:**




## 16.4. Document Revision

**Last Revision Date:** 2020-01-30

## DISCLAIMER

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty , expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use .

## ATTACHMENT 7

Sodium Bisulfate MSDS

# Sodium Bisulfate

## SECTION 1 : Identification of the substance/mixture and of the supplier

**Product name** : **Sodium Bisulfate**

**Manufacturer/Supplier Trade name:**

**Manufacturer/Supplier Article number:** **S25535A**

**Recommended uses of the product and uses restrictions on use:**

**Manufacturer Details:**

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

**Supplier Details:**

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

**Emergency telephone number:**

Fisher Science Education Emergency Telephone No.: 800-535-5053

## SECTION 2 : Hazards identification

**Classification of the substance or mixture:**

**Corrosive**

**Irritant**

Serious eye damage ( Category 1 )

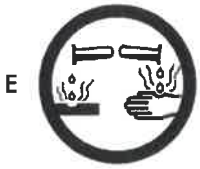
**Signal word** :Danger

**Hazard statements:**
Causes serious eye damage
Causes severe skin burns and eye damage
May cause respiratory irritation
**Precautionary statements:**
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Do not eat, drink or smoke when using this product

**Combustible Dust Hazard: :**
May form combustible dust concentrations in air (during processing).

**Other Non-GHS Classification:**

**WHMIS**




**NFPA/HMIS**

NFPA SCALE (0-4)

| | |
|---|---|
| Health | 2 |
| Flammability | 0 |
| Physical Hazard | 0 |
| Personal Protection | X |

HMIS RATINGS (0-4)

## SECTION 3 : Composition/information on ingredients

| **Ingredients:** | | |
|---|---|---|
| CAS 10034-88-5 | Sodium bisulfate monohydrate | 100 % |
| | | Percentages are by weight |

## SECTION 4 : First aid measures

**Description of first aid measures**

**After inhalation:** Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.Seek medical advice if discomfort or irritation persists.If breathing difficult, give oxygen.

**After skin contact:** Flush with water for 15 minutes. Get medical assistance if irritation develops.Wash affected area with soap and water. Rinse thoroughly. Seek medical attention if irritation, discomfort or vomiting persists.

**After eye contact:** Immediately flush eyes with water for at least 15 minutes. Immediately get medical assistance.Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

**After swallowing:** Do NOT induce vomiting. Dilute with water. Get medical assistance.Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.

**Most important symptoms and effects, both acute and delayed:**

Irritation, Nausea,Headache, Shortness of breath.;

**Indication of any immediate medical attention and special treatment needed:**

If seeking medical attention, provide SDS document to physician.

## SECTION 5 : Firefighting measures

**Extinguishing media**

**Suitable extinguishing agents:** If in laboratory setting, follow laboratory fire suppression procedures. Use

appropriate fire suppression agents for adjacent combustible materials or sources of ignition

**For safety reasons unsuitable extinguishing agents:**

**Special hazards arising from the substance or mixture:**

Combustion products may include carbon oxides or other toxic vapors.Thermal decomposition can lead to release of irritating gases and vapors.Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

**Advice for firefighters:**

**Protective equipment:** Use NIOSH-approved respiratory protection/breathing apparatus.

**Additional information (precautions):** Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.Use spark-proof tools and explosion-proof equipment.

## SECTION 6 : Accidental release measures

**Personal precautions, protective equipment and emergency procedures:**

Wear protective equipment. Transfer to a disposal or recovery container.Use spark-proof tools and explosion-proof equipment.Use respiratory protective device against the effects of fumes/dust/aerosol. Keep unprotected persons away. Ensure adequate ventilation.Keep away from ignition sources. Protect from heat.Stop the spill, if possible. Contain spilled material by diking or using inert absorbent.

**Environmental precautions:**

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13

**Methods and material for containment and cleaning up:**

If in a laboratory setting, follow Chemical Hygiene Plan procedures.Collect liquids using vacuum or by use of absorbents. Place into properly labeled containers for recovery or disposal. If necessary, use trained response staff/contractor.Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

**Reference to other sections:**

## SECTION 7 : Handling and storage

**Precautions for safe handling:**

Minimize dust generation and accumulation. Wash hands after handling. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Follow good hygiene procedures when handling chemical materials. Do not eat, drink, smoke, or use personal products when handling chemical substances. If in a laboratory setting, follow Chemical Hygiene Plan.Use only in well ventilated areas.Avoid generation of dust or fine particulate.Avoid contact with eyes, skin, and clothing.

**Conditions for safe storage, including any incompatibilities:**

Store in a cool location. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store away from foodstuffs. Store away from oxidizing agents.Store in cool, dry conditions in well sealed containers. Keep container tightly sealed.

## SECTION 8 : Exposure controls/personal protection

**Control Parameters:** 10034-88-5, Sodium bisulfate monohydrate, Contains no substances with occupational exposure limit values

**Appropriate Engineering controls:** Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.Use under a fume hood. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment.Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).

**Respiratory protection:** Not required under normal conditions of use. Use suitable respiratory protective device when high concentrations are present. Use suitable respiratory protective device when aerosol or mist is formed. For spills, respiratory protection may be advisable.

**Protection of skin:** The glove material has to be impermeable and resistant to the product/ the substance/ the preparation being used/handled.Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

**Eye protection:** Safety glasses with side shields or goggles.

**General hygienic measures:** The usual precautionary measures are to be adhered to when handling chemicals. Keep away from food, beverages and feed sources. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Do not inhale gases/fumes/dust/mist/vapor/aerosols. Avoid contact with the eyes and skin.

## SECTION 9 : Physical and chemical properties

| | | | |
|---|---|---|---|
| **Appearance (physical state,color)**: | Colorless Crystals. | **Explosion limit lower**:<br>**Explosion limit upper**: | Not Determined<br>Not Determined |
| **Odor**: | Odorless | **Vapor pressure**: | Not Determined |
| **Odor threshold**: | Not Determined | **Vapor density**: | Not Determined |
| **pH-value**: | ~1 | **Relative density**: | Not Determined |
| **Melting/Freezing point**: | 183C | **Solubilities**: | Soluble in Water |
| **Boiling point/Boiling range**: | Decomposes | **Partition coefficient (n-octanol/water)**: | Not Determined |
| **Flash point (closed cup)**: | Not Determined | **Auto/Self-ignition temperature**: | Not Determined |
| **Evaporation rate**: | Not Determined | **Decomposition temperature**: | 430C |
| **Flammability (solid,gaseous)**: | Not Determined | **Viscosity**: | a. Kinematic:Not Determined<br>b. Dynamic: Not Determined |
| **Density**: Not Determined | | | |

## SECTION 10 : Stability and reactivity

**Reactivity:**
**Chemical stability:**table under normal temperatures and pressures. Hygroscopic.No decomposition if used and stored according to specifications.
**Possible hazardous reactions:**
**Conditions to avoid:**Store away from oxidizing agents, strong acids or bases.
**Incompatible materials:**Strong bases, Strong oxidizing agents. Strong acids.Strong bases.
**Hazardous decomposition products:**Sulphur oxides, Sodium oxides. Carbon oxides (CO, CO2).

## SECTION 11 : Toxicological information

| | |
|---|---|
| **Acute Toxicity**: No additional information. | |
| **Chronic Toxicity**: No additional information. | |
| **Corrosion Irritation**: No additional information. | |
| **Sensitization**: | No additional information. |
| **Single Target Organ (STOT)**: | No additional information. |
| **Numerical Measures**: | No additional information. |
| **Carcinogenicity**: | No additional information. |
| **Mutagenicity**: | No additional information. |
| **Reproductive Toxicity**: | No additional information. |

## SECTION 12 : Ecological information

**Ecotoxicity Persistence and degradability**: Readily degradable in the environment.
**Bioaccumulative potential**:
**Mobility in soil**:
**Other adverse effects**:

## SECTION 13 : Disposal considerations

**Waste disposal recommendations**:

Product/containers must not be disposed together with household garbage. Do not allow product to reach sewage system or open water.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). Consult federal state/ provincial and local regulations regarding the proper disposal of waste material that may incorporate some amount of this product.

## SECTION 14 : Transport information

**UN-Number**

3260

**UN proper shipping name**

CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. ,

**Transport hazard class(es)**

**Class:**
8 Corrosive substances

**Packing group**:III
**Environmental hazard**:
**Transport in bulk**:
**Special precautions for user**:

## SECTION 15 : Regulatory information

**United States (USA)**

**SARA Section 311/312 (Specific toxic chemical listings)**:

None of the ingredients is listed

**SARA Section 313 (Specific toxic chemical listings)**:

None of the ingredients is listed

**RCRA (hazardous waste code)**:

None of the ingredients is listed

**TSCA (Toxic Substances Control Act)**:

All ingredients are listed.

**CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act)**:

None of the ingredients is listed

**Proposition 65 (California)**:

**Chemicals known to cause cancer**:

None of the ingredients is listed

**Chemicals known to cause reproductive toxicity for females**:

None of the ingredients is listed

**Chemicals known to cause reproductive toxicity for males**:

None of the ingredients is listed

**Chemicals known to cause developmental toxicity**:

None of the ingredients is listed

**Canada**

**Canadian Domestic Substances List (DSL)**:

All ingredients are listed.

**Canadian NPRI Ingredient Disclosure list (limit 0.1%)**:

None of the ingredients is listed

**Canadian NPRI Ingredient Disclosure list (limit 1%)**:

None of the ingredients is listed

## SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct

employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

**GHS Full Text Phrases**:

**Abbreviations and acronyms**:
IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

**Effective date** : 12.16.2014
**Last updated** : 03.19.2015

## ATTACHMENT 8

Sodium Hydroxide MSDS

ERCO Worldwide

# SAFETY DATA SHEET

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

## 1. Identification

| | |
|---|---|
| **Product identifier** | **Sodium Hydroxide Solution** |
| **Other means of identification** | Liquid caustic (solution of 18-70% Sodium hydroxide in water), Soda lye solution, Caustic soda solution, Aqueous alkali metal hydroxide, NaOH |
| **Product family** | Alkali metal hydroxide |
| **Recommended use** | Acid neutralization, petroleum refining, manufacture of paper, cellulose, textiles, plastics, explosives and dyestuffs. Metal cleaning, etching and electroplating. Regeneration of ion exchange resins. |
| **Recommended restrictions** | None known |

**Manufacturer/Importer/Supplier/Distributor information**

**Manufacturer**

| | |
|---|---|
| **Company name** | ERCO Worldwide |
| **Address** | 302 The East Mall<br>Suite 200<br>Toronto, ON M9B 6C7<br>Canada |
| **Telephone** | (416) 239-7111 (M- F: 8:00 am – 5:00pm EST) |
| **Website** | http://www.ercoworldwide.com |
| **E-mail** | productinfo@ercoworldwide.com |
| **Emergency phone number** | Canada & USA: 1-800-424-9300 (CHEMTREC) |

**Supplier** Refer to Manufacturer

## 2. Hazard(s) Identification

| | | |
|---|---|---|
| **Physical hazards** | Corrosive to metals | Category 1 |
| **Health hazards** | Skin corrosion | Category 1A |
| | Serious eye damage | Category 1 |
| | Acute Toxicity, Oral | Category 3 |
| | Specific target organ toxicity, single exposure | Category 3 respiratory tract irritation |

**Environmental hazards** Not currently regulated by OSHA, refer to Section 12 for additional information.

**OSHA defined hazards** This mixture does not meet the classification criteria according to OSHA HazCom 2012.

**Label elements**

**Signal word** Danger

**Hazard statement**

May be corrosive to metals.
Toxic if swallowed.
Causes severe skin burns and eye damage.
May cause respiratory irritation.

**Precautionary statement**

**Prevention**

Keep only in original container. Wash hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe dusts or mist. Wear protective gloves, protective clothing, eye protection, face protection. Avoid breathing fume, gas, vapors, spray. Use only outdoors or in a well-ventilated area.

**Response**

Immediately call a POISON CENTER or doctor/physician.

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
IF ON SKIN (OR HAIR): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Absorb spillage to prevent material damage.

**Storage**

Store locked up. Store in a well-ventilated place. Keep container tightly closed. Store in corrosive resistant container with a resistant inner liner.

**Disposal**

Dispose of contents/container in accordance with local/regional/national/international regulations.

**Hazard(s) not otherwise classified (HNOC)**

No OSHA defined hazard classes.
Other hazards which do not result in classification: Contact with most metals will generate flammable hydrogen gas. Contact with water will generate considerable heat. Reacts vigorously, violently or explosively with many organic and inorganic chemicals, such as strong acids, acid chlorides, acid anhydrides, ketones, glycols and organic peroxides. Chronic skin contact with low concentrations may cause dermatitis.

**Supplemental information**

Not applicable.

## 3. Composition/Information on Ingredients

| Chemical name | Common name and synonyms | CAS number | Conc. % By Weight |
|---|---|---|---|
| Sodium Hydroxide | Caustic Soda, Lye (Sodium), Sodium Hydrate, Soda Lye | 1310-73-2 | 18 - < 70 w/w% |
| Dihydrogen oxide | Water | 7732-18-5 | Balance |

**Chemical name of impurities, stabilizing solvents and/or additives:** None

## 4. First-Aid Measures

**Inhalation**

Move to fresh air. If breathing is difficult, trained personnel should give oxygen. If breathing stops, provide artificial respiration. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediately call a POISON CENTER or doctor/physician.

**Skin Contact**

Take off immediately all contaminated clothing. Immediately flush skin with running water for at least 20 minutes, or until the feeling of slipperiness disappears. Cover wound with sterile dressing. Do not rub area of contact. Wash contaminated clothing before reuse. Leather and shoes that have been contaminated with the solution may need to be destroyed. Immediately call a POISON CENTER or doctor/physician.

**Eye Contact**

Immediately flush eyes with plenty of water for at least 20 minutes, holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately call a POISON CENTER or doctor/physician.

**Ingestion**

Rinse mouth. Do NOT induce vomiting. Never give anything by mouth to a victim who is unconscious or is having convulsions. If victim can swallow, have him/her drink one cup of water to dilute material in stomach. If vomiting occurs naturally, repeat administration of water. Immediately call a POISON CENTER or doctor/physician.

**Most important symptoms/effects, acute and delayed**

Inhalation of mists can cause severe respiratory irritation. Symptoms may include coughing, choking and wheezing.

Inhalation could result in pulmonary edema (fluid accumulation). Symptoms of pulmonary edema (chest pain, shortness of breath) may be delayed.

Direct skin contact may cause corrosive skin burns, deep ulcerations and possibly permanent scarring.

Corrosive to the eyes and may cause severe damage including blindness. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause severe irritation and corrosive damage in the mouth, throat

and stomach. Symptoms may include abdominal pain, vomiting, burns, perforations, bleeding and eventually death.

**Indication of immediate medical attention and special treatment needed**

Immediate medical attention is required. Causes chemical burns. Symptoms may be delayed.

**General information**

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

## 5. Fire-Fighting Measures

**Suitable extinguishing media**

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use as appropriate: Water Spray or Fog. Alcohol resistant foam. Dry chemical powder. Use water with caution. Contact with water will generate considerable heat. Do not apply water directly to sodium hydroxide since it can generate significant heat and cause spattering.

**Unsuitable extinguishing media**

Carbon dioxide ($CO_2$). Use chemical extinguishing agents with caution. Some chemical extinguishing agents may react with this material.

**Specific hazards arising from the chemical**

Not considered flammable. Contact with most metals will generate flammable hydrogen gas. Contact with water will generate considerable heat. The heat that is generated may be sufficient enough to ignite nearby combustible materials. Reacts vigorously, violently or explosively with many organic and inorganic chemicals, such as strong acids, acid chlorides, acid anhydrides, ketones, glycols and organic peroxides. Toxic fumes, gases or vapours may evolve on burning.

**Special protective equipment and precautions for firefighters**

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode. A full-body chemical resistant suit should be worn.

**Firefighting equipment/instructions**

Fight fire with normal precautions from a reasonable distance. Evacuate the area promptly. Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers. Do not allow run-off from firefighting to enter drains or water courses. Dike for water control.

**Specific methods**

Use standard firefighting procedures and consider the hazards of other involved materials.

When moist, sodium hydroxide can react with metals, such as aluminum, tin and zinc, to form flammable and explosive hydrogen gas. Toxic sodium oxide fumes can be generated by thermal decomposition at elevated temperatures.

| | |
|---|---|
| **Hazardous combustion products** | Fight fire with normal precautions from a reasonable distance. Evacuate the area promptly. Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers. Do not allow run-off from firefighting to enter drains or water courses. Dike for water control. |

## 6. Accidental Release Measures

| | |
|---|---|
| **Personal precautions, protective equipment and emergency procedures** | Immediately evacuate personnel to safe areas. Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. For personal protection, see section 8 of the SDS. |
| **Methods and materials for containment and cleaning up** | Ventilate the area. Remove sources of ignition. Stop leak if you can do so without risk. Absorb spillage to prevent material damage. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces.<br><br>Small Spills: Contain and absorb spilled liquid with non-combustible, inert absorbent material (e.g. sand). Dilute alkali with water and neutralize with acids (e.g. acetic acid / vinegar).<br><br>Large Spills: Prevent entry into waterways, sewer, basements or confined areas. If not recoverable, dilute with water or flush to holding area and neutralize. Remove with vacuum trucks or pump to storage/salvage vessels. Contact the proper local authorities.<br><br>Never return spills to original containers for re-use. Contaminated absorbent material may pose the same hazards as the spilled product. For waste disposal, see section 13 of the SDS. |
| **Environmental precautions** | Avoid discharge into drains, water courses or onto the ground. Contact local authorities in case of spillage to drain/aquatic environment. |

## 7. Handling and Storage

| | |
|---|---|
| **Precautions for safe handling** | Wear chemically resistant protective equipment during handling. Wear protective gloves/clothing and eye/face protection. Do not breathe mist. Do not taste or swallow. Avoid contact with eyes, skin and clothing. Keep away from heat. Keep away from metals and other incompatibles. When preparing or diluting solution, always add to water, slowly and with stirring. Use cold water to prevent excessive heat generation. Never add water to the product. Label containers appropriately. Wash thoroughly after handling. When using, do not eat, drink or smoke. Avoid release to the environment. |

**Conditions for safe storage, including any incompatibilities**

Store in a cool, dry place out of direct sunlight. Store in a well-ventilated place. Store locked up. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks. Store away from incompatible materials (see Section 10 of the SDS). Store in original tightly closed container. May be corrosive to Aluminum, stainless steels, carbon steel, copper, bronze, etc. Store in corrosive resistant container with a resistant inner liner. Suitable container and packaging materials for safe storage: Nickel. Polyvinyl chloride (PVC). Polytetrafluoroethylene (PTFE). Polypropylene.

## 8. Exposure Controls/Personal Protection

**Occupational exposure limits**

**US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)**

| Components | Type | Value |
|---|---|---|
| Sodium Hydroxide (CAS 1310-73-2) | PEL | 2 mg/m$^3$ |

**US. ACGIH Threshold Limit Values**

| Components | Type | Value |
|---|---|---|
| Sodium Hydroxide (CAS 1310-73-2) | Ceiling | 2 mg/m$^3$ |

**US. NIOSH: Pocket Guide to Chemical Hazards**

| Components | Type | Value |
|---|---|---|
| Sodium Hydroxide (CAS 1310-73-2) | Ceiling | 2 mg/m$^3$ |

**Biological limit values**

No biological exposure limits noted for the ingredient(s).

**Appropriate engineering controls**

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

**Individual protection measures, such as personal protective equipment**

**Eye/face protection**

Wear eye/face protection. Chemical goggles and face shield are recommended.

**Skin protection**

**Hand protection**

Wear appropriate chemical resistant impervious gloves.

**Other**

Wear as appropriate: Butyl rubber. Neoprene. Nitrile. Polyvinyl chloride (PVC). VitonTM rubber (fluor rubber).

**Respiratory protection**

In case of insufficient ventilation, wear suitable respiratory equipment. A NIOSH/MSHA approved air-purifying respirator with

| | |
|---|---|
| | the appropriate chemical cartridges or a positive-pressure, air-supplied respirator may be used to reduce exposure. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. Respirators should be selected based on the form and concentration of contaminants in air, and in accordance with OSHA (29 CFR 1910.134). Advice should be sought from respiratory protection specialists. |
| **Thermal Hazards** | Wear appropriate thermal protective clothing, when necessary. |
| **General hygiene considerations** | Do not breathe mist. Avoid contact with eyes, skin and clothing. When using, do not eat, drink or smoke. Upon completion of work, wash hands before eating, drinking, smoking or use of toilet facilities. Remove soiled clothing and wash it thoroughly before reuse. Handle in accordance with good industrial hygiene and safety practice. |

## 9. Physical and Chemical Properties

| | |
|---|---|
| **Appearance** | Clear to slightly turbid, viscous liquid |
| **Physical state** | Liquid |
| **Form** | Viscous liquid |
| **Colour** | Clear water-white |
| **Odor** | Odorless |
| **Odor threshold** | Not Available |
| **pH** | > 14 (at high alkali concentration in water, pH scale is not applicable) |
| **Melting point/freezing point** | 57.2 °F (14 °C) / 57.2 °F (14 °C) (approximately) |
| **Initial boiling point and boiling range** | 284 °F (140 °C) @ 760 mmHg |
| **Flash point** | Not Applicable |
| **Evaporation rate** | Not Applicable (the only evaporation that occurs is water) |
| **Flammability (solid, gas)** | Not Available |
| **Upper/lower flammability or explosive limits** | |
| **Flammability limit – lower (%)** | Not Applicable |
| **Flammability limit – upper (%)** | Not Applicable |
| **Explosive limit – lower (%)** | Not Applicable |
| **Explosive limit – upper (%)** | Not Applicable |
| **Vapor pressure** | 0.2 kPa<br>1.5 mm Hg |
| **Vapor pressure temp.** | 77 °F (25 °C) |
| **Vapor density** | Not Available |
| **Relative density** | 1.52 g/cm³ |
| **Solubility (ies)** | |
| **Solubility (water)** | Soluble in all proportions |

| | |
|---|---|
| **Solubility (other)** | Soluble in absolute alcohol, methanol and glycerol. Moderately soluble in ethanol. Insoluble in acetone and diethyl ether. |
| **Partition coefficient (n-octanol/water)** | Not available |
| **Auto-ignition temperature** | Not Applicable |
| **Decomposition temperature** | Not Available |
| **Viscosity** | 25.39 cSt (40% solution) |
| **Viscosity temperature** | 68 °F (20 °C) |
| **Other information** | |
| **Specific gravity** | 1.52 at 20 °C |

## 10. Stability and Reactivity

**Reactivity**

Contact with most metals will generate flammable hydrogen gas. Contact with water will generate considerable heat. May be corrosive to Aluminum, stainless steels, carbon steel, copper, bronze, etc. Sodium hydroxide does not polymerize itself, but will violently polymerize certain other substances including: acetaldehyde, acrolein, acrylonitrile.

**Chemical stability**

Material is stable under normal conditions. Rapidly absorbs moisture and carbon dioxide from the air forming sodium carbonate. Water, when added to sodium hydroxide may cause localized overheating and possible spattering.

**Possibility of hazardous reactions**

Reacts vigorously, violently or explosively with many organic and inorganic chemicals, such as strong acids, acid chlorides, acid anhydrides, ketones, glycols and organic peroxides.

**Conditions to Avoid**

Contact with incompatible materials. Avoid high temperatures. Do not use in areas without adequate ventilation.

**Incompatible materials**

Metals. Water, moisture. Acids. Flammable liquids. Organo halogen compounds. Nitromethane. Nitrous compounds. Sodium borohydride. Tetrahydrofuran. Chlorinated compounds. Maleic anhydride. Cyanogen azide. Nitroalkanes. Silver nitrate. Ammonia. Zirconium. Acetaldehyde. Acrolein. Acrylonitrile. Allyl alcohol. Zinc Dust. 1,2- Dichloroethylene, Trichloroethylene or Tetrachloroethane. Phosphorus. Hydroquinone. Cinnamaldehyde. Sugars. Chlorine trifluoride, Phosphorus pentoxide or Trichloronitromethane. Chloroform. Methanol.

Sodium hydroxide solutions attack plastics, such as polyamide-imide (Torlon) (10-100% solutions), polybutylene terephthalate and polyethylene terephthalate (20-100%), thermoset polyester isophthalic acid (10-100%), polyvinylidene fluoride (Kynar; PVDF) (70-100% solutions), polyurethane (riged) (80-100%), and polyvinylidene chloride (Saran) (100%); elastomers, such as polysulfide and butadiene-styrene (SBR) (10-100%) and soft rubber (30-100%) (52,55); and coatings, such as polyester and vinyls (10-100%), coal tar epoxy, general purpose epoxy, epoxy polyamide and phenolic (70-100%).

| | |
|---|---|
| **Hazardous decomposition products** | Contact with metals (aluminum, zinc, tin) and sodium tetrahydroborate liberates hydrogen gas.<br><br>In the event of fire the following can be released: Sodium oxides. |

## 11. Toxicological Information

**Information on likely routes of exposure**

| | |
|---|---|
| **Inhalation** | May cause severe irritation and burning of the mouth, throat and esophagus; vomiting; diarrhea; edema (swelling) of larynx and a subsequent suffocation. Perforation of gastro-intestinal tract can occur. |
| **Skin contact** | Causes severe skin burns and eye damage. Not expected to be absorbed through the skin. Frequently deep ulcerations and ultimate scarring. Destructive effect on tissues. |
| **Eye contact** | Causes serious eye damage. Instantaneous painful irritation of the eyes. Can penetrate deeply causing irritation or severe burns depending on the concentration and duration of exposure. In severe cases, ulceration and permanent blindness may occur. |
| **Ingestion** | Toxic if swallowed. Causes digestive tract burns. Irritation of respiratory tract, inflammation of lungs, difficulty breathing. May cause pulmonary edema. |

| | |
|---|---|
| **Symptoms related to the physical, chemical and toxicological characteristics** | Inhalation of mists can cause severe respiratory irritation. Symptoms may include coughing, choking and wheezing. Symptoms of pulmonary edema (chest pain, shortness of breath) may be delayed. May cause severe irritation and corrosive damage in the mouth, throat and stomach. Symptoms may include abdominal pain, vomiting, burns, perforations, bleeding and eventually death. Direct skin contact may cause corrosive skin burns, deep ulcerations and possibly permanent scarring. Corrosive to the eyes and may cause severe damage including blindness. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. |

**Delayed and immediate effects and chronic effects from short-term and long-term exposure**

| | |
|---|---|
| **Effects of short-term (acute) exposure** | Direct contact can cause severe burns with deep ulceration, permanent scarring, and baldness. It can penetrate to deeper layers of the skin and corrosion will continue until removed. With dilute solution, the sensation of irritation may be delayed for hours. Eye damage can range from severe irritation and mild scarring to blistering, disintegration, ulceration, severe scarring and clouding. Ingestion can produced severe corrosive burns to mouth, throat, and esophagus. Symptoms include severe pain, vomiting, diarrhea, collapse and possible death. Small amounts of caustic which enter the lungs during ingestion or vomiting (aspiration) can cause serious lung injury and death. Sodium hydroxide does not readily form a vapor, so inhalation is only likely to occur if aerosol is formed. Severe irritation of the respiratory tract, and possible permanent damage and pulmonary edema may result from aerosol exposure. Symptoms of pulmonary edema may be delayed for up to 48 hours. |

**Effects of long-term (chronic) exposure** Repeated or prolonged exposure of the skin to low concentrations of liquid can cause dermatitis. There are a few reports of chronic respiratory disease from repeated and prolonged exposure to mists. There is no evidence of carcinogenicity in humans from occupational exposures. Sodium hydroxide does not accumulate in the body. Glaucoma and cataracts are possible late developments. In severe cases, permanent blindness results.

**Information on toxicological effects**

**Acute toxicity** There is no available data for the product itself, only for the ingredients. See below for individual ingredient acute toxicity data.

| Components | Species | Test Results |
|---|---|---|
| Sodium Hydroxide (CAS 1310-73-2) | | |
| **Acute** | | |
| *Dermal* | | |
| $LD_{50}$ | Rabbit | 1,350 mg/kg |
| *Inhalation* | | |
| $LC_{50}$ | Rat | No Data in Literature |
| *Oral* | | |
| $LD_{50}$ | Rat | 140-340 mg/kg |
| Water (CAS 7732-18-5) | | |
| **Acute** | | |
| *Dermal* | | |
| $LD_{50}$ | Rabbit | Not available |
| *Inhalation* | | |
| $LC_{50}$ | Rat | Not available |
| *Oral* | | |
| $LD_{50}$ | Rat | > 89840 mg/kg |

**Skin corrosion** Hazardous by OSHA criteria.
Category 1A. Causes severe skin burns and eye damage.

**Serious eye damage** Hazardous by OSHA criteria.
Category 1. Causes serious eye damage.

**Respiratory or skin sensitization**

**Respiratory sensitization** Not expected to be a respiratory sensitizer.

**Skin sensitizer** This product is not expected to be a skin sensitizer.

**Germ cell mutagenicity** Not expected to be mutagenic in humans.

**Carcinogenicity** This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

| | |
|---|---|
| **OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)** | Not listed. |
| **Reproductive toxicity** | This product is not expected to cause reproductive or developmental effects. |
| **Specific target organ toxicity - single exposure** | Hazardous by OSHA criteria.<br>Category 3. May cause respiratory irritation. |
| **Specific target organ toxicity - repeated exposure** | Not classified as a specific target organ toxicity - repeated exposure. |
| **Aspiration toxicity** | This product is not classified as an aspiration hazard. |
| **Chronic effects** | Chronic skin contact with low concentrations may cause dermatitis. |

## 12. Ecological Information

**Ecotoxicity** May cause shifts in water pH outside the range of pH 5 -10. Because of the high pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems. However, may be neutralized by naturally occurring acidity in the environment. The ingredient ecotoxicity data appearing below is expected to be primarily associated with pH.

| Components | | Species | Test Results |
|---|---|---|---|
| Sodium Hydroxide (CAS 1310-73-2) | | | |
| **Aquatic** | | | |
| *Acute* | | | |
| Crustacea | $EC_{50}$ | Water flea (*Ceriodaphnia dubia*) | 40 mg/l, 48 hours |

| | |
|---|---|
| **Persistence and degradability** | No data is available on the degradability of this product. Biodegradation is not applicable to inorganic substances. |
| **Bioaccumulative potential** | No accumulation in living organisms is expected due to high solubility and dissociation properties. |
| **Mobility in soil** | High water solubility indicates a high mobility in soil. |
| **Other adverse effects** | No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component. |

## 13. Disposal Considerations

| | |
|---|---|
| **Disposal instructions** | Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents and containers in accordance with local/regional/national/international regulations. |
| **Local disposal regulations** | Dispose in accordance with all applicable regulations. |
| **Hazardous waste code** | The waste code should be assigned in discussion between the user, the producer and the waste disposal company. |
| **Waste from residues / unused products** | Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions). |
| **Contaminated packaging** | Empty containers should be taken to an approved waste handling site for recycling or disposal.<br><br>Since emptied containers may retain product residue, follow label warnings even after container is emptied. |

## 14. Transport Information

**DOT**

| | |
|---|---|
| **UN number** | UN1824 |
| **UN proper shipping name** | Sodium hydroxide solution |
| **Transport hazard class(es)** | |
| **Class** | 8 |
| **Subsidiary risk** | None |
| **Packing group** | II |
| **Special precautions for user** | Read safety instructions, SDS and emergency procedures before handling.<br>US CERCLA Reportable Quantity (RQ): 1000 lbs / 454 kg |
| **Special provisions** | B2; IB2; N34; T7; TP2 |
| **Packaging exceptions** | 154 |
| **Packaging non bulk** | 202 |
| **Packaging bulk** | 242 |

**IATA**

| | |
|---|---|
| **UN number** | UN1824 |
| **UN proper shipping name** | Sodium hydroxide solution |
| **Transport hazard class(es)** | |
| **Class** | 8 |

| | |
|---|---|
| **Subsidiary risk** | None |
| **Packing group** | II |
| **Environmental hazards** | No |
| **ERG Code** | 8L |
| **Special precautions for user** | Read safety instructions, SDS and emergency procedures before handling. |
| **Other information** | |
| **Passenger and cargo aircraft** | Allowed |
| **Cargo aircraft only** | Allowed |

**IMDG**

| | |
|---|---|
| **UN number** | UN1824 |
| **UN proper shipping name** | Sodium hydroxide solution |
| **Transport hazard class(es)** | |
| **Class** | 8 |
| **Subsidiary risk** | None |
| **Packing group** | II |
| **Environmental hazards** | |
| **Marine pollutant** | No. |
| **EmS** | F-A, S-B |
| **Special precautions for user** | Read safety instructions, SDS and emergency procedures before handling. |

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not available.

**DOT**

**IATA; IMDG**

## 15. Regulatory Information

**US federal regulations**

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

| | | |
|---|---|---|
| **TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)** | Not regulated. | |
| **CERCLA Hazardous Substance List (40 CFR 302.4)** | Sodium hydroxide (CAS 1310-73-2) | Listed. |
| **SARA 304 Emergency release notification** | Not regulated. | |
| **OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)** | Not listed. | |

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

| | |
|---|---|
| **Hazard categories** | Immediate Hazard - Yes<br>Delayed Hazard - No<br>Fire Hazard - No<br>Pressure Hazard - No<br>Reactivity Hazard - Yes |
| **SARA 302 Extremely hazardous substance** | Not listed. |
| **SARA 311/312 Hazardous chemical** | No |
| **SARA 313 (TRI reporting)** | Not regulated. |

**Other federal regulations**

| | |
|---|---|
| **Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List** | Not regulated. |
| **Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)** | Not regulated. |

| | |
|---|---|
| **Safe Drinking Water Act (SDWA)** | Not regulated. |

**US state regulations**

| | |
|---|---|
| **US. Massachusetts RTK - Substance List** | Sodium hydroxide (CAS 1310-73-2) |
| **US. New Jersey Worker and Community Right-to-Know Act** | Sodium hydroxide (CAS 1310-73-2) |
| **US. Pennsylvania Worker and Community Right-to-Know Law** | Sodium hydroxide (CAS 1310-73-2) |
| **US. Rhode Island RTK** | Sodium hydroxide (CAS 1310-73-2) |
| **US. California Proposition 65** | California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. |

**International Inventories**

| Country(s) or region | Inventory name | On inventory (yes/no)* |
|---|---|---|
| Australia | Australian Inventory of Chemical Substances (AICS) | Yes |
| Canada | Domestic Substances List (DSL) | Yes |
| Canada | Non-Domestic Substances List (NDSL) | No |
| China | Inventory of Existing Chemical Substances in China (IECSC) | Yes |
| Europe | European Inventory of Existing Commercial Chemical Substances (EINECS) | Yes |
| Europe | European List of Notified Chemical Substances (ELINCS) | No |
| Japan | Inventory of Existing and New Chemical Substances (ENCS) | Yes |
| Korea | Existing Chemicals List (ECL) | Yes |
| New Zealand | New Zealand Inventory | Yes |
| Philippines | Philippine Inventory of Chemicals and Chemical Substances (PICCS) | Yes |
| United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory | Yes |

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

## 16.Other Information

| | |
|---|---|
| **Issue date** | 5/19/2020 |
| **Revision #** | 3 |
| **Revision Indicator** | Removal of CANUTEC emergency phone number. |
| **List of abbreviations** | ACGIH: American Conference of Governmental Industrial Hygienists CAS: Chemical Abstract Services<br>CERCLA: Comprehensive Environmental Response, Compensation and Liability Act of 1980<br>CFR: Code of Federal Regulations<br>DOT: Department of Transportation<br>DSL: Domestic Substance List<br>EINECS: European Inventory of Existing Commercial chemical Substances<br>EPA: Environmental Protection Agency<br>EPCRA: Emergency Planning and Community Right-to-Know Act<br>HSDB® - Hazardous Substances Data Bank<br>IARC: International Agency for Research on Cancer<br>IATA: International Air Transport Association<br>IBC: Intermediate Bulk Container<br>ICAO: International Civil Aviation Organization<br>IMDG: International Maritime Dangerous Goods<br>LC: Lethal Concentration<br>LD: Lethal Dose<br>NIOSH: National Institute of Occupational Safety and Health<br>NOEC: No observable effect concentration<br>NTP: National Toxicology Program<br>OECD: Organization for Economic Cooperation and Development<br>OSHA: Occupational Safety and Health Administration<br>PPE: Personal Protective Equipment<br>RCRA: Registry of Toxic Effects of Chemical Substances<br>RTECS: Registry of Toxic Effects of Chemical Substances<br>SARA: Superfund Amendments and Reauthorization Act<br>SDS: Safety Data Sheet<br>STEL: Short Term Exposure Limit<br>TLV: Threshold Limit Values<br>TWA: Time Weighted Average |
| **References** | ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices (2014) Canadian Centre for Occupational Health and Safety, CCInfoWeb Databases, 2014 (Chempendium, RTECs, HSDB, INCHEM)<br>Material Safety Data Sheet from manufacturer.<br>OECD - The Global Portal to Information on Chemical Substances - eChemPortal, 2014. |

**Disclaimer**

Information presented in this SDS is furnished in accordance with OSHA's Hazard Communication Standard (HCS) 2012.

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## ATTACHMENT 9

Sodium Thiosulfate 1.0M MSDS

# Sodium Thiosulfate, 1.0N (1.0M)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 07/10/2013 Revision date: 04/25/2018 Supersedes: 04/25/2018 Version: 1.1

## SECTION 1: Identification

### 1.1. Identification

Product form : Mixtures

Product name : Sodium Thiosulfate, 1.0N (1.0M)

Product code : LC25100

### 1.2. Recommended use and restrictions on use

Use of the substance/mixture : For laboratory and manufacturing use only.

Recommended use : Laboratory chemicals

Restrictions on use : Not for food, drug or household use

### 1.3. Supplier

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or +1-703-741-5970

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Not classified

### 2.2. GHS Label elements, including precautionary statements

Not classified as a hazardous chemical.

Other hazards not contributing to the classification : None.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Not applicable

### 3.2. Mixtures

| Name | Product identifier | % | GHS-US classification |
|---|---|---|---|
| Water | (CAS-No.) 7732-18-5 | 75.16 | Not classified |
| Sodium Thiosulfate, Pentahydrate | (CAS-No.) 10102-17-7 | 24.82 | Not classified |
| Sodium Carbonate, Anhydrous | (CAS-No.) 497-19-8 | 0.02 | Skin Irrit. 2, H315<br>Eye Irrit. 2A, H319 |

Full text of hazard classes and H-statements : see section 16

## SECTION 4: First-aid measures

### 4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persists.

First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

### 4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects : Not expected to present a significant hazard under anticipated conditions of normal use.

### 4.3. Immediate medical attention and special treatment, if necessary

None.

## SECTION 5: Fire-fighting measures

### 5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

### 5.2. Specific hazards arising from the chemical

Fire hazard : Not flammable.

Explosion hazard : Not available.

Reactivity : None.

### 5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures : None.

#### 6.1.1. For non-emergency personnel

Protective equipment : Safety glasses.

Emergency procedures : Evacuate unnecessary personnel.

#### 6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

### 6.3. Methods and material for containment and cleaning up

For containment : Dam up the liquid spill.

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

### 6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.

Hygiene measures : Wash contaminated clothing before reuse.

### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container closed when not in use.

Incompatible products : Strong oxidizers. Strong acids.

Incompatible materials : Direct sunlight.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

| **Sodium Thiosulfate, Pentahydrate (10102-17-7)** |
|---|
| Not applicable |

| **Water (7732-18-5)** |
|---|
| Not applicable |

| Sodium Carbonate, Anhydrous (497-19-8) |
|---|
| Not applicable |

### 8.2. Appropriate engineering controls

Appropriate engineering controls : Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure.

### 8.3. Individual protection measures/Personal protective equipment

**Personal protective equipment:**

Safety glasses.

**Hand protection:**

Wear protective gloves.

**Eye protection:**

Chemical goggles or safety glasses

**Respiratory protection:**

Respiratory protection not required in normal conditions

**Other information:**

Do not eat, drink or smoke during use.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| | | |
|---|---|---|
| Physical state | : | Liquid |
| Appearance | : | Clear, colorless liquid. |
| Color | : | Colorless |
| Odor | : | None. |
| Odor threshold | : | No data available |
| pH | : | No data available |
| Melting point | : | No data available |
| Freezing point | : | No data available |
| Boiling point | : | No data available |
| Flash point | : | No data available |
| Relative evaporation rate (butyl acetate=1) | : | No data available |
| Flammability (solid, gas) | : | Non flammable. |
| Vapor pressure | : | No data available |
| Relative vapor density at 20 °C | : | No data available |
| Relative density | : | No data available |
| Solubility | : | Miscible with water. |
| Log Pow | : | No data available |
| Auto-ignition temperature | : | No data available |
| Decomposition temperature | : | No data available |
| Viscosity, kinematic | : | No data available |
| Viscosity, dynamic | : | No data available |
| Explosion limits | : | No data available |
| Explosive properties | : | Not applicable. |

Oxidizing properties : None.

### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

None.

### 10.2. Chemical stability

Not established.

### 10.3. Possibility of hazardous reactions

Not established.

### 10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

### 10.5. Incompatible materials

Strong oxidizers. Strong acids.

### 10.6. Hazardous decomposition products

Sulfur compounds. Carbon dioxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Likely routes of exposure : Skin and eye contact

Acute toxicity : Not classified

| **Sodium Thiosulfate, Pentahydrate (10102-17-7)** | |
|---|---|
| LD50 oral rat | 5000 mg/kg |
| ATE US (oral) | 5000 mg/kg body weight |

| **Water (7732-18-5)** | |
|---|---|
| LD50 oral rat | ≥ 90000 mg/kg |
| ATE US (oral) | 90000 mg/kg body weight |

| **Sodium Carbonate, Anhydrous (497-19-8)** | |
|---|---|
| LD50 oral rat | 4090 mg/kg |
| ATE US (oral) | 4090 mg/kg body weight |

Skin corrosion/irritation : Not classified

Serious eye damage/irritation : Not classified

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Based on available data, the classification criteria are not met

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Based on available data, the classification criteria are not met

Specific target organ toxicity – single exposure : Not classified

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

## SECTION 12: Ecological information

### 12.1. Toxicity

| Sodium Thiosulfate, Pentahydrate (10102-17-7) | |
|---|---|
| LC50 fish 1 | ≥ 10000 |

| Sodium Carbonate, Anhydrous (497-19-8) | |
|---|---|
| LC50 fish 1 | 300 mg/l |
| EC50 Daphnia 1 | 265 mg/l |
| LC50 fish 2 | 740 mg/l |

### 12.2. Persistence and degradability

| Sodium Thiosulfate, 1.0N (1.0M) | |
|---|---|
| Persistence and degradability | Not established. |

| Sodium Thiosulfate, Pentahydrate (10102-17-7) | |
|---|---|
| Persistence and degradability | Not established. |

| Water (7732-18-5) | |
|---|---|
| Persistence and degradability | Not established. |

| Sodium Carbonate, Anhydrous (497-19-8) | |
|---|---|
| Persistence and degradability | Not established. |

### 12.3. Bioaccumulative potential

| Sodium Thiosulfate, 1.0N (1.0M) | |
|---|---|
| Bioaccumulative potential | Not established. |

| Sodium Thiosulfate, Pentahydrate (10102-17-7) | |
|---|---|
| Log Pow | -4.35 |
| Bioaccumulative potential | Not established. |

| Water (7732-18-5) | |
|---|---|
| Bioaccumulative potential | Not established. |

| Sodium Carbonate, Anhydrous (497-19-8) | |
|---|---|
| Bioaccumulative potential | Not established. |

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

Other information : Avoid release to the environment.

## SECTION 13: Disposal considerations

### 13.1. Disposal methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations.

Ecology - waste materials : Avoid release to the environment.

## SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

Not regulated

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

### 15.2. International regulations

**CANADA**

| **Sodium Thiosulfate, Pentahydrate (10102-17-7)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

| **Sodium Carbonate, Anhydrous (497-19-8)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

**EU-Regulations**

No additional information available

**National regulations**

| **Sodium Thiosulfate, Pentahydrate (10102-17-7)** |
|---|
| Not listed on the Canadian IDL (Ingredient Disclosure List) |

| **Sodium Carbonate, Anhydrous (497-19-8)** |
|---|
| Listed on the Canadian IDL (Ingredient Disclosure List) |

### 15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

## SECTION 16: Other information

Revision date : 04/25/2018

Other information : None.

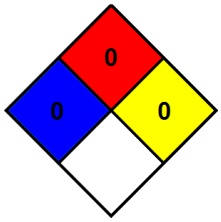
Full text of H-phrases: see section 16:

| | |
|---|---|
| H315 | Causes skin irritation |
| H319 | Causes serious eye irritation |

NFPA health hazard : 0 - Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.




Hazard Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : B

B - Safety glasses, Gloves

SDS US LabChem

*Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.*

## ATTACHMENT 10

Sulfuric Acid MSDS

WaterLink, Inc.
(402) 933-8228 - Tel
(402) 933-6833 - Fax
www.waterlinkinc.com
5222 North 16th Street
Omaha, NE 68110



# Safety Data Sheet

**Compliant with the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), International Mandate, UNCED Agenda 21, Chapter 19**

## SECTION 1: IDENTIFICATION

Product Name/ID No: SULFURIC ACID 35%
Synonyms/Common Names: Sulfuric Acid, Battery Acid, Hydrogen Sulfate, Dihydrogen Sulfate, Oil of Vitriol
CAS No.: 7664-93-9
Mf:
DOT Classification/Label: Corrosive 8
Appearance and Odor: Colorless to light yellow liquid. Odorless unless hot.

| | |
|---|---|
| Health | 2 |
| Flammability | 0 |
| Reactivity | 2 |
| Personal Protection | ** |

** See Section 8 of this SDS.
0=Minimal, 1=Slight, 2=Moderate, 3=Serious, 4=Severe

## SECTION 2: HAZARD(S)

**CLASSIFICATION:**
**DANGER CORROSIVE**

**Causes severe skin burns and eye damage**

Precautionary Statements:

The Primary Route/s/ of exposure: Eye Contact, Skin Contact, Ingestion and Inhalation

Potential Health Effects:

Eye Contact: This product causes severe eye burns with possible permanent eye damage. Possible blindness if first aid and medical attention is not given promptly. Brief contact of small amounts causes immediate stinging and pain.

Skin Contact: Burning of the skin will be experienced within seconds of exposure to the skin. Left untreated, severe skin damage including chemical burns (skin ulcerations) that are very slow to heal are possible.

Inhalation: Breathing of fumes causes severe irritation and burning to the respiratory tract. Prolonged inhalation can result in tissue damage.

Ingestion: Highly corrosive to the mouth and tissues of the digestive tract. Toxic and may be fatal if sufficient quantity is swallowed.

Chronic effects of exposure: Causes chemical burns that are very slow to heal, and could result in permanent scaring.

Avoid temperatures greater than 300ºC: yields sulfur trioxide gas, which is toxic, corrosive and an oxidizer.

First Aid:

**General:** Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

**Inhalation:** When symptoms occur: go into open air and ventilate suspected area. Obtain medical attention if breathing difficulty persists.

**Skin Contact:** Remove contaminated clothing. Immediately flush skin with plenty of water for at least 30 minutes. Get immediate medical advice/attention. Wash contaminated clothing before reuse.

**Eye Contact:** Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

**Ingestion:** Rinse mouth. Do NOT induce vomiting. Obtain medical attention.

## SECTION 3: COMPOSITION/INFORMATION

| Chemical Name | CAS# | TVL (ACGIH) | PEL (OSHA) | % COMP |
|---|---|---|---|---|
| Sulfuric Acid | 7664-93-9 | 0.2 mg/$m^3$ | 1.0 mg/ $m^3$ | 35% |

(Contains no other hazardous ingredients in a concentration of 0.01 % or more.)

## SECTION 4: FIRST-AID MEASURES

**Eye Contact:** Wash eyes immediately with water for 30 minutes while holding the eyelids open. GET IMMEDIATE MEDICAL ATTENTION. When transporting to medical facility continue flushing if possible.

**Skin Contact:** Remove contaminated clothing to expose affected area and wash with soap and water. Rinse and continue flushing affected area for fifteen minutes. Transport to medical facility. Wash contaminated clothing prior to re-use. Discard any items that cannot be decontaminated.

**Inhalation:** Remove person to fresh air and give artificial respiration if not breathing. If breathing difficulty continues, give oxygen if available. GET MEDICAL ATTENTION.

**Ingestion:** Give two cups of water or milk to dilute, DO NOT INDUCE VOMITING and transport immediately to medical facility. Never give anything by mouth to an unconscious or convulsing person.

**Notes:** Skin contact is characterized by bleaching/whitening of the affected areas.

## SECTION 5: FIRE-FIGHTING MEASURES

**Flash Point:** None

**Flammability Limits (In air):** None

**Extinguishing Media:** Water spray or fog may be used to knock down corrosive vapor cloud. Water may be applied to the sides of the containers exposed to flames provided the water does not come in contact with the tank contents.

**Auto ignition Temperature:** Does not ignite.

**Hazardous Decomposition Products:** Avoid tempratures greater than 300ºC: yields sulfur trioxide gas, which is toxic, corrosive and an oxidizer.

**Special Fire-fighting Procedures:** Use positive-pressure self-contained breathing apparatus and fire-fighting clothing. Use recommended protective clothing for post-fire conditions.

**Unusual Fire and Explosion Hazards:** None are known.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

**Steps to be taken in case of spill or release:** Evacuate area except for trained personnel who are properly protected with safety clothing and equipment as detailed in this SDS. Unprotected personnel should not attempt clean-up.

First priority is to contain spill or release and prevent from entering onto the soil or into waterways, lakes or groundwater.

For small spills dilute with water and collect for disposal. For larger spills attempt to collect product in suitable containers for proper disposal..

**NOTICE FOR REPORTABLE SPILL/RELEASE QUANTITY (RQ):** The CERCLA RQ is 1000 lbs for Sulfuric Acid.

## SECTION 7: HANDLING AND STORAGE

**Storage:** Keep containers tightly closed and away from incompatible materials:

Nitro compounds, carbides, dienes, alcohols (when heated): causes explopsions. Oxidizing agents, such as chlorates and permanganates: causes fires and possible explosions. Allyl compounds and aldehydes: undergoes polymerization, possibly violent. Alkalies, amines, water, hydrated salts, carboxylic acid anhydrides, nitriles, olefinic organics, glycols, aqueous acids: causes strong exothermic reactions. carbonates, cyanides, sulfides, sulfites, metals such as copper: yields toxic gases. Store in cool, dry place.

**Shelf Life:** Recommend using this product within 12 months from date of purchase.

**Handling:** Do not get in eyes, on skin or clothing. Do not take internally. Avoid breathing of mists or heated vapors from this product. Use with adequate ventilation. Wash thoroughly after handling. Handle only with proper protective clothing and equipment as noted in this SDS. Do not use this product without an emergency eyewash station readily available**.**

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational exposure controls: (consult local authorities for acceptable exposure limits)
Chemical name Regulatory List Value and type
Hydrochloric Acid

USA OSHA PEL 7 mg/m3 Ceiling
USA ACGIH 7 mg/m3 TLV Ceiling
USA NIOSH 7 mg/m3 Ceiling
OSHA IDLH 50 ppm

TWA: Time Weighted Average over 8 hours of work.
TLV: Threshold Limit Value over 8 hours of work.
REL: Recommended Exposure Limit
STEL: Short Term Exposure Limit during x minutes.
IDLH: Immediately Dangerous to Life or Health

Eye/Facial Protection: Wear chemical goggles and full face shield when handling. Use only where an emergency eyewash station is immediately available. Safety glasses ARE NOT considered adequate protection to prevent entry into the eyes.

Skin Protection: Wear full-body protective moisture/chemical resistant clothing when handling and dispensing this product. Neoprene or rubber suits are recommended when transferring this product.

Wear rubber or neoprene boots to prevent contact with feet. See Section 4 for appropriate First Aid Measures. Respiratory Protection: Wear air-purifying respiratory with approved filter canisters if exposed to vapors or mists.

Additional Protective Information: Use proper engineering controls to provide adequate ventilation.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

State: Liquid
Solubility (in water): Complete
Specific Gravity: 1.25 basis 98% $H_2SO_4$ @ 40º C
Boiling Point: 109º C
pH: 0.3 (1% Solution)
Vapor Pressure: 0.52 @ 30%
Freezing Point: N/A
Flash Point: None
Vapor Density: 3.4 (air=1)

**SECTION 11: TOXICOLOGICAL INFORMATION**

**Routes of Entry**: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals**:

**WARNING**: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2140 mg/kg [Rat.]. Acute toxicity of the vapor (LC50): 320 mg/m3 2 hours [Mouse].

**Chronic Effects on Humans**:

**CARCINOGENIC EFFECTS**: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. May cause damage to the following organs: kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes and teeth.

**Other Toxic Effects on Humans**:

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion.

**Special Remarks on Toxicity to Animals**: Not available.

**Special Remarks on Chronic Effects on Humans**:

**Mutagenicity**: Cytogenetic Analysis: Hamster, ovary = 4mmol/L Reproductive effects: May cause adverse reproductive effects based on animal data. Developmental abnormalities (musculoskeletal) in rabbits at a dose of 20 mg/m3 for 7 hrs.(RTECS)

**Teratogenecity**: neither embryotoxic, fetoxic, nor teratogenetic in mice or rabbits at inhaled doses producing some maternal toxicity

**Special Remarks on other Toxic Effects on Humans**:

**Acute Potential Health Effects**:

Skin: Causes severe skin irritation and burns. Continued contact can cause tissue necrosis.
Eye: Causes severe eye irritation and burns. May cause irreversible eye injury. Ingestion: Harmful if swallowed. May cause permanent damage to the digestive tract. Causes gastrointestial tract burns. May cause perforation of the stomach, GI bleeding, edema of the glottis, necrosis and scarring, and sudden circulatory collapse(similar to acute inhalation). It may also cause systemic toxicity with acidosis. Inhalation: May cause severe irritation of the respiratory tract and mucous membranes with sore throat, coughing, shortness of breath, and delayed lung edema. Causes chemical burns to the repiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Cause corrosive action on mucous membranes. May affect cardiovascular system (hypotension, depressed cardiac output, bradycardia). Circulatory collapse with clammy skin, weak and rapid pulse, shallow respiration, and scanty urine may follow. Circulatory shock is often the immediate cause of death. May also affect teeth (changes in teeth and supporting structures - erosion, discoloration).

**Chronic Potential Health Effects**:

**Inhalation**: Prolonged or repeated inhalation may affect behavior (muscle contraction or spasticity), urinary system (kidney damage), and cardiovascular system, heart (ischemic heart leisons), and respiratory system/lungs (pulmonary edema, lung damage), teeth (dental discoloration, erosion).
Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic skin reaction.

**SECTION 12: ECOLOGICAL INFORMATION**

Ecotoxicity in water ($LC_{50}$): 49 mg/l 48 hours [bluegill/sunfish].

BOD5 and COD: Not available.

Products of Biodegradation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

**SECTION 13: DISPOSAL CONSIDERATIONS**

RCRA: Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Waste Residues: Carefully dilute with water and neutralize. Neutralized material may be flushed to sewer (REGULATIONS PERMITTING!) or disposed of through a licensed contractor. Users should review their operations in terms of the applicable federal/nation or local regulations and consult with appropriate regulatory agencies before discharging or disposing of waste material.

Product containers: Containers, if thoroughly cleaned, preferably by rinsing three times and handling the rinse water as waste residues, may be disposed of or recycled as non-hazardous waste. Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies before discharging or disposing of waste material.

Regulatory Considerations: All disposal practices must be performed in compliance with all Federal, State and Local regulations. Compliance with these laws is the strict responsibility of the waste generator. NOTICE IS HEREBY GIVEN, that WATERLINK, INC. has no control over the practices used or the parties responsible for any disposal of product.

Note also that regulations vary in different states and locations.

Unused or Uncontaminated Product: Recycle if possible. Send collected material only to properly licensed and permitted recyclers. NOTE: Treat empty drums and containers as they were full. Empty containers require proper management as well. DO NOT DUMP!

**SECTION 14: TRANSPORT INFORMATION**

Proper Shipping Name: Sulfuric Acid, 8, UN1830, PGII
Hazard Class: Corrosive, 8
ID Number: UN 1830
Packaging Group: II
Complete Shipping Description: Sulfuric Acid, 8, UN1830, PGII

**SECTION 15: REGULATORY INFORMATION**

**TSCA**
CAS# 7664-93-9 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**SARA**

**Section 302 (RQ)**
CAS# 7664-93-9: final RQ = 1000 pounds (454 kg)

**Section 302 (TPQ)**
CAS# 7664-93-9: TPQ = 1000 pounds; RQ = 1000 pounds

**SARA Codes**
CAS # 7664-93-9: acute, chronic, reactive.

**Section 313**
This material contains Sulfuric acid (CAS# 7664-93-9, 95 98 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7664-93-9 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 7664-93-9 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts. California No Significant Risk Level: None of the chemicals in this product are listed.

## SECTION 16: OTHER INFORMATION

The information contained herein is provided in good faith and the data is from sources believed to be reliable, however no warranty is being made, expressed or implied. It is the users' specific responsibility to determine the hazards associated with the use of this product, the conditions of use or the environment in which the product is used. The user is responsible for compliance with all local, state and federal laws that may be involved in the use of this product. Since the conditions under which this product may be used are beyond the control of WATERLINK, INC., the user therefore assumes all responsibility for the use of this product including product waste, if any, that may be produced from any process of application. WATERLINK, INC., makes no warranty regarding the data presented herein, the fitness or suitability of this product for any particular use of purpose, nor is any guarantee made or liability assumed for damage or injury of any kind.

Last updated by WaterLink Regulatory Affairs: 2/7/20

## ATTACHMENT 11

Trizma MSDS

# SAFETY DATA SHEET

Version 6.4
Revision Date 01/15/2020
Print Date 05/30/2020

## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1 Product identifiers

Product name : Trizma® base solution

Product Number : T1699
Brand : Sigma

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

## SECTION 2: Hazards identification

### 2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

### 2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## SECTION 3: Composition/information on ingredients

### 3.2 Mixtures

Synonyms : 2-Amino-2-(hydroxymethyl)-1,3-propanediol
THAM
Trometamol
Tris base
Trizma® base
Tris(hydroxymethyl)aminomethane
tris base solution



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No components need to be disclosed according to the applicable regulations.

## SECTION 4: First aid measures

### 4.1 Description of first aid measures

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

**In case of skin contact**
Wash off with soap and plenty of water.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water.

### 4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed
No data available

## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

### 5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information
No data available

## SECTION 6: Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures
Avoid breathing vapours, mist or gas.
For personal protection see section 8.

### 6.2 Environmental precautions
No special environmental precautions required.

### 6.3 Methods and materials for containment and cleaning up
Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections
For disposal see section 13.



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## SECTION 7: Handling and storage

### 7.1 Precautions for safe handling
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): 12: Non Combustible Liquids

### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

**Components with workplace control parameters**
Contains no substances with occupational exposure limit values.

### 8.2 Exposure controls

**Appropriate engineering controls**
General industrial hygiene practice.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Body Protection**
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection not required. For nuisance exposures use type OV/AG (US) or type ABEK (EU EN 14387) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
No special environmental precautions required.

## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

a) Appearance Form: liquid



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| | | |
|---|---|---|
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: 167 - 172 °C (333 - 342 °F) - lit. |
| f) | Initial boiling point and boiling range | 219 - 220 °C 426 - 428 °F at 13 hPa - lit. |
| g) | Flash point | ()No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | No data available |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## SECTION 10: Stability and reactivity

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents



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### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx)
Other decomposition products - No data available
In the event of fire: see section 5

## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

**Acute toxicity**
Inhalation: No data available

Dermal: No data available

No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.



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## SECTION 12: Ecological information

**12.1 Toxicity**
No data available

**12.2 Persistence and degradability**
No data available

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available

**12.5 Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**
No data available

## SECTION 13: Disposal considerations

**13.1 Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

## SECTION 14: Transport information

**DOT (US)**
Not dangerous goods

**IMDG**
Not dangerous goods

**IATA**
Not dangerous goods

## SECTION 15: Regulatory information

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.



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**SARA 311/312 Hazards**
No SARA Hazards

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Sodium azide | 26628-22-8 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Water | 7732-18-5 | |
| Tris (hydroxymethyl) aminomethane | 77-86-1 | |
| Sodium azide | 26628-22-8 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Water | 7732-18-5 | |
| Tris (hydroxymethyl) aminomethane | 77-86-1 | |

**California Prop. 65 Components**
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## SECTION 16: Other information

**Further information**
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.4 Revision Date: 01/15/2020 Print Date: 05/30/2020



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## ATTACHMENT 12

Zinc Acetate MSDS

# Zinc Acetate, Dihydrate

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 12/30/2013 Revision date: 01/11/2017 Supersedes: 01/11/2017 Version: 1.1

## SECTION 1: Identification

### 1.1. Identification

| | | |
|---|---|---|
| Product form | : | Substance |
| Substance name | : | Zinc Acetate, Dihydrate |
| CAS No | : | 5970-45-6 |
| Product code | : | LC27070 |
| Formula | : | C4H6O4Zn.2H2O |
| Synonyms | : | acetic acid, zinc salt, dihydrate / zinc diacetate, dihydrate |

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

| | | |
|---|---|---|
| Use of the substance/mixture | : | Reagent |
| Restrictions on use | : | Not for food, drug or household use |

### 1.3. Details of the supplier of the safety data sheet

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Hazardous to the aquatic environment - Acute Hazard Category 1 H400

Full text of H statements : see section 16

### 2.2. Label elements

**GHS-US labeling**

Hazard pictograms (GHS-US) :

GHS09

| | | |
|---|---|---|
| Signal word (GHS-US) | : | Warning |
| Hazard statements (GHS-US) | : | H400 - Very toxic to aquatic life |
| Precautionary statements (GHS-US) | : | P273 - Avoid release to the environment<br>P391 - Collect spillage<br>P501 - Dispose of contents/container to comply with local, state and federal regulations |

### 2.3. Other hazards

Other hazards not contributing to the classification : None under normal conditions.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Substance type : Mono-constituent

| Name | Product identifier | % | GHS-US classification |
|---|---|---|---|
| Zinc Acetate, Dihydrate<br>(Main constituent) | (CAS No) 5970-45-6 | 100 | Aquatic Acute 1, H400 |

Full text of hazard classes and H-statements : see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with labored breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.

First-aid measures after inhalation : Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.

First-aid measures after skin contact : Rinse with water. Soap may be used. Remove clothing before washing. Take victim to a doctor if irritation persists.

First-aid measures after eye contact : Rinse immediately with plenty of water. Do not apply neutralizing agents. Take victim to an ophthalmologist if irritation persists.

First-aid measures after ingestion : Rinse mouth with water. Immediately after ingestion: give lots of water to drink. Call Poison Information Centre (www.big.be/antigif.htm). Consult a doctor/medical service if you feel unwell. Ingestion of large quantities: immediately to hospital.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : AFTER INHALATION OF DUST: Coughing. Slight irritation.

Symptoms/injuries after skin contact : Slight irritation.

Symptoms/injuries after eye contact : Irritation of the eye tissue.

Symptoms/injuries after ingestion : Vomiting. Nausea.

### 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Adapt extinguishing media to the environment.

Unsuitable extinguishing media : No unsuitable extinguishing media known.

### 5.2. Special hazards arising from the substance or mixture

Fire hazard : DIRECT FIRE HAZARD. Non combustible.

Explosion hazard : DIRECT EXPLOSION HAZARD. No data available on direct explosion hazard. INDIRECT EXPLOSION HAZARD. No data available on indirect explosion hazard.

Reactivity : Upon combustion CO and CO2 are formed and formation of metallic fumes (zinc oxide).

### 5.3. Advice for firefighters

Precautionary measures fire : Exposure to fire/heat: keep upwind. Exposure to fire/heat: have neighbourhood close doors and windows.

Firefighting instructions : Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.

Protection during firefighting : Heat/fire exposure: compressed air/oxygen apparatus.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

Protective equipment : Gloves. Safety glasses. Protective clothing. Dust cloud production: compressed air/oxygen apparatus. See "Material-Handling" to select protective clothing.

Emergency procedures : Mark the danger area. Prevent dust cloud formation, e.g. by wetting.

Measures in case of dust release : In case of dust production: keep upwind. Dust production: have neighbourhood close doors and windows.

#### 6.1.2. For emergency responders

Protective equipment : Do not breathe dust. Equip cleanup crew with proper protection.

Emergency procedures : Stop release. Ventilate area.

### 6.2. Environmental precautions

Prevent soil and water pollution. Prevent spreading in sewers.

### 6.3. Methods and material for containment and cleaning up

For containment : Contain released substance, pump into suitable containers. Consult "Material-handling" to select material of containers. Plug the leak, cut off the supply. Dam up the solid spill. Knock down/dilute dust cloud with water spray.

Methods for cleaning up : Stop dust cloud by covering with sand/earth. Scoop solid spill into closing containers. See "Material-handling" for suitable container materials. Carefully collect the spill/leftovers. Clean contaminated surfaces with an excess of water. Wash clothing and equipment after handling.

### 6.4. Reference to other sections

No additional information available

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Comply with the legal requirements. Clean contaminated clothing. Do not discharge the waste into the drain. Avoid raising dust. Observe normal hygiene standards. Keep container tightly closed. Carry operations in the open/under local exhaust/ventilation or with respiratory protection.

### 7.2. Conditions for safe storage, including any incompatibilities

Incompatible products : Strong bases. Strong oxidizers.

Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: oxidizing agents. (strong) bases.

Storage area : Store at ambient temperature. Store in a dry area. Keep container in a well-ventilated place. Meet the legal requirements.

Special rules on packaging : SPECIAL REQUIREMENTS: closing. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.

Packaging materials : SUITABLE MATERIAL: wood. glass. cardboard. plastics.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

No additional information available

### 8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Personal protective equipment : Gloves. Safety glasses.

Materials for protective clothing : GIVE GOOD RESISTANCE: rubber. synthetic material.

Hand protection : Gloves.

Eye protection : Safety glasses. In case of dust production: protective goggles.

Skin and body protection : Protective clothing.

Respiratory protection : Dust formation: dust mask. On heating: gas mask.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state : Solid

Appearance : Crystalline solid. Powder.

Color : White

Odor : Mild odour Vinegar odour

Odor threshold : No data available

pH : 6 - 7 (5 %)

pH solution : 5 %

| | | |
|---|---|---|
| Melting point | : | 237 °C |
| Freezing point | : | No data available |
| Boiling point | : | Not applicable |
| Flash point | : | Not applicable |
| Relative evaporation rate (butyl acetate=1) | : | No data available |
| Flammability (solid, gas) | : | No data available |
| Vapor pressure | : | No data available |
| Relative vapor density at 20 °C | : | No data available |
| Relative density | : | 1.7 |
| Specific gravity / density | : | 1735 kg/m³ |
| Molecular mass | : | 219.51 g/mol |
| Solubility | : | Soluble in water.<br>Water: 31 g/100ml<br>Ethanol: 3 g/100ml<br>Ether: 0.1 g/100ml |
| Log Pow | : | No data available |
| Auto-ignition temperature | : | No data available |
| Decomposition temperature | : | No data available |
| Viscosity, kinematic | : | No data available |
| Viscosity, dynamic | : | No data available |
| Explosion limits | : | No data available |
| Explosive properties | : | No data available |
| Oxidizing properties | : | No data available |

### 9.2. Other information

| | | |
|---|---|---|
| VOC content | : | 0 % |
| Other properties | : | Substance has acid reaction. |

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Upon combustion CO and CO2 are formed and formation of metallic fumes (zinc oxide).

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

Not established.

### 10.4. Conditions to avoid

No additional information available

### 10.5. Incompatible materials

Strong bases. Strong oxidizers.

### 10.6. Hazardous decomposition products

Carbon dioxide. Carbon monoxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

| | | |
|---|---|---|
| Likely routes of exposure | : | Skin and eye contact; Inhalation |
| Acute toxicity | : | Not classified |

| Zinc Acetate, Dihydrate (5970-45-6) | |
|---|---|
| LD50 oral rat | 2460 mg/kg (Rat) |
| ATE US (oral) | 2460.000 mg/kg body weight |

| | | |
|---|---|---|
| Skin corrosion/irritation | : | Not classified<br>pH: 6 - 7 (5 %) |

| | | |
|---|---|---|
| Serious eye damage/irritation | : | Not classified<br>pH: 6 - 7 (5 %) |
| Respiratory or skin sensitization | : | Not classified |
| Germ cell mutagenicity | : | Not classified |
| Carcinogenicity | : | Not classified |
| Reproductive toxicity | : | Not classified |
| Specific target organ toxicity – single exposure | : | Not classified |
| Specific target organ toxicity – repeated exposure | : | Not classified |
| Aspiration hazard | : | Not classified |
| Symptoms/injuries after inhalation | : | AFTER INHALATION OF DUST: Coughing. Slight irritation. |
| Symptoms/injuries after skin contact | : | Slight irritation. |
| Symptoms/injuries after eye contact | : | Irritation of the eye tissue. |
| Symptoms/injuries after ingestion | : | Vomiting. Nausea. |

## SECTION 12: Ecological information

### 12.1. Toxicity

| | | |
|---|---|---|
| Ecology - general | : | Dangerous for the environment. |
| Ecology - air | : | Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009). |
| Ecology - water | : | Mild water pollutant (surface water). For Flanders: maximum concentration in drinking water: 5.000 mg/l (zinc)(M.B. 28/1/2003). Highly toxic to fishes. Very toxic to invertebrates (Daphnia). Highly toxic to algae. May cause eutrophication at very low concentration. Inhibition of activated sludge. |

| Zinc Acetate, Dihydrate (5970-45-6) | |
|---|---|
| EC50 Daphnia 1 | 0.068 mg/l (EC50; 48 h) |
| LC50 fish 2 | 0.88 ppm (TLm; 96 h) |
| Threshold limit algae 1 | < 0.12 mg/l (EC50) |

### 12.2. Persistence and degradability

No additional information available

### 12.3. Bioaccumulative potential

No additional information available

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

No additional information available

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

| | | |
|---|---|---|
| Waste disposal recommendations | : | Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle/reuse. Precipitate/make insoluble. Remove to an authorized dump (Class I). |
| Additional information | : | Hazardous waste according to Directive 2008/98/EC. |

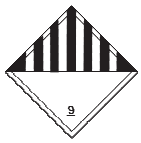
## SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

| | | |
|---|---|---|
| Transport document description | : | UN3077 Environmentally hazardous substances, solid, n.o.s., 9, III |
| UN-No.(DOT) | : | UN3077 |

| | | |
|---|---|---|
| Proper Shipping Name (DOT) | : | Environmentally hazardous substances, solid, n.o.s. |
| Transport hazard class(es) (DOT) | : | 9 - Class 9 - Miscellaneous hazardous material 49 CFR 173.140 |
| Packing group (DOT) | : | III - Minor Danger |
| Hazard labels (DOT) | : | 9 - Class 9 (Miscellaneous dangerous materials) |




| | | |
|---|---|---|
| Dangerous for the environment | : | Yes |
| Marine pollutant | : | Yes |

| | | |
|---|---|---|
| DOT Packaging Non Bulk (49 CFR 173.xxx) | : | 213 |
| DOT Packaging Bulk (49 CFR 173.xxx) | : | 240 |
| DOT Symbols | : | G - Identifies PSN requiring a technical name |
| DOT Special Provisions (49 CFR 172.102) | : | 8 - A hazardous substance that is not a hazardous waste may be shipped under the shipping description “Other regulated substances, liquid or solid, n.o.s.”, as appropriate. In addition, for solid materials, special provision B54 applies.<br>146 - This description may be used for a material that poses a hazard to the environment but does not meet the definition for a hazardous waste or a hazardous substance, as defined in 171.8 of this subchapter, or any hazard class as defined in Part 173 of this subchapter, if it is designated as environmentally hazardous by the Competent Authority of the country of origin, transit or destination.<br>335 - Mixtures of solids that are not subject to this subchapter and environmentally hazardous liquids or solids may be classified as “Environmentally hazardous substances, solid, n.o.s,” UN3077 and may be transported under this entry, provided there is no free liquid visible at the time the material is loaded or at the time the packaging or transport unit is closed. Each transport unit must be leak-proof when used as bulk packaging.<br>A112 - Notwithstanding the quantity limits shown in Column (9A) and (9B) for this entry, the following IBCs are authorized for transportation aboard passenger and cargo-only aircraft. Each IBC may not exceed a maximum net quantity of 1,000 kg:<br>a. Metal: 11A, 11B, 11N, 21A, 21B and 21N<br>b. Rigid plastics: 11H1, 11H2, 21H1 and 21H2<br>c. Composite with plastic inner receptacle: 11HZ1, 11HZ2, 21HZ1 and 21HZ2<br>d. Fiberboard: 11G<br>e. Wooden: 11C, 11D and 11F (with inner liners)<br>f. Flexible: 13H2, 13H3, 13H4, 13H5, 13L2, 13L3, 13L4, 13M1 and 13M2 (flexible IBCs must be sift-proof and water resistant or must be fitted with a sift-proof and water resistant liner).<br>B54 - Open-top, sift-proof rail cars are also authorized.<br>IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).<br>IP3 - Flexible IBCs must be sift-proof and water-resistant or must be fitted with a sift-proof and water-resistant liner.<br>N20 - A 5M1 multi-wall paper bag is authorized if transported in a closed transport vehicle.<br>T1 - 1.5 178.274(d)(2) Normal..... 178.275(d)(2)<br>TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter. |
| DOT Packaging Exceptions (49 CFR 173.xxx) | : | 155 |
| DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) | : | No limit |

| | | |
|---|---|---|
| DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) | : | No limit |
| DOT Vessel Stowage Location | : | A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel. |
| Other information | : | No supplementary information available. |

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

| **Zinc Acetate, Dihydrate (5970-45-6)** |
|---|
| Not listed on the United States TSCA (Toxic Substances Control Act) inventory |

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory except for:

| | | |
|---|---|---|
| Zinc Acetate, Dihydrate | CAS No 5970-45-6 | 100% |

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

### 15.2. International regulations

#### CANADA

| **Zinc Acetate, Dihydrate (5970-45-6)** | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List)<br>Not listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

#### EU-Regulations

No additional information available

#### National regulations

No additional information available

### 15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

## SECTION 16: Other information

Revision date : 01/11/2017

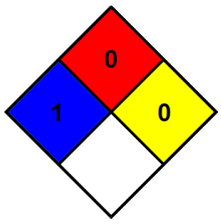
Full text of H-phrases: see section 16:

| | |
|---|---|
| H400 | Very toxic to aquatic life |

NFPA health hazard : 1 - Materials that, under emergency conditions, can cause significant irritation.

NFPA fire hazard : 0 - Materials that will not burn under typical dire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.




HMIS III Rating

Health : 1 Slight Hazard - Irritation or minor reversible injury possible

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : B

B - Safety glasses, Gloves

SDS US LabChem

*Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.*

## ATTACHMENTS

1. Air SDS
2. Carbon Dioxide SDS
3. Carbon Monoxide in Air SDS
4. Conductivity Solution MSDS
5. Helium SDS
6. Hydrogen SDS
7. Hydrogen Sulfide Mix with Pentane SDS
8. Hydrogen Sulfide in Nitrogen SDS
9. Hydrogen Sulfide Mix with Methane SDS
10. Isobutylene Air SDS
11. Methane in Air SDS
12. Nitrogen SDS
13. Pentane in Air SDS
14. SDS Buffer Solution pH 4.00
15. SDS Buffer Solution pH 7.00
16. SDS Buffer Solution pH 10.00
17. SDS Dissolved-Oxygen-Solution
18. SDS Helium Compressed Gas
19. SDS peracetic-acid 35 with-h2so4
20. SDS Zorbell's Solution and ORP Standard 200mV

## ATTACHMENT 1

Air SDS

# Safety Data Sheet
Air

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Air

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| CAS # |
| --- |
| Not assigned. |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| Chemical Substance | Chemical Family | Trade Names |
|---|---|---|
| AIR, COMPRESSED | | AIR; UN 1002 |

## Section 4: First Aid Measures

| Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|
| Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Get medical attention. | |

## Section 5: Fire Fighting Measures

| Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|
| Use extinguishing agents appropriate for surrounding fire. | | ▪ No respirator is required under normal conditions of use. |

## Section 6: Accidental Release Measures

| Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|
| | | Stop leak if possible without personal risk. |

| Methods for Cleanup | Other Information |
|---|---|

## Section 7: Handling and Storage

| Handling | Storage |
|---|---|
| Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | |

## Section 8: Exposure Controls/Personal Protection

| Exposure Guidelines |
|---|
| AIR, COMPRESSED: No occupational exposure limits established. |

### Engineering Controls

No specific controls are needed.

| Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|
| Eye protection not required under normal conditions. | Protective clothing is not required under normal conditions. | No respirator is required under normal conditions of use. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|
| Gas | | Colorless | | | Not available | |


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| Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|

| Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|
| -317 F (-194 C) | Not available | 760 mmHg @ -194 C | 1 | Not applicable | Slightly soluble | Not applicable | Not available | Not applicable | 0.01853 cP @ 26.85 C |

| Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|
| | | 1.29 g/L @ 0 C | | | Not applicable | Slightly Soluble |

## Section 10: Stability and Reactivity

| Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|
| Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | None known |

| Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|
| No hazard expected. | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|
| Not available | Not available | |

| Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|
| No information is available | No information is available | No significant target effects reported. |

### Chronic Effects

| Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|
| Not available | Not available | No data | No data |

## Section 12: Ecological Information

### Fate and Transport

| Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|
| Fish toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

Dispose in accordance with all applicable regulations.

## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

| Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|
| Air, compressed | UN1002 | 2.2 | Not available | 2.2 | Not available | Not available | Not available |


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### Canadian Transportation of Dangerous Goods

| Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|
| Air, compressed | UN1002 | 2.2 | Not available |

## Section 15: Regulatory Information

### U.S. Regulations

| CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|
| Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|
| No | No | No | No | Yes |

### SARA 372.65

Not regulated.

### OSHA Process Safety

Not regulated.

### State Regulations

| CA Proposition 65 |
|---|
| Not regulated. |

### Canadian Regulations

| WHMIS Classification |
|---|
| A |

### National Inventory Status

| US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|
| Not listed on inventory. | Not listed. | Not determined. |

## Section 16: Other Information

| NFPA Rating |
|---|
| HEALTH=0 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 2

Carbon Dioxide SDS

# Safety Data Sheet
Carbon Dioxide

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Carbon Dioxide

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| CAS # |
|---|
| 124-38-9 |


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| Chemical Substance | Chemical Family | Trade Names |
|---|---|---|
| CARBON DIOXIDE, GAS | Inorganic gases | CARBONIC ACID GAS; CARBONIC ANHYDRIDE; CARBON DIOXIDE; CARBON OXIDE; UN 1013; CO2 |

## Section 4: First Aid Measures

| Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|
| If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention. | Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | Do not induce vomiting. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |

## Section 5: Fire Fighting Measures

| Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|
| Non-flammable | Non-flammable | ▪ Any appropriate escape-type, self-contained breathing apparatus.<br>▪ Non-flammable |

## Section 6: Accidental Release Measures

| Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|
| Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Do not touch spilled material. | Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers. | Stop leak if possible without personal risk. |

| Methods for Cleanup | Other Information |
|---|---|
| Stop leak, evacuate, remove source of ignition. | None |

## Section 7: Handling and Storage

| Handling | Storage |
|---|---|
| Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances. | Store and handle in accordance with all current regulations and standards |

## Section 8: Exposure Controls/Personal Protection

| Exposure Guidelines |
|---|
| CARBON DIOXIDE, GAS: CARBON DIOXIDE: 5000 ppm (9000 mg/m3) OSHA TWA 10000 ppm (18000 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 30000 ppm (54000 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 5000 ppm ACGIH TWA 30000 ppm ACGIH STEL 5000 ppm (9000 mg/m3) NIOSH recommended TWA 10 hour(s) 30000 ppm (54000 mg/m3) NIOSH recommended STEL |

### Engineering Controls

Handle only in fully enclosed systems.

| Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|
| For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. | For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing. | Any appropriate escape-type, self-contained breathing apparatus. |


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### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|
| Gas | Colorless | Colorless | N/A | Gas | Odorless | Acid taste |

| Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|
| Not flammable | Not available | N/A | Nonflammable | Nonflammable | Nonflammable |

| Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|
| Not available | -71 F (-57 C) @ 4000 mmHg | 43700 mmHg @ 21 C | 1.5 (Air=1) | 1.522 @ 21 C | Soluble | 3.7 (saturated aqueous solution) @ 101.3 kPa (carbonic acid) | Not available | Not applicable | 0.01657 cP @ 0 C |

| Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|
| 44.01 | C-O2 | 0.114 | Not available | Not applicable | Not applicable | Soluble: Alcohol, acetone, hydrocarbons, organic solvents |

## Section 10: Stability and Reactivity

| Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|
| Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Combustible materials, oxidizing materials, metal salts, reducing agents, metal carbide, metals, bases |

| Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|
| Carbon monoxide | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|
| Not established | Not established | Ringing in the ears, nausea, irregular heartbeat, headache, drowsiness, dizziness, tingling sensation, visual disturbances, suffocation, convulsions, coma |

| Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|
| Irritation, frostbite, blurred vision | Liquid: blisters, frostbite | Difficulty breathing |

### Chronic Effects

| Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|
| Not available | Not established | Available. | No data |

## Section 12: Ecological Information

### Fate and Transport

| Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|


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| | | | |
|---|---|---|---|
| Fish toxicity: 150000 ug/L 48 day(s) (Mortality) Brown trout (Salmo trutta)<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Relatively non-persistent in the environment. Moderately volatile from water. | Accumulates very little in the bodies of living organisms. | Leaches through the soil |

## Section 13: Disposal Considerations

Dispose in accordance with all applicable regulations.

## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

| Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|
| Carbon dioxide | UN1013 | 2.2 | Not applicable | 2.2 | 75 kg or L | 150kg | None |

### Canadian Transportation of Dangerous Goods

| Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|
| Carbon dioxide | UN1013 | 2.2 | Not applicable |

## Section 15: Regulatory Information

### U.S. Regulations

| CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|
| Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|
| Yes | No | No | No | Yes |

### SARA 372.65

Not regulated.

### OSHA Process Safety

Not regulated.

### State Regulations

| CA Proposition 65 |
|---|
| Not regulated. |

### Canadian Regulations

| WHMIS Classification |
|---|
| A |

### National Inventory Status

| US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|
| Listed on inventory. | Not listed. | Listed on inventory. |


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## Section 16: Other Information

**FPA Rating**

HEALTH=3 FIRE=0 REACTIVITY=0 SPECIAL=SA

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 3

Carbon Monoxide in Air SDS

# Safety Data Sheet
Carbon Monoxide in Air

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Carbon Monoxide in Air
**Synonyms:** CO/AIR
**Recommended Use:** Calibration gas
**Usage Restrictions:**

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| | CAS # | Concentration |
|---|---|---|
| Carbon Monoxide | 630-08-0 | 1 ppm - 5000 ppm |


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| | | |
|---|---|---|
| **Air** | Not applicable | Balance |

| | Chemical Substance | Chemical Family | Trade Names |
|---|---|---|---|
| **Carbon Monoxide** | CARBON MONOXIDE | Inorganic gases | CARBON OXIDE; CARBON OXIDE (CO); UN 1016; CO |
| **Air** | AIR, COMPRESSED | Inorganic gases | AIR; UN 1002 Nitrogen CAS: 7727-37-9 Oxygen CAS: 7782-44-7 |

## Section 4: First Aid Measures

| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **Carbon Monoxide** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Air** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Get medical attention. | |

## Section 5: Fire Fighting Measures

| | Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|---|
| **Carbon Monoxide** | Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray. | Carbon dioxide | ▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.<br>▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. |
| **Air** | Use extinguishing agents appropriate for surrounding fire. | | ▪ No respirator is required under normal conditions of use. |

## Section 6: Accidental Release Measures

| | Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|---|
| **Carbon Monoxide** | Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. | Avoid heat, flames, sparks and other sources of ignition. Keep out of water supplies and sewers. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **Air** | | | Stop leak if possible without personal risk. |

| | Methods for Cleanup | Other Information |
|---|---|---|
| **Carbon Monoxide** | Stop leak, evacuate area. Wear protective equipment. | Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). |
| **Air** | | |

## Section 7: Handling and Storage

| | Handling | Storage |
|---|---|---|


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| | Handling | Storage |
|---|---|---|
| Carbon Monoxide | Keep separated from incompatible substances. | Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. |
| Air | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | |

## Section 8: Exposure Controls/Personal Protection

| | Exposure Guidelines |
|---|---|
| Carbon Monoxide | CARBON MONOXIDE: 50 ppm (55 mg/m3) OSHA TWA 35 ppm (40 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 200 ppm (229 mg/m3) OSHA ceiling (vacated by 58 FR 35338, June 30, 1993) 25 ppm ACGIH TWA 35 ppm (40 mg/m3) NIOSH recommended TWA 10 hour(s) 200 ppm (229 mg/m3) NIOSH recommended ceiling |
| Air | AIR, COMPRESSED: No occupational exposure limits established. |

### Engineering Controls

Handle only in fully enclosed systems.

| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| Carbon Monoxide | Eye protection not required, but recommended. | Protective clothing is not required. | Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. |
| Air | Eye protection not required under normal conditions. | Protective clothing is not required under normal conditions. | No respirator is required under normal conditions of use. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| | Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|---|
| Carbon Monoxide | Gas | Colorless | Colorless | N/A | Gas | Odorless | Tasteless |
| Air | Gas | Clear | Colorless | | Gas | Not available | |

| | Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|---|
| Carbon Monoxide | Flammable | Not available | 1479.11 (log = 3.17) (estimated from water solubility) | 1128-1202 F (609-650 C) | 0.74 | 12.0-12.5% |
| Air | | | | | | |

| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| Carbon Monoxide | -312.7 F (-191.5 C) | -326 F (-199 C) | 760 mmHg @ -191 C gas; cannot be liquefied at room temperature | 0.968 (Air=1) | Not applicable | 2.3% @ 20 C | Not applicable | Not available | Not applicable | 0.01657 cP @ 0 C |
| Air | -317 F (-194 C) | Not available | 760 mmHg @ -194 C | 1 | Not applicable | Slightly soluble | Not applicable | Not available | Not applicable | 0.01853 cP @ 26.85 C |

| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|
| Carbon Monoxide | 28.01 | C-O | 1.250 g/L @ 0 C | Not available | 100% | Not applicable | Soluble: Alcohol, benzene, acetic acid, ethyl acetate, chloroform, cuprous chloride solutions |
| Air | | | 1.29 g/L @ 0 C | | | Not applicable | Slightly Soluble |


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## Section 10: Stability and Reactivity

| | Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|---|
| **Carbon Monoxide** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Oxidizing materials, halogens, metal oxides, metals, combustible materials, lithium |
| **Air** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | None known |

| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|
| **Carbon Monoxide** | Oxides of carbon | Will not polymerize. |
| **Air** | No hazard expected. | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| | Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|---|
| **Carbon Monoxide** | LC50 Inhalation Gas. Rat 1807 ppm 4 hours | Not available | Changes in body temperature, changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, hallucinations, pain in extremities, tremors, loss of coordination, hearing loss, visual disturbances, eye damage, suffocation, blood disorders, convulsions, coma |
| **Air** | Not available | Not available | |

| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| **Carbon Monoxide** | No information on significant adverse effects | No information on significant adverse effects | Acute toxicity, Category 3, inhalation; H331: Toxic if inhaled. Reproductive toxicity, Category 1A; H360D: May damage the unborn child. Specific Target Organ Toxicity (repeated exposure), Category 1; H372: Causes damage to organs through prolonged or repeated exposure. |
| **Air** | No information is available | No information is available | No significant target effects reported. |

### Chronic Effects

| | Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|---|
| **Carbon Monoxide** | Not available | Available. | Available. | No data |
| **Air** | Not available | Not available | No data | No data |

## Section 12: Ecological Information

### Fate and Transport

| | Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|---|
| **Carbon Monoxide** | Fish toxicity: 75000 ug/L 1 day(s) LC100 (Mortality) Orangespotted sunfish (Lepomis humilis) Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available | Relatively non-persistent in the environment. Highly volatile from water. | Not available | Not expected to leach through the soil or the sediment. |
| **Air** | Fish toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

| | |
|---|---|
| **Carbon Monoxide** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Air** | Dispose in accordance with all applicable regulations. |


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## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

#### DOT Information For This Mixture

| | |
|---|---|
| **Shipping Name** | Compressed gas, n.o.s. (Air, Carbon Monoxide) |
| **UN Number** | UN1956 |
| **Hazard Class** | 2.2 |
| **Hazard Information** | Non-Flammable Gas |

#### Individual Component Information

| | Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|---|
| **Carbon Monoxide** | Carbon monoxide, compressed | UN1016 | 2.3 | Not applicable | 2.3; 2.1 | Forbidden | 25 kg | Toxic-Inhalation Hazard Zone D |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available | 2.2 | Not available | Not available | Not available |

#### Canadian Transportation of Dangerous Goods

| | Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|---|
| **Carbon Monoxide** | Carbon monoxide, compressed | UN1016 | 2.3; 2.1 | Not applicable |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available |

## Section 15: Regulatory Information

#### U.S. Regulations

| | CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|---|
| **Carbon Monoxide** | Not regulated. | Not regulated. | Not regulated. |
| **Air** | Not regulated. | Not regulated. | Not regulated. |

#### SARA 370.21

| | Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|---|
| **Carbon Monoxide** | Yes | No | Yes | No | Yes |
| **Air** | No | No | No | No | Yes |

#### SARA 372.65

| | |
|---|---|
| **Carbon Monoxide** | Not regulated. |
| **Air** | Not regulated. |

#### OSHA Process Safety

| | |
|---|---|
| **Carbon Monoxide** | Not regulated. |
| **Air** | Not regulated. |

#### State Regulations

| | CA Proposition 65 |
|---|---|
| **Carbon Monoxide** | Known to the state of California to cause the following: Carbon monoxide Developmental toxicity (Jul 01, 1989) |
| **Air** | Not regulated. |

#### Canadian Regulations

| | WHMIS Classification |
|---|---|
| **Carbon Monoxide** | A, B1, D1A, D2A. |
| **Air** | A |


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National Inventory Status

| | US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|---|
| **Carbon Monoxide** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Air** | Not listed on inventory. | Not listed. | Not determined. |

## Section 16: Other Information

| | NFPA Rating |
|---|---|
| **Carbon Monoxide** | HEALTH=3 FIRE=4 REACTIVITY=0 |
| **Air** | HEALTH=0 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 4

Conductivity Solution MSDS

## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

**Product Identifier**

| | |
|---|---|
| Product Name | Traceable® Conductivity Standard |
| Product Number(s) | 4066, 4067, 4068, 4068, 4161, 4162, 4173, 4174, 4176, 4177, 4178, 4179, 4561, 4562, 4566, 4567, 4568, 4569, 4573, 4580, 4581 |
| Pure Substance/mixture | Mixture |

093283
093284
093281
093282
093285
0932811

**Relevant identified uses of the substance or mixture and uses advised against**

| | |
|---|---|
| Recommended Use | Calibration and storage of conductivity meters/probes |
| Uses advised against | Any use which involves bodily contact or ingestion. |

**Manufacture/Supplier**

Traceable® Products
12554 Old Galveston Rd. Suite B230
Webster, TX 77598

| | |
|---|---|
| E-mail address | sales@control3.com |
| Made In | USA |

**Product Information** 281-482-1714

## 2. HAZARDS IDENTIFICATION

**Classification according to Regulation (EC) No. 1272/2008 [CLP]**
This mixture is classified as not hazardous according to regulation (EC) 1272/2008 [GHS]

**Label Elements**

The product contains no substances which at their given concentration, are considered hazardous to health.

**Appearance** Clear **Physical State** Liquid **Odor** None

EUH210 - Safety data sheet available upon request.

**Precautionary Statements**
P202 - Do not handle until all safety information has been read and understood.

**Hazards not otherwise classified (HNOC)**
No information available

**Other Information**
No information available

**Additional advice on labeling**
Classification according to EU Directives 67/548/EEC or 1999/45/EC.

**OSHA Regulatory Status**
This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous ingredients

| Component | Chemical Formula | EC-No. | CAS-No | Classification according Regulation (EC) No. 1272 [CLP] | Weight % | Trade Secret |
|---|---|---|---|---|---|---|
| Water | - | - | 7732-18-5 | - | >86 % | * |
| Potassium chloride | KCL | 231-211-8 | 7447-40-7 | - | 0.01-13.5 % | * |
| N-Propanol | - | 200-746-9 | 71-23-8 | - | 0.01-1.6 % | * |

*The exact percentage (concentration) of composition has been withheld as a trade secret.

## 4. FIRST AID MEASURES

First Aid Measures

| | |
|---|---|
| General Advice | Use first aid treatment according to the nature of the injury. For further assistance, contact your local Poison Control Center. Show this safety data sheet to the doctor in attendance. |
| Eye Contact | In case of eye contact, remove contact lens and rinse thoroughly with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention. |
| Skin Contact | Wash off immediately with soap and plenty of water while removing all contaminated clothing and shoes. If skin reactions occur, contact a physician. |

| | |
|---|---|
| Inhalation | Move to fresh air. If breathing is difficult, give oxygen. If symptoms persist, obtain medical attention. |
| Ingestion | Clean mouth with water and drink afterwards plenty of water. Do not include vomiting. Call a physician or Poison Control Center immediately. |
| Production of First-Aiders | Use personal protective equipment. See Section 8 for more detail. Do not use mouth to mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical devices. |

Most important symptoms and effects, both acute and delayed
Most important symptoms/effects No information available

Indication of any immediate medical attention and special treatment needed
Notes to Physician Treat symptomatically

## 5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media
No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

## 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

| | |
|---|---|
| Personal Precautions | Avoid breathing, mist or vapors. Ensure adequate ventilation. Use personal protective equipment. Refer to Section 8. Evacuate personnel to safe areas. |
| Environmental Precautions | Prevent further leakage or spillage if safe to do so. Do not let product enter drains. |

Method and Material for Containment and Cleaning Up

| | |
|---|---|
| Methods for Containment | Prevent further leakage or spillage if safe to do so. |
| Methods for Cleaning Up | Soak up with inert absorbent material. Pick up and transfer to properly labeled containers. |

## 7. HANDLING AND STORAGE

Precautions for Safe Handling

| | |
|---|---|
| Handling | To avoid risks to human health and the environment, comply with the instructions for use.<br>Wear personal protective equipment. Avoid breathing dust/fume/gas/mist/vapors/spray<br>Ensure adequate ventilation, especially in confined areas. Prevent the buildup of electrostatic charge. |
| Hygiene Considerations | Handle in accordance with good industrial hygiene and safety practice. |

Conditions for Safe Storage, Including any Incompatibilities

| | |
|---|---|
| Storage | Keep container tightly closed in a dry and well-ventilated place. Containers which have been opened must be resealed and kept upright to prevent leakage. Store at room temperature in the original container. Keep away from direct sunlight. |
| Incompatible Products | No information available. |

Specific end use(s)

| | |
|---|---|
| Specific use | Calibration and storage of pH meters/probes. |
| Risk Management Methods (RMM) | The information required is contained in this Safety Data Sheet. |

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Exposure Guidelines

| Component | ACGIH TLV | OSHA PEL | NIOSH IDLH |
|---|---|---|---|
| 1-Propanol 71-23-8 | 200 ppm | 200 ppm | |

Appropriate Engineering Controls
Engineering Measures Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

| | |
|---|---|
| Eye/face Protection | Wear chemical splash goggles. If splashes are likely to occur, wear: Face-shield. |
| Skin and Body Protection | Wear protection gloves/clothing |
| Respiratory Protection | None required under normal usage. In case of inadequate ventilation wear respiratory protection. |
| Hygiene Measures | Handle in accordance with good industrial hygiene and safety practice. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Information on basic physical and chemical properties.**

| | |
|---|---|
| Physical State | Liquid |
| Appearance | Clear |
| Odor | Slight alcohol |
| Odor Threshold | No information available |
| pH Range | ~4-6 |

| **Property** | **Values** | **Remarks * Method** |
|---|---|---|
| Melting point/freezing point | No information available | |
| Boiling Point/Range | No information available | |
| Flash Point (High in °C) | Does not flash. | |
| Evaporation Rate | No information available | |
| Flammability (solid, gas) | No information available | |
| Flammability Limit in Air | | |
| Upper flammability limit: | No information available | |
| Lower flammability limit: | No information available | |
| Vapor pressure | No information available | |
| Vapor Density | No information available | |
| Specific Gravity | No information available | |
| Water Solubility | Totally soluble in water at 20°C | |
| Solubility in other solvents | No information available | |
| Partition coefficient | No information available | |
| Autoignition Temperature | No information available | |
| Decomposition Temperature | No information available | |
| Kinematic Viscosity | No information available | |
| Dynamic Viscosity | No information available | |
| Explosive Properties | No information available | |
| Oxidizing Properties | No information available | |

**Other Information**

| | |
|---|---|
| Softening Point | No information available |
| Molecular Weight | No information available |
| VOC Content (%) | No information available |
| Density | No information available |
| Bulk Density | No information available |

## 10. STABILITY AND REACTIVITY

**Reactivity**
No information available

**Chemical Stability**
Stable under normal conditions

**Possibility of Hazardous Reactions**
None known

**Conditions to Avoid**
No dangerous conditions known.

**Incompatible Materials**
No common materials present a hazard

**Hazardous Decomposition Products**
None known.

## 11. TOXICOLOGICAL INFORMATION

**Information on likely routes of exposure**

| | |
|---|---|
| **Inhalation** | No information available |
| **Eye Contact** | No information available |
| **Skin Contact** | No information available |
| **Ingestion** | No information available |

| Component | | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|---|
| Water | 7732-18-5 | LD50 > 90 ml/kg (Rat) | - | - |
| 1-Propanol | 71-23-8 | LD50 8,038 mg/kg (Rat) | LD50 4,000 mg/kg (Rabbit) | 20000 ppm, 1 hr (Rat) |

**Information on Toxicological Effects**

**Symptoms** No information available

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Sensitization** No information available
**Mutagenic Effects** No information available
**Carcinogenicity** No component >0.1% is listed by NTP, IARC, OSHA or ACGIH as a suspect or potential carcinogen.
**Reproductive Effects** No information available
**STOT – single exposure** Central nervous system depression
**STOT – repeated exposure** Nausea, dizziness, narcosis or drowsiness
**Aspiration hazard** No information available

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

This material is not expected to be harmful to aquatic life.

| Component | Freshwater Algae | Freshwater Fish | Water Flea |
|---|---|---|---|
| 1-Propanol | - | LC50: - Pimephales promelas (fathead minnow) – 4,555 mg/l – 96 h | EC50 – Daphnia magna (Water flea) – 3,642 mg/l – 48 h |
| Potassium chloride | - | LC50: - Pimephales promelas (fathead minnow) – 880 mg/l – 96 h | - |

**Persistence and Degradability**

This product is expected to be inherently biodegradable.

**Bioaccumulation/Accumulation**

There is no evidence to suggest bioaccumulation will occur.

**Mobility**

No information available

**Results of PBT and vPvB assessment**

No information available

**Other adverse effects**

No information available

**Endocrine Disruptor Information**

No information available

## 13. DISPOSAL CONSIDERATIONS

**Waste Treatment Methods**

**Waste Disposal Methods** Disposal should be in accordance with applicable regional, national and local laws and regulations.
**Contaminated Packaging** Improper disposal or reuse of this container may be dangerous and illegal.

## 14. TRANSPORT INFORMATION

**DOT** Not regulated
**TDG** Not regulated
**MEX** Not regulated
**ICAO** Not regulated
**IATA** Not regulated
**IMDG/IMO** Not regulated
**RID** Not regulated
**ADR** Not regulated
**ADN** Not regulated

## 15. REGULATORY INFORMATION

**European Union Regulations**

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

**International Inventories**

USINV Component listed
CANINV Component listed
EINECS/ELINCS Component listed

| | |
|---|---|
| ENCS | Complies |
| IECSC | Complies |
| KECL | Complies |
| PICCS | Complies |
| AICS | Component listed |

USINV/ TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
CANINV/ DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS - Japanese Existing and New Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

**U.S. Federal Regulations**

This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazardous Communication Standard, 29 CFR 1910.1200.

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40n of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazardous Categorization

| | |
|---|---|
| Acute Health Hazard | No |
| Chronic Health Hazard | No |
| Fire Hazard | No |
| Sudden Release of Pressure Hazard | No |
| Reactive Hazard | No |

Clean Water Act

Not applicable

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional or state level pertaining to releases of this material.

**U.S. State Regulations**

California Proposition 65

This product is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

State Right-to-Know

| | |
|---|---|
| Massachusetts Right-to-Know Act – Substance List | n-Propanol |
| New Jersey Worker and Community Right-to-Know Act | n-Propanol |
| Pennsylvania Right-to-Know Act – Hazardous Substance | n-Propanol |
| Rhode Island Right-to-Know Act | Not regulated |

**U.S. EPA Label Information**

No information available

## 16. OTHER INFORMATION

Revision Date: 26-April-2018

| Hazard Categories: | Health | Fire | Pressure | Reactivity | Reference 49 CFR 171.8, |
|---|---|---|---|---|---|
| Immediate | Yes | No | No | No | OSHA 29 CFR 1910.1200 and |
| Delayed | No | No | XXX | XXX | SARA 302/311/312/313. |

HMIS Hazard ratings: Health 1 Fire 0 Instability 0 Other B (Goggles, gloves)

Hazard Ratings: Least: 0 Slight: 1 Moderate: 2 High: 3 Extreme: 4

This SDS is in accordance to Regulation (EC) No. 1907/2006.

Disclaimer:

IMPORTANT: The information contained in this SDS is correct to the best of our knowledge as of the issue date (or subsequent revision date, if any), and is to be used only as a guide. This SDS does not constitute a guarantee (express or implied) of any kind and we make no warranties of any kind as to the accuracy or completeness of the information contained herein or the merchantability or fitness of the product or this information for a purpose. It is the responsibility of each individual buyer/user to determine the suitability of this information and the product for its intended purposes. This information relates only to the designated product as shipped and may not be valid if the product is used in combination with any other materials or is not used in accordance with our instructions, or is altered in any way. It is the responsibility of the buyer/user to ensure that its activities comply with all applicable government requirements. Since conditions of use of the product are not under direct control of Traceable® Products, it is the duty of the buyer/user to determine the necessary conditions for the safe use of the product. Traceable® Products will not be liable for any injuries or damages resulting from handling, use, misuse or contact with the product.

## ATTACHMENT 5

Helium SDS

# Safety Data Sheet
Helium

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Helium

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| CAS # |
|---|
| 7440-59-7 |


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| Chemical Substance | Chemical Family | Trade Names |
|---|---|---|
| HELIUM | Inorganic gases | HELIUM GAS; HELIUM COMPRESSED; HELIUM-4; ATOMIC HELIUM; UN 1046; He |

## Section 4: First Aid Measures

| Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|
| Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |

## Section 5: Fire Fighting Measures

| Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|
| Non-flammable. Use suitable extinguishing media for surrounding fire. | Non-flammable | ▪ Non-flammable<br>▪ Non-flammable |

## Section 6: Accidental Release Measures

| Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|
| Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. | Avoid soil, waterways, drains and sewers | Stop leak if possible without personal risk. |

| Methods for Cleanup | Other Information |
|---|---|
| Stop leak, evacuate area. Contact emergency personnel. | None |

## Section 7: Handling and Storage

| Handling | Storage |
|---|---|
| Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |

## Section 8: Exposure Controls/Personal Protection

| Exposure Guidelines |
|---|
| HELIUM: ACGIH (simple asphyxiant) |

### Engineering Controls

Handle only in fully enclosed systems.

| Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|
| Eye protection not required, but recommended. | Protective clothing is not required. | Non-flammable |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|


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| Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|
| Gas | Colorless | Colorless | N/A | Gas | Odorless | Tasteless |

| ash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|
| Not flammable | Not available | Not available | Nonflammable | Nonflammable | Nonflammable |

| Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|
| -452 F (-269 C) | -458 F (-272 C) @ 26 atm | 1719 mmHg @ -268 C | 0.138 (Air=1) | Not applicable | 0.94% @ 0 C | Not applicable | Not available | Not applicable | 0.02012 cP @ 26.8 C |

| Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|
| 4.0026 | He | 0.1785 g/L @ 0 C | Not available | 100% | Not applicable | Insoluble: Not available |

## Section 10: Stability and Reactivity

| Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|
| Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | No data available. |

| Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|
| Miscellaneous decomposition products | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|
| Not available | Not available | Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, fatigue, dizziness, disorientation, emotional disturbances, tingling sensation, loss of coordination, suffocation, convulsions, unconsciousness, coma |

| Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|
| Liquid: frostbite, blurred vision | Liquid: frostbite | Difficulty breathing |

### Chronic Effects

| Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|
| Not available | Not available | Not available | No data |

## Section 12: Ecological Information

### Fate and Transport

| Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|
| Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

Dispose in accordance with all applicable regulations.


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## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

| Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|
| Helium, compressed | UN1046 | 2.2 | Not applicable | 2.2 | 75 kg or L | 150 kg | N/A |

### Canadian Transportation of Dangerous Goods

| Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|
| Helium, compressed | UN1046 | 2.2 | Not applicable |

## Section 15: Regulatory Information

### U.S. Regulations

| CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|
| Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|
| Yes | No | No | No | Yes |

### SARA 372.65

Not regulated.

### OSHA Process Safety

Not regulated.

### State Regulations

| CA Proposition 65 |
|---|
| Not regulated. |

### Canadian Regulations

| WHMIS Classification |
|---|
| A |

### National Inventory Status

| US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|
| Listed on inventory. | Not listed. | Not determined. |

## Section 16: Other Information

| NFPA Rating |
|---|
| HEALTH=0 FIRE=0 REACTIVITY=0 SPECIFIC HAZARD=SA |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 6

Hydrogen SDS

# Safety Data Sheet
Hydrogen

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Hydrogen

## Section 2: Hazards Identification

**Danger**

### Hazard Classification:
Flammable (Category 1)
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated
Extremely flammable gas

### Precautionary Statements
**Prevention:**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

**Response:**
Eliminate all ignition sources if safe to do so.
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

**Storage:**
Protect from sunlight.
Store in well-ventilated place.


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## Section 3: Composition/Information on Ingredients

| CAS # |
|---|
| 1333-74-0 |

| Chemical Substance | Chemical Family | Trade Names |
|---|---|---|
| HYDROGEN | inorganic, gas | HYDROGEN GAS; HYDROGEN COMPRESSED; HYDROGEN (H2); DIHYDROGEN; UN 1049; H2 |

## Section 4: First Aid Measures

| Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|
| Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |

## Section 5: Fire Fighting Measures

| Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|
| Carbon dioxide, regular dry chemical Large fires: Flood with fine water spray. | None known | ▪ Any self-contained breathing apparatus with a full facepiece.<br>▪ Any self-contained breathing apparatus with a full facepiece. |

## Section 6: Accidental Release Measures

| Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|
| Keep unnecessary people away, isolate hazard area and deny entry. Do not touch spilled material. Ventilate closed spaces before entering. | Avoid heat, flames, sparks and other sources of ignition. | Reduce vapors with water spray. Remove sources of ignition. |

| Methods for Cleanup | Other Information |
|---|---|
| Stop leak if possible without personal risk. | None |

## Section 7: Handling and Storage

| Handling | Storage |
|---|---|
| Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |

## Section 8: Exposure Controls/Personal Protection

| Exposure Guidelines |
|---|
| HYDROGEN: ACGIH (simple asphyxiant) |

### Engineering Controls
Handle only in fully enclosed systems.


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| Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|
| Eye protection not required, but recommended. | Protective clothing is not required. | Any self-contained breathing apparatus with a full facepiece. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|
| Gas | Colorless | Colorless | N/A | Gas | Odorless | Tasteless |

| Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|
| Flammable gas (burns at all ambient temperatures) | Not available | Not available | 752 F (400 C) | 0.75 | 0.04 |

| Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|
| -423 F (-253 C) | -434 F (-259 C) | 760 mmHg @ -253 C | 0.07 (Air=1) | Not applicable | 1.82% @ 20 C | Not applicable | Not available | Not applicable | 0.008957 cP @ 26.8 C |

| Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|
| 2 | H2 | 0.08987 g/L @ 0 C | Not available | Not available | Not applicable | Soluble: Not available |

## Section 10: Stability and Reactivity

| Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|
| Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Metals, oxidizing materials, metal oxides, combustible materials, halogens, metal salts, halo carbons, nitrogen triflouride, oxygen diflouride, magnesium and calcium carbonate, sodium, potassium |

| Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|
| Miscellaneous decomposition products | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|
| Not available | Not available | Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, fatigue, dizziness, disorientation, mood swings, tingling sensation, loss of coordination, convulsions, unconsciousness, coma |

| Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|
| Not irritating | Not irritating | Difficulty breathing |

### Chronic Effects

| Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|
| Not available | Not available | Not available | No data |


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## Section 12: Ecological Information

### Fate and Transport

| Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|
| Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

| Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|
| Hydrogen, compressed | UN1049 | 2.1 | Not applicable | 2.1 | Forbidden | 150 kg | None |

### Canadian Transportation of Dangerous Goods

| Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|
| Hydrogen, compressed | UN1049 | 2.1 | Not applicable |

## Section 15: Regulatory Information

### U.S. Regulations

| CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|
| Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|
| Yes | No | Yes | No | Yes |

### SARA 372.65

Not regulated.

### OSHA Process Safety

Not regulated.

### State Regulations

| CA Proposition 65 |
|---|
| Not regulated. |

### Canadian Regulations

| WHMIS Classification |
|---|
| A, B1. |

### National Inventory Status

| US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|


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| | | |
|---|---|---|
| Listed on inventory. | Not listed. | Listed on inventory. |

## Section 16: Other Information

| NFPA Rating |
|---|
| HEALTH=0 FIRE=4 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 7

# Hydrogen Sulfide Mix with Pentane SDS

# Safety Data Sheet
H2S Quad Pentane

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: H2S Quad Pentane
**Synonyms:**
**Recommended Use:**
**Usage Restrictions:**

## Section 2: Hazards Identification

**Danger**

### Hazard Classification:
Aspiration Hazard (Category 1)
Gases Under Pressure
Specific target organ toxicity (Single Exposure) (Category 3)

### Hazard Statements:
Contains gas under pressure; may explode if heated
May be fatal if swallowed and enters airways
May cause respiratory irritation;
Toxic to aquatic life
Toxic to aquatic life with long lasting effects

### Precautionary Statements
**Prevention:**
Use only outdoors or in a well-ventilated area.
Avoid breathing dust/fume/gas/mist/ vapors/spray.
[In case of inadequate ventilation] wear respiratory protection.

**Response:**
Do NOT induce vomiting.
If swallowed: Rinse mouth. Do NOT induce vomiting.
Immediately call a poison center or doctor.
If inhaled: Remove person to fresh air and keep comfortable for breathing.

**Storage:**


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Store in a well-ventilated place. Keep container tightly closed.
Protect from sunlight.
Store locked up.

**Disposal:**
Dispose of contents and/or container in accordance with applicable regulations.

## Section 3: Composition/Information on Ingredients

| | CAS # | Concentration |
|---|---|---|
| **Hydrogen Sulfide** | 7783-06-4 | 10 - 40 ppm |
| **Carbon Monoxide** | 630-08-0 | 50 - 300 ppm |
| **n-Pentane** | 109-66-0 | 0.1% - 0.75% |
| **Oxygen** | 7782-44-7 | 12% - 20.9% |
| **Nitrogen** | 7727-37-9 | Balance |

| | Chemical Substance | Chemical Family | Trade Names |
|---|---|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE | inorganic, gas | HYDROGEN SULFIDE (H2S); DIHYDROGEN MONOSULFIDE; DIHYDROGEN SULFIDE; HYDROSULFURIC ACID; SULFUR DIHYDRIDE; SULFURETED HYDROGEN; SULFUR HYDRIDE; STINK DAMP; SEWER GAS; RCRA U135; UN 1053; H2S |
| **Carbon Monoxide** | CARBON MONOXIDE | inorganic, gas | CARBON OXIDE; CARBON OXIDE (CO); UN 1016; CO |
| **n-Pentane** | N-PENTANE | hydrocarbons, aliphatic | PENTANE; AMYL HYDRIDE; UN 1265; C5H12 |
| **Oxygen** | OXYGEN, COMPRESSED GAS | inorganic, gas | OXYGEN; DIOXYGEN; MOLECULAR OXYGEN; OXYGEN MOLECULE; PURE OXYGEN; UN 1072; O2 |
| **Nitrogen** | NITROGEN, COMPRESSED GAS | inorganic, gas | DIATOMIC NITROGEN; DINITROGEN; NITROGEN; NITROGEN-14; NITROGEN GAS; UN 1066; N2 |

## Section 4: First Aid Measures

| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Carbon Monoxide** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **n-Pentane** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | Aspiration hazard. DO NOT induce vomiting. If vomiting occurs, keep head lower than hips to help prevent aspiration. Get immediate medical attention. Give artificial respiration if not breathing. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention. | Not available |


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| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **Oxygen** | None expected | None expected | Not likely route of exposure | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention. | None |
| **Nitrogen** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |

## Section 5: Fire Fighting Measures

| | Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|---|
| **Hydrogen Sulfide** | Let burn unless leak can be stopped immediately. Large fires: Use regular foam or flood with fine water spray. | Sulfur oxides | ▪ Any self-contained breathing apparatus with a full facepiece.<br>▪ Protective material types: butyl rubber, polyvinyl chloride (PVC), neoprene |
| **Carbon Monoxide** | Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray. | Carbon dioxide | ▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.<br>▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. |
| **n-Pentane** | Regular dry chemical, carbon dioxide, water, regular foam Large fires: Use regular foam or flood with fine water spray. | Carbon monoxide, carbon dioxide and toxic and irritating fumes | ▪ Any self-contained breathing apparatus with a full facepiece.<br>▪ Any self-contained breathing apparatus with a full facepiece. |
| **Oxygen** | Non-flammable. Use extinguishing agent appropriate for the material which is burning. Use water in large quantities for fires involving oxygen. | Oxides of burning material | ▪ Respiratory protection may be needed for frequent or heavy exposure.<br>▪ None |
| **Nitrogen** | Non-flammable. Use suitable extinguishing media for surrounding fire. Cylinders may rupture or explode if exposed to heat. | Non-flammable | ▪ Respiratory protection may be needed for frequent or heavy exposure. |

## Section 6: Accidental Release Measures

| | Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|---|
| **Hydrogen Sulfide** | Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 150 feet. For tank, rail car or tank truck: 800 meters (1/2 mile). Do not touch spilled material. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Remove sources of ignition. Reduce vapors with water spray. Do not get water directly on material. |
| **Carbon Monoxide** | Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. | Avoid heat, flames, sparks and other sources of ignition. Keep out of water supplies and sewers. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **n-Pentane** | Keep unnecessary people away, isolate hazard area and deny entry. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **Oxygen** | Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. | Avoid contact with combustible materials. | Stop leak if possible without personal risk. |
| **Nitrogen** | Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. | No significant effects from contamination expected. | Stop leak if possible without personal risk. |


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| | Methods for Cleanup | Other Information |
|---|---|---|
| **Hydrogen Sulfide** | Collect runoff for disposal as potential hazardous waste. Dike for later disposal. Absorb with sand or other non-combustible material. Add an alkaline material (lime, crushed limestone, sodium bicarbonate, or soda ash). | Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA). |
| **Carbon Monoxide** | Stop leak, evacuate area. Wear protective equipment. | Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). |
| **n-Pentane** | Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. | Not available |
| **Oxygen** | Stop leak and ventilate | None |
| **Nitrogen** | N/A | N/A |

# Section 7: Handling and Storage

| | Handling | Storage |
|---|---|---|
| **Hydrogen Sulfide** | Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store in a cool, dry place. Store in a well-ventilated area. Avoid contact with light. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30). Keep separated from incompatible substances. | Subject to handling regulations: U.S. OSHA 29 CFR 1910.119. |
| **Carbon Monoxide** | Keep separated from incompatible substances. | Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. |
| **n-Pentane** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. See original container for storage recommendations. | Grounding and bonding required. Keep separated from incompatible substances. |
| **Oxygen** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |
| **Nitrogen** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |

# Section 8: Exposure Controls/Personal Protection

| | Exposure Guidelines |
|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE: 20 ppm OSHA ceiling 50 ppm OSHA peak 10 minute(s) (once if no other measurable exposure occurs) 10 ppm (14 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 15 ppm (21 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 10 ppm ACGIH TWA 15 ppm ACGIH STEL 10 ppm (15 mg/m3) NIOSH recommended ceiling 10 minute(s) TLV-TWA: 1ppm Upper respiratory irritation (ACGIH) |
| **Carbon Monoxide** | CARBON MONOXIDE: 50 ppm (55 mg/m3) OSHA TWA 35 ppm (40 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 200 ppm (229 mg/m3) OSHA ceiling (vacated by 58 FR 35338, June 30, 1993) 25 ppm ACGIH TWA 35 ppm (40 mg/m3) NIOSH recommended TWA 10 hour(s) 200 ppm (229 mg/m3) NIOSH recommended ceiling |
| **n-Pentane** | PENTANE: 1000 ppm (2950 mg/m3) OSHA TWA 600 ppm (1770 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 750 ppm (2210 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 600 ppm ACGIH TWA 120 ppm (350 mg/m3) NIOSH recommended TWA 10 hour(s) 610 ppm (1800 mg/m3) NIOSH recommended ceiling 15 minute(s) |
| **Oxygen** | OXYGEN, COMPRESSED GAS: No occupational exposure limits established. |
| **Nitrogen** | NITROGEN, COMPRESSED GAS: NITROGEN: ACGIH (simple asphyxiant) |

### Engineering Controls

Handle only in fully enclosed systems.

| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| **Hydrogen Sulfide** | Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. | Wear appropriate chemical resistant clothing. | Any self-contained breathing apparatus with a full facepiece. |


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| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| **Carbon Monoxide** | Eye protection not required, but recommended. | Protective clothing is not required. | Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. |
| **n-Pentane** | Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. | Wear appropriate chemical resistant clothing. | Any self-contained breathing apparatus with a full facepiece. |
| **Oxygen** | Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. |
| **Nitrogen** | Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| | Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Gas | Colorless | Colorless | N/A | Gas | Rotten egg odor | N/A |
| **Carbon Monoxide** | Gas | Colorless | Colorless | N/A | Gas | Odorless | Tasteless |
| **n-Pentane** | Liquid | Clear | Colorless | N/A | Liquid | Gasoline odor | N/A |
| **Oxygen** | Gas | Clear | Colorless | N/A | Gas | Odorless | Tasteless |
| **Nitrogen** | Gas | Clear | Colorless | N/A | Gas | Odorless | Tasteless |

| | Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Flammable | Not available | Not available | 500 F (260 C) | 44-46% | 4.0-4.3% |
| **Carbon Monoxide** | Flammable | Not available | 1479.11 (log = 3.17) (estimated from water solubility) | 1128-1202 F (609-650 C) | 0.74 | 12.0-12.5% |
| **n-Pentane** | <-40 F (<-40 C) (CC) | IA | Not available | 500 F (260 C) | 0.078 | 0.014 |
| **Oxygen** | Not flammable | Not available | Not available | Nonflammable | Nonflammable | Nonflammable |
| **Nitrogen** | Not flammable | Not available | Not available | Nonflammable | Nonflammable | Nonflammable |

| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | -78 to -77 F (-61 to -60.3 C) | -123 F (-86 C) | 15200 mmHg @ 25 C | 1.2 (Air=1) | 1.192 | 2.58-2.9% @ 20 C | 4.5-<7 (saturated solution) | 0.13 ppm | Not applicable | 0.0128 cP @ 25 C |
| **Carbon Monoxide** | -312.7 F (-191.5 C) | -326 F (-199 C) | 760 mmHg @ -191 C gas; cannot be liquefied at room temperature | 0.968 (Air=1) | Not applicable | 2.3% @ 20 C | Not applicable | Not available | Not applicable | 0.01657 cP @ 0 C |
| **n-Pentane** | 96.93 F (36.07 C) | -201.5 F (-129.7 C) | 400 mmHg @ 18.5 C | 2.5 (Air=1) | 0.626 | 0.0004 | Not available | 2.2-5000 ppm | 28.6 (butyl acetate=1) | <32 SUS |
| **Oxygen** | -297 F (-183 C) | -360 F (-218 C) | 760 mmHg @ -183 C | 1.1 (Air=1) | Not applicable | 3.2% @ 25 C | Not applicable | Not available | Not applicable | 0.02075 cP @ 25 C |
| **Nitrogen** | -321 F (-196 C) | -346 F (-210 C) | 760 mmHg @ -196 C | 0.967 (Air=1) | Not applicable | 1.6% @ 20 C | Not applicable | Not available | Not applicable | 0.01787 cP @ 27 C |

| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|


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| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | 34.08 | H2-S | 1.539 g/L @ 0 C | Not available | Not available | Not applicable | Soluble: Carbon disulfide, alcohol, ether, glycerol, gasolines, kerosene, crude oil, alkali solutions |
| **Carbon Monoxide** | 28.01 | C-O | 1.250 g/L @ 0 C | Not available | 100% | Not applicable | Soluble: Alcohol, benzene, acetic acid, ethyl acetate, chloroform, cuprous chloride solutions |
| **n-Pentane** | 72.15g/mol | C5-H12 | Not available | Not available | Not available | Not available | Soluble: Alcohol, ether, acetone, benzene, chloroform |
| **Oxygen** | 31.9988 | O2 | 1.309 g/L @ 25 C | Not available | Not applicable | Not applicable | Soluble: Alcohol |
| **Nitrogen** | 28.0134 | N2 | 1.2506 g/L | Not available | 100% | 1 | Soluble: Liquid ammonia |

# Section 10: Stability and Reactivity

| | Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|---|
| **Hydrogen Sulfide** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Combustible materials, metals, oxidizing materials, halogens, metal oxides, metal salts, bases, rust, oxidants, oxygen, copper powder, acetaldehyde, silver fulminate |
| **Carbon Monoxide** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Oxidizing materials, halogens, metal oxides, metals, combustible materials, lithium |
| **n-Pentane** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Oxidizing materials, combustible materials, halogen compounds |
| **Oxygen** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Combustible materials, halo carbons, metals, bases, reducing agents, amines, metal salts, oxidizing materials, alkaline earth and alkali metals |
| **Nitrogen** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Metals, oxidizing materials |

| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|
| **Hydrogen Sulfide** | Oxides of sulfur | Will not polymerize. |
| **Carbon Monoxide** | Oxides of carbon | Will not polymerize. |
| **n-Pentane** | Oxides of carbon | Will not polymerize. |
| **Oxygen** | Miscellaneous decomposition products | Will not polymerize. |
| **Nitrogen** | Oxides of nitrogen | Will not polymerize. |

# Section 11: Toxicology Information

### Acute Effects

| | Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|---|
| **Hydrogen Sulfide** | 444 ppm inhalation-rat LC50 | Irritation 0.000125 ppm/5 hour(s) eyes-human | Irritation, lack of sense of smell, sensitivity to light, nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, disorientation, tremors, visual disturbances, suffocation, lung congestion, internal bleeding, heart damage, nerve damage, brain damage, coma, death |
| **Carbon Monoxide** | LC50 Inhalation Gas. Rat 1807 ppm 4 hours | Not available | Changes in body temperature, changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, hallucinations, pain in extremities, tremors, loss of coordination, hearing loss, visual disturbances, eye damage, suffocation, blood disorders, convulsions, coma |
| **n-Pentane** | >2000 mg/kg oral-rat LD50 | Not available | Irritation, nausea, difficulty breathing, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, central nervous system depression, asphyxiant |
| **Oxygen** | Not established | Not established | Irritation, changes in body temperature, nausea, difficulty breathing, irregular heartbeat, dizziness, disorientation, hallucinations, mood swings, pain in extremities, tremors, lung congestion, convulsions |
| **Nitrogen** | Not available | Not available | Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma |

| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|


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| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| **Hydrogen Sulfide** | Irritation, sensitivity to light, visual disturbances | Irritation liquid: frostbite | Harmful if inhaled, respiratory tract irritation, skin irritation, eye irritation, blood damage |
| **Carbon Monoxide** | No information on significant adverse effects | No information on significant adverse effects | Blood damage, suffocation |
| **n-Pentane** | Irritation | Irritation | Respiratory tract irritation, skin irritation, aspiration hazard, central nervous system depression |
| **Oxygen** | No information on significant adverse effects | No information on significant adverse effects | No significant target effects reported. |
| **Nitrogen** | Contact with rapidly expanding gas may cause burns or frostbite | No information on significant adverse effects | Difficulty breathing |

### Chronic Effects

| | Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|---|
| **Hydrogen Sulfide** | Not available | Not available | Available. | No data |
| **Carbon Monoxide** | Not available | Available. | Available. | No data |
| **n-Pentane** | Not available | Not available | Not available | No data |
| **Oxygen** | Not known. | Available. | Available. | No data |
| **Nitrogen** | Not hazardous | Not available | Not available | No data |

## Section 12: Ecological Information

### Fate and Transport

| | Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|---|
| **Hydrogen Sulfide** | Fish toxicity: Acute LC50 7 ug/L Fresh water Fish - Fathead minnow - Pimephales promelas - FRY 96 hours; 14.9 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (Pimeph<br>Invertibrate toxicity: 9730 ug/L 1.5 hour(s) (Mortality) Mediterranean mussel (Mytilus galloprovincialis)<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Highly toxic to aquatic life. | Not available | Not available |
| **Carbon Monoxide** | Fish toxicity: 75000 ug/L 1 day(s) LC100 (Mortality) Orangespotted sunfish (Lepomis humilis)<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Relatively non-persistent in the environment. Highly volatile from water. | Not available | Not expected to leach through the soil or the sediment. |
| **n-Pentane** | Fish toxicity: Not available<br>Invertibrate toxicity: 3000000 ug/L 48 week(s) (Mortality) Pacific oyster (Crassostrea gigas)<br>Algal toxicity: 1000 ug/L 8 year(s) EC50 (Photosynthesis) Algae,phytoplankton,algal mat (Algae)<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Not available | Not available |
| **Oxygen** | Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Low bioaccumulation | Not available |
| **Nitrogen** | Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

| | |
|---|---|
| **Hydrogen Sulfide** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U135. |


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| | |
|---|---|
| **Carbon Monoxide** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **n-Pentane** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Oxygen** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Nitrogen** | Dispose in accordance with all applicable regulations. |

# Section 14: Transportation Information

## U.S. DOT 49 CFR 172.101

### DOT Information For This Mixture

| | |
|---|---|
| **Shipping Name** | Compressed gas, n.o.s. (Nitrogen, Oxygen) |
| **UN Number** | UN1956 |
| **Hazard Class** | 2.2 |
| **Hazard Information** | Non-Flammable Gas |

### Individual Component Information

| | Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Hydrogen sulfide | UN1053 | 2.3 | Not applicable | 2.3; 2.1 | Forbidden | Forbidden | Toxic-Inhalation Hazard Zone B |
| **Carbon Monoxide** | Carbon monoxide, compressed | UN1016 | 2.3 | Not applicable | 2.3; 2.1 | Forbidden | 25 kg | Toxic-Inhalation Hazard Zone D |
| **n-Pentane** | Pentanes | UN1265 | 3 | II | 3 | N/A | N/A | N/A |
| **Oxygen** | Oxygen, compressed | UN1072 | 2.2 | Not available | 2.2; 5.1 | 75 kg or L | 150 kg | N/A |
| **Nitrogen** | Nitrogen, compressed | UN1066 | 2.2 | Not applicable | 2.2 | 75 kg or L | 150 kg | N/A |

## Canadian Transportation of Dangerous Goods

| | Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE; or HYDROGEN SULPHIDE | UN1053 | 2.3; 2.1 | Not applicable |
| **Carbon Monoxide** | Carbon monoxide, compressed | UN1016 | 2.3; 2.1 | Not applicable |
| **n-Pentane** | Pentanes | UN1265 | 3 | II |
| **Oxygen** | Oxygen, compressed | UN1072 | 2.2; 5.1 | Not applicable |
| **Nitrogen** | Nitrogen, compressed | UN1066 | 2.2 | Not applicable |

# Section 15: Regulatory Information

## U.S. Regulations

| | CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|---|
| **Hydrogen Sulfide** | 100 LBS RQ | 500 LBS TPQ | 100 LBS RQ |
| **Carbon Monoxide** | Not regulated. | Not regulated. | Not regulated. |
| **n-Pentane** | Not regulated. | Not regulated. | Not regulated. |
| **Oxygen** | Not regulated. | Not regulated. | Not regulated. |
| **Nitrogen** | Not regulated. | Not regulated. | Not regulated. |

## SARA 370.21

| | Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Yes | No | Yes | No | Yes |
| **Carbon Monoxide** | Yes | No | Yes | No | Yes |


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| | | | | | |
|---|---|---|---|---|---|
| **n-Pentane** | Yes | No | Yes | No | No |
| **Oxygen** | No | No | Yes | No | Yes |
| **Nitrogen** | Yes | No | No | No | Yes |

### SARA 372.65

| | |
|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE: Administrative stay issued Aug. 22, 1994 |
| **Carbon Monoxide** | Not regulated. |
| **n-Pentane** | Not regulated. |
| **Oxygen** | Not regulated. |
| **Nitrogen** | Not regulated. |

### OSHA Process Safety

| | |
|---|---|
| **Hydrogen Sulfide** | 1500 LBS TQ |
| **Carbon Monoxide** | Not regulated. |
| **n-Pentane** | Not regulated. |
| **Oxygen** | Not regulated. |
| **Nitrogen** | Not regulated. |

### State Regulations

| | **CA Proposition 65** |
|---|---|
| **Hydrogen Sulfide** | Not regulated. |
| **Carbon Monoxide** | Known to the state of California to cause the following: Carbon monoxide Developmental toxicity (Jul 01, 1989) |
| **n-Pentane** | Not regulated. |
| **Oxygen** | Not regulated. |
| **Nitrogen** | Not regulated. |

### Canadian Regulations

| | **WHMIS Classification** |
|---|---|
| **Hydrogen Sulfide** | A, B1, D1A, D2B. |
| **Carbon Monoxide** | A, B1, D1A, D2A. |
| **n-Pentane** | B2 |
| **Oxygen** | A,C |
| **Nitrogen** | A |

### National Inventory Status

| | **US Inventory (TSCA)** | **TSCA 12b Export Notification** | **Canada Inventory (DSL/NDSL)** |
|---|---|---|---|
| **Hydrogen Sulfide** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Carbon Monoxide** | Listed on inventory. | Not listed. | Listed on inventory. |
| **n-Pentane** | Listed on inventory. | PENTANE CAS NUMBER: 109-66-0 SECTION 4 | Listed on inventory. |
| **Oxygen** | Listed on inventory. | Not listed. | Not determined. |
| **Nitrogen** | Listed on inventory. | Not listed. | Listed on inventory. |

## Section 16: Other Information

| | **NFPA Rating** |
|---|---|
| **Hydrogen Sulfide** | HEALTH=4 FIRE=4 REACTIVITY=0 |
| **Carbon Monoxide** | HEALTH=3 FIRE=4 REACTIVITY=0 |
| **n-Pentane** | HEALTH=2 FIRE=4 REACTIVITY=0 |
| **Oxygen** | HEALTH=0 FIRE=0 REACTIVITY=0 |
| **Nitrogen** | HEALTH=1 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 8

# Hydrogen Sulfide in Nitrogen SDS

# Safety Data Sheet

## 1 PPM - 5000 PPM HYDROGEN SULFIDE IN NITROGEN

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: 1 PPM - 5000 PPM HYDROGEN SULFIDE IN NITROGEN

**Synonyms:**
**Recommended Use:**
**Usage Restrictions:**

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:

Gases Under Pressure

### Hazard Statements:

Contains gas under pressure; may explode if heated
Toxic to aquatic life

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| | CAS # | Concentration |
|---|---|---|


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| | | |
|---|---|---|
| **Hydrogen Sulfide** | 7783-06-4 | 1 - 5000 PPM |
| **Nitrogen** | 7727-37-9 | 99.5 to 99.999% |

| | Chemical Substance | Chemical Family | Trade Names |
|---|---|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE | inorganic, gas | HYDROGEN SULFIDE (H2S); DIHYDROGEN MONOSULFIDE; DIHYDROGEN SULFIDE; HYDROSULFURIC ACID; SULFUR DIHYDRIDE; SULFURETED HYDROGEN; SULFUR HYDRIDE; STINK DAMP; SEWER GAS; RCRA U135; UN 1053; H2S |
| **Nitrogen** | NITROGEN, COMPRESSED GAS | inorganic, gas | DIATOMIC NITROGEN; DINITROGEN; NITROGEN; NITROGEN-14; NITROGEN GAS; UN 1066; N2 |

## Section 4: First Aid Measures

| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Nitrogen** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |

## Section 5: Fire Fighting Measures

| | Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|---|
| **Hydrogen Sulfide** | Let burn unless leak can be stopped immediately. Large fires: Use regular foam or flood with fine water spray. | Sulfur oxides | ▪ Any self-contained breathing apparatus with a full facepiece.<br>▪ Protective material types: butyl rubber, polyvinyl chloride (PVC), neoprene |
| **Nitrogen** | Non-flammable. Use suitable extinguishing media for surrounding fire. Cylinders may rupture or explode if exposed to heat. | Non-flammable | ▪ Respiratory protection may be needed for frequent or heavy exposure. |

## Section 6: Accidental Release Measures

| | Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|---|
| **Hydrogen Sulfide** | Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 150 feet. For tank, rail car or tank truck: 800 meters (1/2 mile). Do not touch spilled material. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Remove sources of ignition. Reduce vapors with water spray. Do not get water directly on material. |
| **Nitrogen** | Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. | No significant effects from contamination expected. | Stop leak if possible without personal risk. |

| | Methods for Cleanup | Other Information |
|---|---|---|


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| | Methods for Cleanup | Other Information |
|---|---|---|
| **Hydrogen Sulfide** | Collect runoff for disposal as potential hazardous waste. Dike for later disposal. Absorb with sand or other non-combustible material. Add an alkaline material (lime, crushed limestone, sodium bicarbonate, or soda ash). | Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA). |
| **Nitrogen** | N/A | N/A |

## Section 7: Handling and Storage

| | Handling | Storage |
|---|---|---|
| **Hydrogen Sulfide** | Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store in a cool, dry place. Store in a well-ventilated area. Avoid contact with light. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30). Keep separated from incompatible substances. | Subject to handling regulations: U.S. OSHA 29 CFR 1910.119. |
| **Nitrogen** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |

## Section 8: Exposure Controls/Personal Protection

| | Exposure Guidelines |
|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE: 20 ppm OSHA ceiling 50 ppm OSHA peak 10 minute(s) (once if no other measurable exposure occurs) 10 ppm (14 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 15 ppm (21 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 10 ppm ACGIH TWA 15 ppm ACGIH STEL 10 ppm (15 mg/m3) NIOSH recommended ceiling 10 minute(s) TLV-TWA: 1ppm Upper respiratory irritation (ACGIH) |
| **Nitrogen** | NITROGEN, COMPRESSED GAS: NITROGEN: ACGIH (simple asphyxiant) |

### Engineering Controls

Handle only in fully enclosed systems.

| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| **Hydrogen Sulfide** | Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. | Wear appropriate chemical resistant clothing. | Any self-contained breathing apparatus with a full facepiece. |
| **Nitrogen** | Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| | Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Gas | Colorless | Colorless | N/A | Gas | Rotten egg odor | N/A |
| **Nitrogen** | Gas | Clear | Colorless | N/A | Gas | Odorless | Tasteless |

| | Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Flammable | Not available | Not available | 500 F (260 C) | 44-46% | 4.0-4.3% |
| **Nitrogen** | Not flammable | Not available | Not available | Nonflammable | Nonflammable | Nonflammable |


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| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | -78 to -77 F (-61 to -60.3 C) | -123 F (-86 C) | 15200 mmHg @ 25 C | 1.2 (Air=1) | 1.192 | 2.58-2.9% @ 20 C | 4.5-<7 (saturated solution) | 0.13 ppm | Not applicable | 0.0128 cP @ 25 C |
| **Nitrogen** | -321 F (-196 C) | -346 F (-210 C) | 760 mmHg @ -196 C | 0.967 (Air=1) | Not applicable | 1.6% @ 20 C | Not applicable | Not available | Not applicable | 0.01787 cP @ 27 C |

| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | 34.08 | H2-S | 1.539 g/L @ 0 C | Not available | Not available | Not applicable | Soluble: Carbon disulfide, alcohol, ether, glycerol, gasolines, kerosene, crude oil, alkali solutions |
| **Nitrogen** | 28.0134 | N2 | 1.2506 g/L | Not available | 100% | 1 | Soluble: Liquid ammonia |

## Section 10: Stability and Reactivity

| | Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|---|
| **Hydrogen Sulfide** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Combustible materials, metals, oxidizing materials, halogens, metal oxides, metal salts, bases, rust, oxidants, oxygen, copper powder, acetaldehyde, silver fulminate |
| **Nitrogen** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Metals, oxidizing materials |

| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|
| **Hydrogen Sulfide** | Oxides of sulfur | Will not polymerize. |
| **Nitrogen** | Oxides of nitrogen | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| | Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|---|
| **Hydrogen Sulfide** | 444 ppm inhalation-rat LC50 | Irritation 0.000125 ppm/5 hour(s) eyes-human | Irritation, lack of sense of smell, sensitivity to light, nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, disorientation, tremors, visual disturbances, suffocation, lung congestion, internal bleeding, heart damage, nerve damage, brain damage, coma, death |
| **Nitrogen** | Not available | Not available | Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma |

| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| **Hydrogen Sulfide** | Irritation, sensitivity to light, visual disturbances | Irritation liquid: frostbite | Harmful if inhaled, respiratory tract irritation, skin irritation, eye irritation, blood damage |
| **Nitrogen** | Contact with rapidly expanding gas may cause burns or frostbite | No information on significant adverse effects | Difficulty breathing |

### Chronic Effects

| | Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|---|
| **Hydrogen Sulfide** | Not available | Not available | Available. | No data |
| **Nitrogen** | Not hazardous | Not available | Not available | No data |

## Section 12: Ecological Information

### Fate and Transport

| | Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|---|


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| | | | | |
|---|---|---|---|---|
| **Hydrogen Sulfide** | Fish toxicity: Acute LC50 7 ug/L Fresh water Fish - Fathead minnow - Pimephales promelas - FRY 96 hours; 14.9 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (Pimeph<br>Invertibrate toxicity: 9730 ug/L 1.5 hour(s) (Mortality) Mediterranean mussel (Mytilus galloprovincialis)<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Highly toxic to aquatic life. | Not available | Not available |
| **Nitrogen** | Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Not available | Not available |

# Section 13: Disposal Considerations

| | |
|---|---|
| **Hydrogen Sulfide** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U135. |
| **Nitrogen** | Dispose in accordance with all applicable regulations. |

# Section 14: Transportation Information

## U.S. DOT 49 CFR 172.101

### DOT Information For This Mixture

| | |
|---|---|
| **Shipping Name** | Compressed gas, n.o.s. (Nitrogen, Hydrogen Sulfide) |
| **UN Number** | UN1956 |
| **Hazard Class** | 2.2 |
| **Hazard Information** | Non-Flammable Gas |

### Individual Component Information

| | Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Hydrogen sulfide | UN1053 | 2.3 | Not applicable | 2.3; 2.1 | Forbidden | Forbidden | Toxic-Inhalation Hazard Zone B |
| **Nitrogen** | Nitrogen, compressed | UN1066 | 2.2 | Not applicable | 2.2 | 75 kg or L | 150 kg | N/A |

## Canadian Transportation of Dangerous Goods

| | Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE; or HYDROGEN SULPHIDE | UN1053 | 2.3; 2.1 | Not applicable |
| **Nitrogen** | Nitrogen, compressed | UN1066 | 2.2 | Not applicable |

# Section 15: Regulatory Information

### U.S. Regulations

| | CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|---|
| **Hydrogen Sulfide** | 100 LBS RQ | 500 LBS TPQ | 100 LBS RQ |
| **Nitrogen** | Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| | Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Yes | No | Yes | No | Yes |


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| | | | | | |
|---|---|---|---|---|---|
| **Nitrogen** | Yes | No | No | No | Yes |

### SARA 372.65

| | |
|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE: Administrative stay issued Aug. 22, 1994 |
| **Nitrogen** | Not regulated. |

### OSHA Process Safety

| | |
|---|---|
| **Hydrogen Sulfide** | 1500 LBS TQ |
| **Nitrogen** | Not regulated. |

### State Regulations

| | **CA Proposition 65** |
|---|---|
| **Hydrogen Sulfide** | Not regulated. |
| **Nitrogen** | Not regulated. |

### Canadian Regulations

| | **WHMIS Classification** |
|---|---|
| **Hydrogen Sulfide** | A, B1, D1A, D2B. |
| **Nitrogen** | A |

### National Inventory Status

| | **US Inventory (TSCA)** | **TSCA 12b Export Notification** | **Canada Inventory (DSL/NDSL)** |
|---|---|---|---|
| **Hydrogen Sulfide** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Nitrogen** | Listed on inventory. | Not listed. | Listed on inventory. |

## Section 16: Other Information

| | **NFPA Rating** |
|---|---|
| **Hydrogen Sulfide** | HEALTH=4 FIRE=4 REACTIVITY=0 |
| **Nitrogen** | HEALTH=1 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 9

# Hydrogen Sulfide Mix with Methane SDS

# Safety Data Sheet

## Hydrogen Sulfide/Carbon Monoxide/Methane/Oxygen/Nitrogen

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Hydrogen Sulfide/Carbon Monoxide/Methane/Oxygen/Nitrogen
**Synonyms:**
**Recommended Use:** Calibration Gas
**Usage Restrictions:**

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated
Toxic to aquatic life

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| | CAS # | Concentration |
|---|---|---|


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| | | |
|---|---|---|
| **Hydrogen Sulfide** | 7783-06-4 | 10 ppm - 300 ppm |
| **Carbon Monoxide** | 630-08-0 | 50 ppm - 800 ppm |
| **Methane** | 74-82-8 | 1.45% - 2.5% |
| **Oxygen** | 7782-44-7 | 12% - 20.9% |
| **Nitrogen** | 7727-37-9 | Balance |

| | Chemical Substance | Chemical Family | Trade Names |
|---|---|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE | Inorganic gases | HYDROGEN SULFIDE (H2S); DIHYDROGEN MONOSULFIDE; DIHYDROGEN SULFIDE; HYDROSULFURIC ACID; SULFUR DIHYDRIDE; SULFURETED HYDROGEN; SULFUR HYDRIDE; STINK DAMP; SEWER GAS; RCRA U135; UN 1053; H2S |
| **Carbon Monoxide** | CARBON MONOXIDE | Inorganic gases | CARBON OXIDE; CARBON OXIDE (CO); UN 1016; CO |
| **Methane** | METHANE, COMPRESSED GAS | Hydrocarbons, Aliphatic, Saturated | FIRE DAMP; MARSH GAS; METHYL HYDRIDE; NATURAL GAS; METHANE; UN 1971; R50; CH4 |
| **Oxygen** | OXYGEN, COMPRESSED GAS | Inorganic gases | OXYGEN; DIOXYGEN; MOLECULAR OXYGEN; OXYGEN MOLECULE; PURE OXYGEN; UN 1072; O2 |
| **Nitrogen** | NITROGEN, COMPRESSED GAS | Inorganic gases | DIATOMIC NITROGEN; DINITROGEN; NITROGEN; NITROGEN-14; NITROGEN GAS; UN 1066; N2 |

## Section 4: First Aid Measures

| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Carbon Monoxide** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Methane** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Oxygen** | None expected | None expected | Not likely route of exposure | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention. | None |
| **Nitrogen** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |


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## Section 5: Fire Fighting Measures

| | Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|---|
| **Hydrogen Sulfide** | Let burn unless leak can be stopped immediately. Large fires: Use regular foam or flood with fine water spray. | Sulfur oxides | ▪ Any self-contained breathing apparatus with a full facepiece.<br>▪ Protective material types: butyl rubber, polyvinyl chloride (PVC), neoprene |
| **Carbon Monoxide** | Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray. | Carbon dioxide | ▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.<br>▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. |
| **Methane** | Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray. | Carbon monoxide, carbon dioxide, water | ▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.<br>▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece. |
| **Oxygen** | Non-flammable. Use extinguishing agent appropriate for the material which is burning. Use water in large quantities for fires involving oxygen. | Oxides of burning material | ▪ Respiratory protection may be needed for frequent or heavy exposure.<br>▪ None |
| **Nitrogen** | Non-flammable. Use suitable extinguishing media for surrounding fire. Cylinders may rupture or explode if exposed to heat. | Non-flammable | ▪ Respiratory protection may be needed for frequent or heavy exposure. |

## Section 6: Accidental Release Measures

| | Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|---|
| **Hydrogen Sulfide** | Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 150 feet. For tank, rail car or tank truck: 800 meters (1/2 mile). Do not touch spilled material. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Remove sources of ignition. Reduce vapors with water spray. Do not get water directly on material. |
| **Carbon Monoxide** | Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. | Avoid heat, flames, sparks and other sources of ignition. Keep out of water supplies and sewers. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **Methane** | Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **Oxygen** | Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. | Avoid contact with combustible materials. | Stop leak if possible without personal risk. |
| **Nitrogen** | Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. | No significant effects from contamination expected. | Stop leak if possible without personal risk. |

| | Methods for Cleanup | Other Information |
|---|---|---|
| **Hydrogen Sulfide** | Collect runoff for disposal as potential hazardous waste. Dike for later disposal. Absorb with sand or other non-combustible material. Add an alkaline material (lime, crushed limestone, sodium bicarbonate, or soda ash). | Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA). |
| **Carbon Monoxide** | Stop leak, evacuate area. Wear protective equipment. | Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). |
| **Methane** | Not available | Not available |
| **Oxygen** | Stop leak and ventilate | None |
| **Nitrogen** | N/A | N/A |


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## Section 7: Handling and Storage

| | Handling | Storage |
|---|---|---|
| **Hydrogen Sulfide** | Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store in a cool, dry place. Store in a well-ventilated area. Avoid contact with light. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30). Keep separated from incompatible substances. | Subject to handling regulations: U.S. OSHA 29 CFR 1910.119. |
| **Carbon Monoxide** | Keep separated from incompatible substances. | Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. |
| **Methane** | Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |
| **Oxygen** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |
| **Nitrogen** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |

## Section 8: Exposure Controls/Personal Protection

| | Exposure Guidelines |
|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE: 20 ppm OSHA ceiling 50 ppm OSHA peak 10 minute(s) (once if no other measurable exposure occurs) 10 ppm (14 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 15 ppm (21 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 10 ppm ACGIH TWA 15 ppm ACGIH STEL 10 ppm (15 mg/m3) NIOSH recommended ceiling 10 minute(s) TLV-TWA: 1ppm Upper respiratory irritation (ACGIH) |
| **Carbon Monoxide** | CARBON MONOXIDE: 50 ppm (55 mg/m3) OSHA TWA 35 ppm (40 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 200 ppm (229 mg/m3) OSHA ceiling (vacated by 58 FR 35338, June 30, 1993) 25 ppm ACGIH TWA 35 ppm (40 mg/m3) NIOSH recommended TWA 10 hour(s) 200 ppm (229 mg/m3) NIOSH recommended ceiling |
| **Methane** | METHANE, COMPRESSED GAS: ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA METHANE: No occupational exposure limits established. ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA |
| **Oxygen** | OXYGEN, COMPRESSED GAS: No occupational exposure limits established. |
| **Nitrogen** | NITROGEN, COMPRESSED GAS: NITROGEN: ACGIH (simple asphyxiant) |

### Engineering Controls

Handle only in fully enclosed systems.

| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| **Hydrogen Sulfide** | Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. | Wear appropriate chemical resistant clothing. | Any self-contained breathing apparatus with a full facepiece. |
| **Carbon Monoxide** | Eye protection not required, but recommended. | Protective clothing is not required. | Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. |
| **Methane** | Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece. |
| **Oxygen** | Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. |
| **Nitrogen** | Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking


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## Section 9: Physical and Chemical Properties

| | Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Gas | Colorless | Colorless | N/A | Gas | Rotten egg odor | N/A |
| **Carbon Monoxide** | Gas | Colorless | Colorless | N/A | Gas | Odorless | Tasteless |
| **Methane** | Gas | Colorless | Colorless | N/A | Gas | Odorless | Tasteless |
| **Oxygen** | Gas | Clear | Colorless | N/A | Gas | Odorless | Tasteless |
| **Nitrogen** | Gas | Clear | Colorless | N/A | Gas | Odorless | Tasteless |

| | Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Flammable | Not available | Not available | 500 F (260 C) | 44-46% | 4.0-4.3% |
| **Carbon Monoxide** | Flammable | Not available | 1479.11 (log = 3.17) (estimated from water solubility) | 1128-1202 F (609-650 C) | 0.74 | 12.0-12.5% |
| **Methane** | -369 F (-223 C) | Not available | 724.44 (log = 2.87) (estimated from water solubility) | 999 F (537 C) | 15% | 5% |
| **Oxygen** | Not flammable | Not available | Not available | Nonflammable | Nonflammable | Nonflammable |
| **Nitrogen** | Not flammable | Not available | Not available | Nonflammable | Nonflammable | Nonflammable |

| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | -78 to -77 F (-61 to -60.3 C) | -123 F (-86 C) | 15200 mmHg @ 25 C | 1.2 (Air=1) | 1.192 | 2.58-2.9% @ 20 C | 4.5-<7 (saturated solution) | 0.13 ppm | Not applicable | 0.0128 cP @ 25 C |
| **Carbon Monoxide** | -312.7 F (-191.5 C) | -326 F (-199 C) | 760 mmHg @ -191 C gas; cannot be liquefied at room temperature | 0.968 (Air=1) | Not applicable | 2.3% @ 20 C | Not applicable | Not available | Not applicable | 0.01657 cP @ 0 C |
| **Methane** | -260 F (-162 C) | -297 F (-183 C) | 760 mmHg @ -161 C | 0.555 (Air=1) | Not applicable | 3.5% @ 17 C | Not applicable | Not available | Not applicable | 0.01118 cP @ 27 C |
| **Oxygen** | -297 F (-183 C) | -360 F (-218 C) | 760 mmHg @ -183 C | 1.1 (Air=1) | Not applicable | 3.2% @ 25 C | Not applicable | Not available | Not applicable | 0.02075 cP @ 25 C |
| **Nitrogen** | -321 F (-196 C) | -346 F (-210 C) | 760 mmHg @ -196 C | 0.967 (Air=1) | Not applicable | 1.6% @ 20 C | Not applicable | Not available | Not applicable | 0.01787 cP @ 27 C |

| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | 34.08 | H2-S | 1.539 g/L @ 0 C | Not available | Not available | Not applicable | Soluble: Carbon disulfide, alcohol, ether, glycerol, gasolines, kerosene, crude oil, alkali solutions |
| **Carbon Monoxide** | 28.01 | C-O | 1.250 g/L @ 0 C | Not available | 100% | Not applicable | Soluble: Alcohol, benzene, acetic acid, ethyl acetate, chloroform, cuprous chloride solutions |
| **Methane** | 16.04 | C-H4 | 0.717 g/L @ 0 C | Not available | Not applicable | Not applicable | Soluble: Alcohol, ether, benzene, organic solvents |
| **Oxygen** | 31.9988 | O2 | 1.309 g/L @ 25 C | Not available | Not applicable | Not applicable | Soluble: Alcohol |
| **Nitrogen** | 28.0134 | N2 | 1.2506 g/L | Not available | 100% | 1 | Soluble: Liquid ammonia |


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## Section 10: Stability and Reactivity

| | Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|---|
| **Hydrogen Sulfide** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Combustible materials, metals, oxidizing materials, halogens, metal oxides, metal salts, bases, rust, oxidants, oxygen, copper powder, acetaldehyde, silver fulminate |
| **Carbon Monoxide** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Oxidizing materials, halogens, metal oxides, metals, combustible materials, lithium |
| **Methane** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Halogens, oxidizing materials, combustible materials |
| **Oxygen** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Combustible materials, halo carbons, metals, bases, reducing agents, amines, metal salts, oxidizing materials, alkaline earth and alkali metals |
| **Nitrogen** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Metals, oxidizing materials |

| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|
| **Hydrogen Sulfide** | Oxides of sulfur | Will not polymerize. |
| **Carbon Monoxide** | Oxides of carbon | Will not polymerize. |
| **Methane** | Oxides of carbon | Will not polymerize. |
| **Oxygen** | Miscellaneous decomposition products | Will not polymerize. |
| **Nitrogen** | Oxides of nitrogen | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| | Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|---|
| **Hydrogen Sulfide** | 444 ppm inhalation-rat LC50 | Irritation 0.000125 ppm/5 hour(s) eyes-human | Irritation, lack of sense of smell, sensitivity to light, nausea, vomiting, difficulty breathing headache, drowsiness, dizziness, disorientation, tremors, visual disturbances, suffocation, lung congestion, internal bleeding, heart damage, nerve damage, brain damage, coma, death |
| **Carbon Monoxide** | LC50 Inhalation Gas. Rat 1807 ppm 4 hours | Not available | Changes in body temperature, changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, hallucinations, pain in extremities, tremors, loss of coordination, hearing loss, visual disturbances, eye damage, suffocation, blood disorders, convulsions, coma |
| **Methane** | Not available | Not available | Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, drowsiness, fatigue, dizziness, disorientation, mood swings, tingling sensation, loss of coordination, suffocation, convulsions, unconsciousness, coma |
| **Oxygen** | Not established | Not established | Irritation, changes in body temperature, nausea, difficulty breathing, irregular heartbeat, dizziness, disorientation, hallucinations, mood swings, pain in extremities, tremors, lung congestion, convulsions |
| **Nitrogen** | Not available | Not available | Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma |

| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| **Hydrogen Sulfide** | Irritation, sensitivity to light, visual disturbances | Irritation liquid: frostbite | Acute toxicity, Category 2, inhalation; H330: Fatal if inhaled. Specific Target Organ Toxicity (single exposure), Category 3; H335: May cause respiratory irritation. Hazardous to the aquatic environment, Acute Category 1; H400: Very toxic to aquatic life |
| **Carbon Monoxide** | No information on significant adverse effects | No information on significant adverse effects | Acute toxicity, Category 3, inhalation; H331: Toxic if inhaled. Reproductive toxicity, Category 1A; H360D: May damage the unborn child. Specific Target Organ Toxicity (repeated exposure), Category 1; H372: Causes damage to organs through prolonged or repeated exposure. |
| **Methane** | No information on significant adverse effects | No information on significant adverse effects | Difficulty breathing |
| **Oxygen** | No information on significant adverse effects | No information on significant adverse effects | No significant target effects reported. |


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| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| **Nitrogen** | Contact with rapidly expanding gas may cause burns or frostbite | No information on significant adverse effects | Difficulty breathing |

### Chronic Effects

| | Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|---|
| **Hydrogen Sulfide** | Not available | Not available | Available. | No data |
| **Carbon Monoxide** | Not available | Available. | Available. | No data |
| **Methane** | Not available | Not available | Not available | No data |
| **Oxygen** | Not known. | Available. | Available. | No data |
| **Nitrogen** | Not hazardous | Not available | Not available | No data |

## Section 12: Ecological Information

### Fate and Transport

| | Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|---|
| **Hydrogen Sulfide** | Fish toxicity: Acute LC50 7 ug/L Fresh water Fish - Fathead minnow - Pimephales promelas - FRY 96 hours; 14.9 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (Pimeph Invertibrate toxicity: 9730 ug/L 1.5 hour(s) (Mortality) Mediterranean mussel (Mytilus galloprovincialis) Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available | Highly toxic to aquatic life. | Not available | Not available |
| **Carbon Monoxide** | Fish toxicity: 75000 ug/L 1 day(s) LC100 (Mortality) Orangespotted sunfish (Lepomis humilis) Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available | Relatively non-persistent in the environment. Highly volatile from water. | Not available | Not expected to leach through the soil or the sediment. |
| **Methane** | Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available | Relatively non-persistent in the environment. Moderately volatile from water. | Accumulates very little in the bodies of living organisms. | Not expected to leach through the soil or the sediment. |
| **Oxygen** | Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available | Not available | Low bioaccumulation | Not available |
| **Nitrogen** | Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

| | |
|---|---|
| **Hydrogen Sulfide** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U135. |
| **Carbon Monoxide** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Methane** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Oxygen** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Nitrogen** | Dispose in accordance with all applicable regulations. |


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# Section 14: Transportation Information

## U.S. DOT 49 CFR 172.101

### DOT Information For This Mixture

| | |
|---|---|
| **Shipping Name** | Compressed gas, n.o.s. (Nitrogen, Oxygen) |
| **UN Number** | UN1956 |
| **Hazard Class** | 2.2 |
| **Hazard Information** | Non-Flammable Gas |

### Individual Component Information

| | Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Hydrogen sulfide | UN1053 | 2.3 | Not applicable | 2.3; 2.1 | Forbidden | Forbidden | Toxic-Inhalation Hazard Zone B |
| **Carbon Monoxide** | Carbon monoxide, compressed | UN1016 | 2.3 | Not applicable | 2.3; 2.1 | Forbidden | 25 kg | Toxic-Inhalation Hazard Zone D |
| **Methane** | Methane, compressed | UN1971 | 2.1 | Not applicable | 2.1 | Forbidden | 150 kg | N/A |
| **Oxygen** | Oxygen, compressed | UN1072 | 2.2 | Not available | 2.2; 5.1 | 75 kg or L | 150 kg | N/A |
| **Nitrogen** | Nitrogen, compressed | UN1066 | 2.2 | Not applicable | 2.2 | 75 kg or L | 150 kg | N/A |

### Canadian Transportation of Dangerous Goods

| | Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE; or HYDROGEN SULPHIDE | UN1053 | 2.3; 2.1 | Not applicable |
| **Carbon Monoxide** | Carbon monoxide, compressed | UN1016 | 2.3; 2.1 | Not applicable |
| **Methane** | Methane, compressed | UN1971 | 2.1 | Not applicable |
| **Oxygen** | Oxygen, compressed | UN1072 | 2.2; 5.1 | Not applicable |
| **Nitrogen** | Nitrogen, compressed | UN1066 | 2.2 | Not applicable |

# Section 15: Regulatory Information

### U.S. Regulations

| | CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|---|
| **Hydrogen Sulfide** | 100 LBS RQ | 500 LBS TPQ | 100 LBS RQ |
| **Carbon Monoxide** | Not regulated. | Not regulated. | Not regulated. |
| **Methane** | Not regulated. | Not regulated. | Not regulated. |
| **Oxygen** | Not regulated. | Not regulated. | Not regulated. |
| **Nitrogen** | Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| | Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|---|
| **Hydrogen Sulfide** | Yes | No | Yes | No | Yes |
| **Carbon Monoxide** | Yes | No | Yes | No | Yes |
| **Methane** | Yes | No | Yes | No | Yes |
| **Oxygen** | No | No | Yes | No | Yes |
| **Nitrogen** | Yes | No | No | No | Yes |

### SARA 372.65

| | |
|---|---|
| **Hydrogen Sulfide** | HYDROGEN SULFIDE: Administrative stay issued Aug. 22, 1994 |
| **Carbon Monoxide** | Not regulated. |


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| | |
|---|---|
| **Methane** | Not regulated. |
| **Oxygen** | Not regulated. |
| **Nitrogen** | Not regulated. |

### OSHA Process Safety

| | |
|---|---|
| **Hydrogen Sulfide** | 1500 LBS TQ |
| **Carbon Monoxide** | Not regulated. |
| **Methane** | Not regulated. |
| **Oxygen** | Not regulated. |
| **Nitrogen** | Not regulated. |

### State Regulations

| | **CA Proposition 65** |
|---|---|
| **Hydrogen Sulfide** | Not regulated. |
| **Carbon Monoxide** | Known to the state of California to cause the following: Carbon monoxide Developmental toxicity (Jul 01, 1989) |
| **Methane** | Not regulated. |
| **Oxygen** | Not regulated. |
| **Nitrogen** | Not regulated. |

### Canadian Regulations

| | **WHMIS Classification** |
|---|---|
| **Hydrogen Sulfide** | A, B1, D1A, D2B. |
| **Carbon Monoxide** | A, B1, D1A, D2A. |
| **Methane** | A, B1 |
| **Oxygen** | A,C |
| **Nitrogen** | A |

### National Inventory Status

| | **US Inventory (TSCA)** | **TSCA 12b Export Notification** | **Canada Inventory (DSL/NDSL)** |
|---|---|---|---|
| **Hydrogen Sulfide** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Carbon Monoxide** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Methane** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Oxygen** | Listed on inventory. | Not listed. | Not determined. |
| **Nitrogen** | Listed on inventory. | Not listed. | Listed on inventory. |

## Section 16: Other Information

| | **NFPA Rating** |
|---|---|
| **Hydrogen Sulfide** | HEALTH=4 FIRE=4 REACTIVITY=0 |
| **Carbon Monoxide** | HEALTH=3 FIRE=4 REACTIVITY=0 |
| **Methane** | HEALTH=1 FIRE=4 REACTIVITY=0 |
| **Oxygen** | HEALTH=0 FIRE=0 REACTIVITY=0 |
| **Nitrogen** | HEALTH=1 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 10

# Isobutylene Air SDS

# Safety Data Sheet
Isobutylene_Air

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Isobutylene_Air
**Synonyms:**
**Recommended Use:**
**Usage Restrictions:**

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| | CAS # | Concentration |
|---|---|---|
| **Isobutylene** | 115-11-7 | 1 PPM - 9,000 ppm |


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| | | |
|---|---|---|
| **Air** | Not assigned. | balance |

| | Chemical Substance | Chemical Family | Trade Names |
|---|---|---|---|
| **Isobutylene** | ISOBUTYLENE | hydrocarbons, aliphatic | 2-METHYLPROPENE; ISOBUTENE; LIQUIFIED PETROLEUM GAS; 2-METHYL-1-PROPENE; L.P.G.; GAMMA-BUTYLENE; ASYM-DIMETHYL ETHYLENE; UN 1055 |
| **Air** | AIR, COMPRESSED | | AIR; UN 1002 |

## Section 4: First Aid Measures

| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **Isobutylene** | If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention. | Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Air** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Get medical attention. | |

## Section 5: Fire Fighting Measures

| | Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|---|
| **Isobutylene** | Carbon dioxide, regular dry chemical<br>Large fires: Flood with fine water spray. | Carbon monoxide, carbon dioxide, water and toxic and irritating fumes | ▪ Any self-contained breathing apparatus with a full facepiece.<br>▪ Any self-contained breathing apparatus with a full facepiece. |
| **Air** | Use extinguishing agents appropriate for surrounding fire. | | ▪ No respirator is required under normal conditions of use. |

## Section 6: Accidental Release Measures

| | Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|---|
| **Isobutylene** | Keep unnecessary people away, isolate hazard area and deny entry. Do not touch spilled material. Ventilate closed spaces before entering. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **Air** | | | Stop leak if possible without personal risk. |

| | Methods for Cleanup | Other Information |
|---|---|---|
| **Isobutylene** | Evacuate and ventilate area. | None |
| **Air** | | |

## Section 7: Handling and Storage

| | Handling | Storage |
|---|---|---|


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| | Handling | Storage |
|---|---|---|
| **Isobutylene** | Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.110. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |
| **Air** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | |

# Section 8: Exposure Controls/Personal Protection

| | Exposure Guidelines |
|---|---|
| **Isobutylene** | TLV-TWA: 250 ppm Carcinogenicity (ACGIH) |
| **Air** | AIR, COMPRESSED: No occupational exposure limits established. |

### Engineering Controls

Handle only in fully enclosed systems.

| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| **Isobutylene** | For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. | For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing. | Any self-contained breathing apparatus with a full facepiece. |
| **Air** | Eye protection not required under normal conditions. | Protective clothing is not required under normal conditions. | No respirator is required under normal conditions of use. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

# Section 9: Physical and Chemical Properties

| | Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|---|
| **Isobutylene** | Gas | Clear | Colorless | N/A | Liquefied gas | Petroleum odor | N/A |
| **Air** | Gas | | Colorless | | | Not available | |

| | Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|---|
| **Isobutylene** | -105 F (-76 C) | Not available | Not available | 869 F (465 C) | 0.096 | 0.018 |
| **Air** | | | | | | |

| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| **Isobutylene** | 19 F (-7 C) | -220 F (-140 C) | 3278 mmHg @ 37.7 C | 1.9 (Air=1) | 0.5879 @ 25 C | Almost insoluble | Not applicable | 20 ppm (46 mg/m3) (unspecified) | Not applicable | Not available |
| **Air** | -317 F (-194 C) | Not available | 760 mmHg @ -194 C | 1 | Not applicable | Slightly soluble | Not applicable | Not available | Not applicable | 0.01853 cP @ 26.85 C |

| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|
| **Isobutylene** | 56.12 | C4-H8 | Not available | Not available | 100% | Not applicable | Soluble: Organic solvents, alcohol, ether, sulfuric acid |
| **Air** | | | 1.29 g/L @ 0 C | | | Not applicable | Slightly Soluble |


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## Section 10: Stability and Reactivity

| | Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|---|
| **Isobutylene** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Oxidizing materials |
| **Air** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | None known |

| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|
| **Isobutylene** | Oxides of carbon | Can polymerize in the presence of catalysts. |
| **Air** | No hazard expected. | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| | Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|---|
| **Isobutylene** | LC50 (rat, inhalation) = 620 g/m 3 /4 hours<br>LC50 (mouse, inhalation) = 415 g/m 3 /2 hours | Not available | Irritation, nausea, vomiting, headache, symptoms of drunkenness, disorientation, tingling sensation, suffocation, convulsions, coma |
| **Air** | Not available | Not available | |

| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| **Isobutylene** | Irritation, frostbite, blurred vision | Liquid: burns, frostbite | Central nervous system depression, difficulty breathing |
| **Air** | No information is available | No information is available | No significant target effects reported. |

### Chronic Effects

| | Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|---|
| **Isobutylene** | Not listed. | Not established | Not established | No data |
| **Air** | Not available | Not available | No data | No data |

## Section 12: Ecological Information

### Fate and Transport

| | Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|---|
| **Isobutylene** | Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not expected<br>Phyto toxicity: Not expected<br>Other toxicity: Not available | Not available | Not available | Dissipates rapidly. |
| **Air** | Fish toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

| | |
|---|---|
| **Isobutylene** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Air** | Dispose in accordance with all applicable regulations. |

## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

### DOT Information For This Mixture

| | |
|---|---|
| **Shipping Name** | Compressed gas, n.o.s. (Air, Isobutylene) |
| **UN Number** | UN1956 |
| **Hazard Class** | 2.2 |


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| | |
|---|---|
| **Hazard Information** | Non-Flammable Gas |

### Individual Component Information

| | Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|---|
| **Isobutylene** | ISOBUTYLENE see also PETROLEUM GASES, LIQUEFIED | UN1055 | 2.1 | Not applicable | 2.1 | Forbidden | 150 kg | N/A |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available | 2.2 | Not available | Not available | Not available |

### Canadian Transportation of Dangerous Goods

| | Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|---|
| **Isobutylene** | Isobutylene | UN1055 | 2.1 | Not applicable |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available |

## Section 15: Regulatory Information

### U.S. Regulations

| | CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|---|
| **Isobutylene** | Not regulated. | Not regulated. | Not regulated. |
| **Air** | Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| | Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|---|
| **Isobutylene** | Yes | No | Yes | No | Yes |
| **Air** | No | No | No | No | Yes |

### SARA 372.65

| | |
|---|---|
| **Isobutylene** | Not regulated. |
| **Air** | Not regulated. |

### OSHA Process Safety

| | |
|---|---|
| **Isobutylene** | Not regulated. |
| **Air** | Not regulated. |

### State Regulations

| | CA Proposition 65 |
|---|---|
| **Isobutylene** | Not regulated. |
| **Air** | Not regulated. |

### Canadian Regulations

| | WHMIS Classification |
|---|---|
| **Isobutylene** | A,B1 |
| **Air** | A |

### National Inventory Status

| | US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|---|
| **Isobutylene** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Air** | Not listed on inventory. | Not listed. | Not determined. |


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## Section 16: Other Information

| | NFPA Rating |
|---|---|
| **Isobutylene** | HEALTH=1 FIRE=4 REACTIVITY=0 |
| **Air** | HEALTH=0 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 11

Methane in Air SDS

# Safety Data Sheet
METHANE IN AIR

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: METHANE IN AIR
**Synonyms:** CH4/AIR
**Recommended Use:** CALIBRATION GAS
**Usage Restrictions:**

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| | CAS # | Concentration |
|---|---|---|
| lethane | 74-82-8 | 0.0001 - 2.5% |


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| | | |
|---|---|---|
| **Air** | Not applicable | Balance |

| | Chemical Substance | Chemical Family | Trade Names |
|---|---|---|---|
| **Methane** | METHANE, COMPRESSED GAS | hydrocarbons, gas | FIRE DAMP; MARSH GAS; METHYL HYDRIDE; NATURAL GAS; METHANE; UN 1971; R50; CH4 |
| **Air** | AIR, COMPRESSED | Inorganic gases | AIR; UN 1002 Nitrogen CAS: 7727-37-9 Oxygen CAS: 7782-44-7 |

## Section 4: First Aid Measures

| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **Methane** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |
| **Air** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Get medical attention. | |

## Section 5: Fire Fighting Measures

| | Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|---|
| **Methane** | Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray. | Carbon monoxide, carbon dioxide, water | ▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.<br>▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece. |
| **Air** | Use extinguishing agents appropriate for surrounding fire. | | ▪ No respirator is required under normal conditions of use. |

## Section 6: Accidental Release Measures

| | Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|---|
| **Methane** | Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **Air** | | | Stop leak if possible without personal risk. |

| | Methods for Cleanup | Other Information |
|---|---|---|
| **Methane** | Not available | Not available |
| **Air** | | |

## Section 7: Handling and Storage

| | Handling | Storage |
|---|---|---|
| **Methane** | Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |
| **Air** | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | |


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## Section 8: Exposure Controls/Personal Protection

| | Exposure Guidelines |
|---|---|
| **Methane** | METHANE, COMPRESSED GAS: ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA METHANE: No occupational exposure limits established. ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA |
| **Air** | AIR, COMPRESSED: No occupational exposure limits established. |

### Engineering Controls

Handle only in fully enclosed systems.

| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| **Methane** | Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece. |
| **Air** | Eye protection not required under normal conditions. | Protective clothing is not required under normal conditions. | No respirator is required under normal conditions of use. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| | Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|---|
| **Methane** | Gas | Colorless | Colorless | N/A | Gas, liquid | Odorless | Tasteless |
| **Air** | Gas | Clear | Colorless | | Gas | Not available | |

| | Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|---|
| **Methane** | -369 F (-223 C) | Not available | 724.44 (log = 2.87) (estimated from water solubility) | 999 F (537 C) | 15% | 5% |
| **Air** | | | | | | |

| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| **Methane** | -260 F (-162 C) | -297 F (-183 C) | 760 mmHg @ -161 C | 0.555 (Air=1) | Not applicable | 3.5% @ 17 C | Not applicable | Not available | Not applicable | 0.01118 cP @ 27 C |
| **Air** | -317 F (-194 C) | Not available | 760 mmHg @ -194 C | 1 | Not applicable | Slightly soluble | Not applicable | Not available | Not applicable | 0.01853 cP @ 26.85 C |

| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|
| **Methane** | 16.04 | C-H4 | 0.717 g/L @ 0 C | Not available | Not applicable | Not applicable | Soluble: Alcohol, ether, benzene, organic solvents |
| **Air** | | | 1.29 g/L @ 0 C | | | Not applicable | Slightly Soluble |

## Section 10: Stability and Reactivity

| | Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|---|
| **Methane** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Halogens, oxidizing materials, combustible materials |
| **Air** | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | None known |

| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|


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| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|
| **Methane** | Oxides of carbon | Will not polymerize. |
| **Air** | No hazard expected. | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| | Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|---|
| **Methane** | Not available | Not available | Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, drowsiness, fatigue, dizziness, disorientation, mood swings, tingling sensation, loss of coordination, suffocation, convulsions, unconsciousness, coma |
| **Air** | Not available | Not available | |

| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| **Methane** | No information on significant adverse effects | No information on significant adverse effects | Difficulty breathing |
| **Air** | No information is available | No information is available | No significant target effects reported. |

### Chronic Effects

| | Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|---|
| **Methane** | Not available | Not available | Not available | No data |
| **Air** | Not available | Not available | No data | No data |

## Section 12: Ecological Information

### Fate and Transport

| | Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|---|
| **Methane** | Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Relatively non-persistent in the environment. Moderately volatile from water. | Accumulates very little in the bodies of living organisms. | Not expected to leach through the soil or the sediment. |
| **Air** | Fish toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

| | |
|---|---|
| **Methane** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Air** | Dispose in accordance with all applicable regulations. |

## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

### DOT Information For This Mixture

| | |
|---|---|
| **Shipping Name** | Compressed gas, n.o.s. (Air, Methane) |
| **UN Number** | UN1956 |
| **Hazard Class** | 2.2 |


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| Hazard Information | Non-Flammable Gas |
|---|---|

### Individual Component Information

| | Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|---|
| **Methane** | Methane, compressed | UN1971 | 2.1 | Not applicable | 2.1 | Forbidden | 150 kg | N/A |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available | 2.2 | Not available | Not available | Not available |

### Canadian Transportation of Dangerous Goods

| | Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|---|
| **Methane** | Methane, compressed | UN1971 | 2.1 | Not applicable |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available |

## Section 15: Regulatory Information

### U.S. Regulations

| | CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|---|
| **Methane** | Not regulated. | Not regulated. | Not regulated. |
| **Air** | Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| | Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|---|
| **Methane** | Yes | No | Yes | No | Yes |
| **Air** | No | No | No | No | Yes |

### SARA 372.65

| | |
|---|---|
| **Methane** | Not regulated. |
| **Air** | Not regulated. |

### OSHA Process Safety

| | |
|---|---|
| **Methane** | Not regulated. |
| **Air** | Not regulated. |

### State Regulations

| | CA Proposition 65 |
|---|---|
| **Methane** | Not regulated. |
| **Air** | Not regulated. |

### Canadian Regulations

| | WHMIS Classification |
|---|---|
| **Methane** | A, B1 |
| **Air** | A |

### National Inventory Status

| | US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|---|
| **Methane** | Listed on inventory. | Not listed. | Listed on inventory. |
| **Air** | Not listed on inventory. | Not listed. | Not determined. |

## Section 16: Other Information

| | NFPA Rating |
|---|---|
| **Methane** | HEALTH=1 FIRE=4 REACTIVITY=0 |


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| | |
|---|---|
| **Air** | HEALTH=0 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 12

Nitrogen SDS

# Safety Data Sheet
Nitrogen

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Nitrogen

## Section 2: Hazards Identification

**Warning**

### Hazard Classification:
Gases Under Pressure

### Hazard Statements:
Contains gas under pressure; may explode if heated

### Precautionary Statements

**Storage:**
Protect from sunlight.
Store in well-ventilated place.

## Section 3: Composition/Information on Ingredients

| CAS # |
|---|
| 7727-37-9 |


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| Chemical Substance | Chemical Family | Trade Names |
|---|---|---|
| NITROGEN, COMPRESSED GAS | inorganic, gas | DIATOMIC NITROGEN; DINITROGEN; NITROGEN; NITROGEN-14; NITROGEN GAS; UN 1066; N2 |

## Section 4: First Aid Measures

| Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|
| Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention. | For inhalation, consider oxygen. |

## Section 5: Fire Fighting Measures

| Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|
| Non-flammable. Use suitable extinguishing media for surrounding fire. Cylinders may rupture or explode if exposed to heat. | Non-flammable | ▪ Respiratory protection may be needed for frequent or heavy exposure. |

## Section 6: Accidental Release Measures

| Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|
| Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. | No significant effects from contamination expected. | Stop leak if possible without personal risk. |

| Methods for Cleanup | Other Information |
|---|---|
| N/A | N/A |

## Section 7: Handling and Storage

| Handling | Storage |
|---|---|
| Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | Keep separated from incompatible substances. |

## Section 8: Exposure Controls/Personal Protection

| Exposure Guidelines |
|---|
| NITROGEN, COMPRESSED GAS: NITROGEN: ACGIH (simple asphyxiant) |

### Engineering Controls

Handle only in fully enclosed systems.

| Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|
| Eye protection not required, but recommended. | Protective clothing is not required. | Respiratory protection may be needed for frequent or heavy exposure. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking


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## Section 9: Physical and Chemical Properties

| Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|
| Gas | Clear | Colorless | N/A | Gas | Odorless | Tasteless |

| Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|
| Not flammable | Not available | Not available | Nonflammable | Nonflammable | Nonflammable |

| Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|
| -321 F (-196 C) | -346 F (-210 C) | 760 mmHg @ -196 C | 0.967 (Air=1) | Not applicable | 1.6% @ 20 C | Not applicable | Not available | Not applicable | 0.01787 cP @ 27 C |

| Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|
| 28.0134 | N2 | 1.2506 g/L | Not available | 100% | 1 | Soluble: Liquid ammonia |

## Section 10: Stability and Reactivity

| Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|
| Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Metals, oxidizing materials |

| Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|
| Oxides of nitrogen | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|
| Not available | Not available | Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma |

| Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|
| Contact with rapidly expanding gas may cause burns or frostbite | No information on significant adverse effects | Difficulty breathing |

### Chronic Effects

| Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|
| Not hazardous | Not available | Not available | No data |

## Section 12: Ecological Information

### Fate and Transport

| Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|
| Fish toxicity: Not available<br>Invertibrate toxicity: Not available<br>Algal toxicity: Not available<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Not available | Not available |

## Section 13: Disposal Considerations

Dispose in accordance with all applicable regulations.


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## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

| Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|
| Nitrogen, compressed | UN1066 | 2.2 | Not applicable | 2.2 | 75 kg or L | 150 kg | N/A |

### Canadian Transportation of Dangerous Goods

| Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|
| Nitrogen, compressed | UN1066 | 2.2 | Not applicable |

## Section 15: Regulatory Information

### U.S. Regulations

| CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|
| Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|
| Yes | No | No | No | Yes |

### SARA 372.65

Not regulated.

### OSHA Process Safety

Not regulated.

### State Regulations

| CA Proposition 65 |
|---|
| Not regulated. |

### Canadian Regulations

| WHMIS Classification |
|---|
| A |

### National Inventory Status

| US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|
| Listed on inventory. | Not listed. | Listed on inventory. |

## Section 16: Other Information

| NFPA Rating |
|---|
| HEALTH=1 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 13

Pentane in Air SDS

# Safety Data Sheet
Pentane/Air

## Section 1: Product and Company Identification

**SpecAir Specialty Gases**
22 Albiston Way
Auburn, ME 04210
Phone: 207-784-5788
Toll Free: 800-292-6218
Fax: 207-784-5383
http://www.specair.com/

Product Code: Pentane/Air
**Synonyms:**
**Recommended Use:**
**Usage Restrictions:**

## Section 2: Hazards Identification

**Danger**

### Hazard Classification:
Aspiration Hazard (Category 1)
Gases Under Pressure
Specific target organ toxicity (Single Exposure) (Category 3)

### Hazard Statements:
Contains gas under pressure; may explode if heated
May be fatal if swallowed and enters airways
May cause respiratory irritation;
Toxic to aquatic life with long lasting effects

### Precautionary Statements
**Prevention:**
Use only outdoors or in a well-ventilated area.
Avoid breathing dust/fume/gas/mist/ vapors/spray.
[In case of inadequate ventilation] wear respiratory protection.

**Response:**
Do NOT induce vomiting.
If swallowed: Rinse mouth. Do NOT induce vomiting.
Immediately call a poison center or doctor.
If inhaled: Remove person to fresh air and keep comfortable for breathing.

**Storage:**
Store in a well-ventilated place. Keep container tightly closed.


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Protect from sunlight.
Store locked up.

**Disposal:**
Dispose of contents and/or container in accordance with applicable regulations.

## Section 3: Composition/Information on Ingredients

| | CAS # | Concentration |
|---|---|---|
| **n-Pentane** | 109-66-0 | 0.35% - 0.75% |
| **Air** | Not applicable | Balance |

| | Chemical Substance | Chemical Family | Trade Names |
|---|---|---|---|
| **n-Pentane** | N-PENTANE | Hydrocarbons, Aliphatic, Saturated | PENTANE; AMYL HYDRIDE; UN 1265; C5H12 |
| **Air** | AIR, COMPRESSED | Inorganic gases | AIR; UN 1002 Nitrogen CAS: 7727-37-9 Oxygen CAS: 7782-44-7 |

## Section 4: First Aid Measures

| | Skin Contact | Eye Contact | Ingestion | Inhalation | Note to Physicians |
|---|---|---|---|---|---|
| **n-Pentane** | Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. | Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention. | Aspiration hazard. DO NOT induce vomiting. If vomiting occurs, keep head lower than hips to help prevent aspiration. Get immediate medical attention. Give artificial respiration if not breathing. | If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention. | Not available |
| **Air** | Wash exposed skin with soap and water. | Flush eyes with plenty of water. | If a large amount is swallowed, get medical attention. | If adverse effects occur, remove to uncontaminated area. Get medical attention. | |

## Section 5: Fire Fighting Measures

| | Suitable Extinguishing Media | Products of Combustion | Protection of Firefighters |
|---|---|---|---|
| **n-Pentane** | Regular dry chemical, carbon dioxide, water, regular foam Large fires: Use regular foam or flood with fine water spray. | Carbon monoxide, carbon dioxide and toxic and irritating fumes | ▪ Any self-contained breathing apparatus with a full facepiece.<br>▪ Any self-contained breathing apparatus with a full facepiece. |
| **Air** | Use extinguishing agents appropriate for surrounding fire. | | ▪ No respirator is required under normal conditions of use. |

## Section 6: Accidental Release Measures

| | Personal Precautions | Environmental Precautions | Methods for Containment |
|---|---|---|---|
| **n-Pentane** | Keep unnecessary people away, isolate hazard area and deny entry. | Avoid heat, flames, sparks and other sources of ignition. | Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition. |
| **Air** | | | Stop leak if possible without personal risk. |


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| | Methods for Cleanup | Other Information |
|---|---|---|
| n-entane | Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. | Not available |
| ir | | |

## Section 7: Handling and Storage

| | Handling | Storage |
|---|---|---|
| n-Pentane | Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125F (52C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods. | Do not get liquid in eyes, on skin, or clothing. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Open valve slowly. Close cylinder valve after each use; keep closed even when empty. If valve is hard to open, discontinue use and contact your supplier. |
| Air | Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. | |

## Section 8: Exposure Controls/Personal Protection

| | Exposure Guidelines |
|---|---|
| n-Pentane | PENTANE: 1000 ppm (2950 mg/m3) OSHA TWA 600 ppm (1770 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 750 ppm (2210 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 600 ppm ACGIH TWA 120 ppm (350 mg/m3) NIOSH recommended TWA 10 hour(s) 610 ppm (1800 mg/m3) NIOSH recommended ceiling 15 minute(s) |
| Air | AIR, COMPRESSED: No occupational exposure limits established. |

### Engineering Controls

Handle only in fully enclosed systems.

| | Eye Protection | Skin Protection | Respiratory Protection |
|---|---|---|---|
| entane | Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. | Wear appropriate chemical resistant clothing. | Any self-contained breathing apparatus with a full facepiece. |
| Air | Eye protection not required under normal conditions. | Protective clothing is not required under normal conditions. | No respirator is required under normal conditions of use. |

### General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

## Section 9: Physical and Chemical Properties

| | Physical State | Appearance | Color | Change in Appearance | Physical Form | Odor | Taste |
|---|---|---|---|---|---|---|---|
| n-Pentane | Liquid | Clear | Colorless | N/A | Liquid | Gasoline odor | N/A |
| Air | Gas | Clear | Colorless | | Gas | Not available | |

| | Flash Point | Flammability | Partition Coefficient | Autoignition Temperature | Upper Explosive Limits | Lower Explosive Limits |
|---|---|---|---|---|---|---|
| n-Pentane | <-40 F (<-40 C) (CC) | IA | Not available | 500 F (260 C) | 0.078 | 0.014 |
| Air | | | | | | |

| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| n-Pentane | 96.93 F (36.07 C) | -201.5 F (-129.7 C) | 400 mmHg @ 18.5 C | 2.5 (Air=1) | 0.626 | 0.0004 | Not available | 2.2-5000 ppm | 28.6 (butyl acetate=1) | <32 SUS |


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| | Boiling Point | Freezing Point | Vapor Pressure | Vapor Density | Specific Gravity | Water Solubility | pH | Odor Threshold | Evaporation Rate | Viscosity |
|---|---|---|---|---|---|---|---|---|---|---|
| Air | -317 F (-194 C) | Not available | 760 mmHg @ -194 C | 1 | Not applicable | Slightly soluble | Not applicable | Not available | Not applicable | 0.01853 cP @ 26.85 C |

| | Molecular Weight | Molecular Formula | Density | Weight per Gallon | Volatility by Volume | Volatility | Solvent Solubility |
|---|---|---|---|---|---|---|---|
| n-Pentane | 72.15g/mol | C5-H12 | Not available | Not available | Not available | Not available | Soluble: Alcohol, ether, acetone, benzene, chloroform |
| Air | | | 1.29 g/L @ 0 C | | | Not applicable | Slightly Soluble |

## Section 10: Stability and Reactivity

| | Stability | Conditions to Avoid | Incompatible Materials |
|---|---|---|---|
| n-Pentane | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | Oxidizing materials, combustible materials, halogen compounds |
| Air | Stable at normal temperatures and pressure. | Stable at normal temperatures and pressure. | None known |

| | Hazardous Decomposition Products | Possibility of Hazardous Reactions |
|---|---|---|
| n-Pentane | Oxides of carbon | Will not polymerize. |
| Air | No hazard expected. | Will not polymerize. |

## Section 11: Toxicology Information

### Acute Effects

| | Oral LD50 | Dermal LD50 | Inhalation |
|---|---|---|---|
| n-Pentane | >2000 mg/kg oral-rat LD50 | Not available | Irritation, nausea, difficulty breathing, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, central nervous system depression, asphyxiant |
| Air | Not available | Not available | |

| | Eye Irritation | Skin Irritation | Sensitization |
|---|---|---|---|
| n-Pentane | Irritation | Irritation | Specific Target Organ Toxicity (single exposure), Category 3; H336: May cause drowsiness or dizziness. Aspiration hazard, Category 1; H304: May be fatal if swallowed and enters airways. |
| Air | No information is available | No information is available | No significant target effects reported. |

### Chronic Effects

| | Carcinogenicity | Mutagenicity | Reproductive Effects | Developmental Effects |
|---|---|---|---|---|
| n-Pentane | Not available | Not available | Not available | No data |
| Air | Not available | Not available | No data | No data |

## Section 12: Ecological Information

### Fate and Transport

| | Eco toxicity | Persistence / Degradability | Bioaccumulation / Accumulation | Mobility in Environment |
|---|---|---|---|---|
| n-Pentane | Fish toxicity: Not available<br>Invertibrate toxicity: 3000000 ug/L 48 week(s) (Mortality) Pacific oyster (Crassostrea gigas)<br>Algal toxicity: 1000 ug/L 8 year(s) EC50 (Photosynthesis) Algae,phytoplankton,algal mat (Algae)<br>Phyto toxicity: Not available<br>Other toxicity: Not available | Not available | Not available | Not available |


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| | | | | |
|---|---|---|---|---|
| **Air** | Fish toxicity: Not available | Not available | Not available | Not available |

## ection 13: Disposal Considerations

| | |
|---|---|
| **n-Pentane** | Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. |
| **Air** | Dispose in accordance with all applicable regulations. |

## Section 14: Transportation Information

### U.S. DOT 49 CFR 172.101

#### DOT Information For This Mixture

| | |
|---|---|
| **Shipping Name** | Compressed gas, n.o.s. (Air, n-Pentane) |
| **UN Number** | UN1956 |
| **Hazard Class** | 2.2 |
| **Hazard Information** | Non-Flammable Gas |

#### Individual Component Information

| | Proper Shipping Name | ID Number | Hazard Class or Division | Packing Group | Labeling Requirements | Passenger Aircraft or Railcar Quantity Limitations | Cargo Aircraft Only Quantity Limitations | Additional Shipping Description |
|---|---|---|---|---|---|---|---|---|
| **n-Pentane** | Pentanes | UN1265 | 3 | II | 3 | N/A | N/A | N/A |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available | 2.2 | Not available | Not available | Not available |

#### Canadian Transportation of Dangerous Goods

| | Shipping Name | UN Number | Class | Packing Group / Risk Group |
|---|---|---|---|---|
| **n-Pentane** | Pentanes | UN1265 | 3 | II |
| **Air** | Air, compressed | UN1002 | 2.2 | Not available |

## Section 15: Regulatory Information

### U.S. Regulations

| | CERCLA Sections | SARA 355.30 | SARA 355.40 |
|---|---|---|---|
| **n-Pentane** | Not regulated. | Not regulated. | Not regulated. |
| **Air** | Not regulated. | Not regulated. | Not regulated. |

### SARA 370.21

| | Acute | Chronic | Fire | Reactive | Sudden Release |
|---|---|---|---|---|---|
| **n-Pentane** | Yes | No | Yes | No | No |
| **Air** | No | No | No | No | Yes |

### SARA 372.65

| | |
|---|---|
| **n-Pentane** | Not regulated. |
| **Air** | Not regulated. |

### OSHA Process Safety

| | |
|---|---|
| **n-Pentane** | Not regulated. |
| **Air** | Not regulated. |


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### State Regulations

| | CA Proposition 65 |
|---|---|
| **n-Pentane** | Not regulated. |
| **Air** | Not regulated. |

### Canadian Regulations

| | WHMIS Classification |
|---|---|
| **n-Pentane** | B2 |
| **Air** | A |

### National Inventory Status

| | US Inventory (TSCA) | TSCA 12b Export Notification | Canada Inventory (DSL/NDSL) |
|---|---|---|---|
| **n-Pentane** | Listed on inventory. | PENTANE CAS NUMBER: 109-66-0 SECTION 4 | Listed on inventory. |
| **Air** | Not listed on inventory. | Not listed. | Not determined. |

## Section 16: Other Information

| | NFPA Rating |
|---|---|
| **n-Pentane** | HEALTH=2 FIRE=4 REACTIVITY=0 |
| **Air** | HEALTH=0 FIRE=0 REACTIVITY=0 |

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard


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## ATTACHMENT 14

# SDS Buffer Solution pH 4.00

# Buffer Solution pH 4.00

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 07/19/2013 Revision date: 12/21/2016 Supersedes: 08/06/2014 Version: 1.3

## SECTION 1: Identification

### 1.1. Identification

Product form : Mixture

Product name : Buffer Solution pH 4.00

Product code : LC12270

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : For laboratory and manufacturing use only.

Recommended use : Laboratory chemicals

Restrictions on use : Not for food, drug or household use

### 1.3. Details of the supplier of the safety data sheet

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Not classified

### 2.2. Label elements

Not classified as a hazardous chemical.

### 2.3. Other hazards

Other hazards not contributing to the classification : None.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substance

Not applicable

### 3.2. Mixture

| Name | Product identifier | % | GHS-US classification |
|---|---|---|---|
| Water | (CAS No) 7732-18-5 | 98.94 | Not classified |
| Potassium Hydrogen Phthalate | (CAS No) 877-24-7 | 1.02 | Eye Irrit. 2B, H320 |
| Formaldehyde, 37% w/w | (CAS No) 50-00-0 | 0.04 | Flam. Liq. 3, H226<br>Acute Tox. 4 (Oral), H302<br>Acute Tox. 4 (Dermal), H312<br>Acute Tox. 2 (Inhalation:vapour), H330<br>Skin Corr. 1C, H314<br>Eye Dam. 1, H318<br>Carc. 1A, H350<br>STOT SE 1, H370<br>Aquatic Acute 2, H401 |

Full text of hazard classes and H-statements : see section 16

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persist.

First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : Not expected to present a significant hazard under anticipated conditions of normal use.

### 4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

### 5.2. Special hazards arising from the substance or mixture

Reactivity : None.

### 5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

Protective equipment : Safety glasses.

Emergency procedures : Evacuate unnecessary personnel.

#### 6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

### 6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

### 6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.

Hygiene measures : Do not eat, drink or smoke when using this product.

### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container closed when not in use.

Incompatible products : Strong oxidizers.

Incompatible materials : None known.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

| Potassium Hydrogen Phthalate (877-24-7) |
|---|
| Not applicable |

| Formaldehyde, 37% w/w (50-00-0) | | |
|---|---|---|
| ACGIH | ACGIH Ceiling (mg/m³) | 0.37 mg/m³ |
| OSHA | OSHA PEL (TWA) (ppm) | 0.75 ppm |
| OSHA | OSHA PEL (STEL) (ppm) | 2 ppm |
| IDLH | US IDLH (ppm) | 20 ppm |
| NIOSH | NIOSH REL (TWA) (ppm) | 0.016 ppm |
| NIOSH | NIOSH REL (ceiling) (ppm) | 0.1 ppm 15 min. |

| Water (7732-18-5) |
|---|
| Not applicable |

### 8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure.

Personal protective equipment : Safety glasses. Gloves.

Hand protection : Wear protective gloves.

Eye protection : Chemical goggles or safety glasses.

Respiratory protection : Respiratory protection not required in normal conditions.

Other information : Do not eat, drink or smoke during use.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state : Liquid

Color : Colorless

Odor : Odorless

Odor threshold : No data available

pH : 4

Melting point : No data available

Freezing point : No data available

Boiling point : No data available

Flash point : No data available

Relative evaporation rate (butyl acetate=1) : No data available

Flammability (solid, gas) : Non flammable.

Vapor pressure : No data available

Relative vapor density at 20 °C : No data available

Relative density : No data available

Specific gravity / density : 1

Solubility : Soluble in water.

Log Pow : No data available

Auto-ignition temperature : No data available

Decomposition temperature : No data available

Viscosity, kinematic : No data available

Viscosity, dynamic : No data available

Explosion limits : No data available

Explosive properties : Not applicable.

Oxidizing properties : None.

### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

None.

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

None.

### 10.4. Conditions to avoid

Extremely high or low temperatures.

### 10.5. Incompatible materials

Strong oxidizers.

### 10.6. Hazardous decomposition products

Formaldehyde. Carbon monoxide. Carbon dioxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Likely routes of exposure : Skin and eye contact

Acute toxicity : Not classified

| Potassium Hydrogen Phthalate (877-24-7) | |
|---|---|
| LD50 oral rat | ≥ 3200 mg/kg |
| ATE US (oral) | 3200.000 mg/kg body weight |

| Formaldehyde, 37% w/w (50-00-0) | |
|---|---|
| LD50 oral rat | 500 mg/kg |
| ATE US (oral) | 500.000 mg/kg body weight |
| ATE US (dermal) | 2000.000 mg/kg body weight |
| ATE US (vapors) | 0.578 mg/l/4h |

| Water (7732-18-5) | |
|---|---|
| LD50 oral rat | ≥ 90000 mg/kg |
| ATE US (oral) | 90000.000 mg/kg body weight |

Skin corrosion/irritation : Not classified
pH: 4

Serious eye damage/irritation : Not classified
pH: 4

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

| Formaldehyde, 37% w/w (50-00-0) | |
|---|---|
| IARC group | 1 - Carcinogenic to humans |

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

## SECTION 12: Ecological information

### 12.1. Toxicity

| Formaldehyde, 37% w/w (50-00-0) | |
|---|---|
| LC50 fish 1 | 41 mg/l (LC50; 96 h) |
| EC50 Daphnia 1 | 14.7 mg/l (EC50; 24 h) |
| EC50 Daphnia 2 | 2 mg/l |
| Threshold limit algae 1 | 2.5 mg/l (EC0; 192 h) |

### 12.2. Persistence and degradability

| Buffer Solution pH 4.00 | |
|---|---|
| Persistence and degradability | Not established. |
| **Potassium Hydrogen Phthalate (877-24-7)** | |
| Persistence and degradability | Not established. |
| **Formaldehyde, 37% w/w (50-00-0)** | |
| Persistence and degradability | Readily biodegradable in water. Biodegradability in soil: no data available. No test data on mobility of the components available. Photodegradation in the air. |
| Biochemical oxygen demand (BOD) | 0.64 g $O_2$/g substance |
| Chemical oxygen demand (COD) | 1.06 g $O_2$/g substance |
| ThOD | 1.068 g $O_2$/g substance |
| BOD (% of ThOD) | 0.6 (5 days; Literature study) |
| **Water (7732-18-5)** | |
| Persistence and degradability | Not established. |

### 12.3. Bioaccumulative potential

| Buffer Solution pH 4.00 | |
|---|---|
| Bioaccumulative potential | Not established. |
| **Potassium Hydrogen Phthalate (877-24-7)** | |
| Bioaccumulative potential | Not established. |
| **Formaldehyde, 37% w/w (50-00-0)** | |
| Log Pow | -0.78 - 0.0 |
| Bioaccumulative potential | Bioaccumulation: not applicable. |
| **Water (7732-18-5)** | |
| Bioaccumulative potential | Not established. |

### 12.4. Mobility in soil

| Formaldehyde, 37% w/w (50-00-0) | |
|---|---|
| Ecology - soil | Toxic to flora. |

### 12.5. Other adverse effects

Effect on the global warming : No known effects from this product.

GWPmix comment : No known effects from this product.

Other information : Avoid release to the environment.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations.

Ecology - waste materials : Avoid release to the environment.

## SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

Not regulated

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

| **Formaldehyde, 37% w/w (50-00-0)** | |
|---|---|
| RQ (Reportable quantity, section 304 of EPA's List of Lists) | 100 lb |
| SARA Section 311/312 Hazard Classes | Immediate (acute) health hazard<br>Delayed (chronic) health hazard |
| SARA Section 313 - Emission Reporting | 0.1 % |

### 15.2. International regulations

**CANADA**

| **Buffer Solution pH 4.00** | |
|---|---|
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

| **Potassium Hydrogen Phthalate (877-24-7)** | |
|---|---|
| WHMIS Classification | Class D Division 2 Subdivision B - Toxic material causing other toxic effects |

| **Formaldehyde, 37% w/w (50-00-0)** | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class B Division 3 - Combustible Liquid<br>Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects<br>Class D Division 2 Subdivision A - Very toxic material causing other toxic effects<br>Class D Division 2 Subdivision B - Toxic material causing other toxic effects<br>Class E - Corrosive Material |

| **Water (7732-18-5)** | |
|---|---|
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

**EU-Regulations**

No additional information available

**National regulations**

| **Formaldehyde, 37% w/w (50-00-0)** |
|---|
| Listed on the Canadian IDL (Ingredient Disclosure List) |

### 15.3. US State regulations

California Proposition 65 - This product contains, or may contain, trace quantities of a substance(s) known to the state of California to cause cancer, developmental and/or reproductive harm

| **Formaldehyde, 37% w/w (50-00-0)** | | | | |
|---|---|---|---|---|
| U.S. - California - Proposition 65 - Carcinogens List | U.S. - California - Proposition 65 - Developmental Toxicity | U.S. - California - Proposition 65 - Reproductive Toxicity - Female | U.S. - California - Proposition 65 - Reproductive Toxicity - Male | Non-significant risk level (NSRL) |
| Yes | Yes | No | No | 40 µg/day |

## SECTION 16: Other information

Revision date : 12/21/2016

Other information : None.

ccording to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

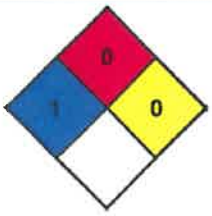
Full text of H-phrases: see section 16:

| | |
|---|---|
| H226 | Flammable liquid and vapor |
| H302 | Harmful if swallowed |
| H312 | Harmful in contact with skin |
| H314 | Causes severe skin burns and eye damage |
| H318 | Causes serious eye damage |
| H320 | Causes eye irritation |
| H330 | Fatal if inhaled |
| H350 | May cause cancer |
| H370 | Causes damage to organs |
| H401 | Toxic to aquatic life |

NFPA health hazard : 1 - Exposure could cause irritation but only minor residual injury even if no treatment is given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.




HMIS III Rating

Health : 1 Slight Hazard - Irritation or minor reversible injury possible

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : A

A - Safety glasses

SDS US LabChem

*Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.*

## ATTACHMENT 15

SDS Buffer Solution pH 7.00

# Buffer Solution pH 7.00

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 07/22/2013 Revision date: 12/22/2016 Supersedes: 07/22/2013 Version: 1.1

## SECTION 1: Identification

### 1.1. Identification

Product form : Mixture

Product name : Buffer Solution pH 7.00

Product code : LC12370

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : For laboratory and manufacturing use only.

Recommended use : Laboratory chemicals

Restrictions on use : Not for food, drug or household use

### 1.3. Details of the supplier of the safety data sheet

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Not classified

### 2.2. Label elements

Not classified as a hazardous chemical.

### 2.3. Other hazards

Other hazards not contributing to the classification : None.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substance

Not applicable

### 3.2. Mixture

| Name | Product identifier | % | GHS-US classification |
|---|---|---|---|
| Water | (CAS No) 7732-18-5 | 99.24 | Not classified |
| Potassium Phosphate, Monobasic | (CAS No) 7778-77-0 | 0.68 | Not classified |
| Sodium Hydroxide | (CAS No) 1310-73-2 | 0.08 | Acute Tox. 4 (Dermal), H312<br>Skin Corr. 1A, H314<br>Eye Dam. 1, H318<br>Aquatic Acute 3, H402 |

Full text of hazard classes and H-statements : see section 16

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persist.

First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : Not expected to present a significant hazard under anticipated conditions of normal use.

### 4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

### 5.2. Special hazards arising from the substance or mixture

No additional information available

### 5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

Protective equipment : Safety glasses.

Emergency procedures : Evacuate unnecessary personnel.

#### 6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

### 6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

### 6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.

### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container closed when not in use.

Incompatible products : Strong oxidizers.

Incompatible materials : None known.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

| **Potassium Phosphate, Monobasic (7778-77-0)** |
|---|
| Not applicable |

| **Sodium Hydroxide (1310-73-2)** | | |
|---|---|---|
| ACGIH | ACGIH Ceiling (mg/m³) | 2 mg/m³ (Sodium hydroxide; USA; Momentary value; TLV - Adopted Value) |
| OSHA | OSHA PEL (TWA) (mg/m³) | 2 mg/m³ |
| IDLH | US IDLH (mg/m³) | 10 mg/m³ |
| NIOSH | NIOSH REL (ceiling) (mg/m³) | 2 mg/m³ |

| Water (7732-18-5) |
|---|
| Not applicable |

### 8.2. Exposure controls

Personal protective equipment : Safety glasses.

Eye protection : Chemical goggles or safety glasses.

Respiratory protection : Respiratory protection not required in normal conditions.

Other information : Do not eat, drink or smoke during use.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| | |
|---|---|
| Physical state | : Liquid |
| Appearance | : Clear, colorless liquid. |
| Color | : Colorless |
| Odor | : None. |
| Odor threshold | : No data available |
| pH | : 7 |
| Melting point | : No data available |
| Freezing point | : No data available |
| Boiling point | : No data available |
| Flash point | : No data available |
| Relative evaporation rate (butyl acetate=1) | : No data available |
| Flammability (solid, gas) | : Non flammable. |
| Vapor pressure | : No data available |
| Relative vapor density at 20 °C | : No data available |
| Relative density | : No data available |
| Solubility | : Soluble in water. |
| Log Pow | : No data available |
| Auto-ignition temperature | : No data available |
| Decomposition temperature | : No data available |
| Viscosity, kinematic | : No data available |
| Viscosity, dynamic | : No data available |
| Explosion limits | : No data available |
| Explosive properties | : No data available |
| Oxidizing properties | : No data available |

### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No additional information available

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

Not established.

### 10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

### 10.5. Incompatible materials

Strong oxidizers.

### 10.6. Hazardous decomposition products

Phosphorus oxides. Sodium oxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Likely routes of exposure : Skin and eye contact

Acute toxicity : Not classified

| Potassium Phosphate, Monobasic (7778-77-0) | |
|---|---|
| LD50 dermal rabbit | 4640 mg/kg |
| ATE US (dermal) | 4640.000 mg/kg body weight |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| ATE US (dermal) | 1350.000 mg/kg body weight |

| Water (7732-18-5) | |
|---|---|
| LD50 oral rat | ≥ 90000 mg/kg |
| ATE US (oral) | 90000.000 mg/kg body weight |

Skin corrosion/irritation : Not classified
pH: 7

Serious eye damage/irritation : Not classified
pH: 7

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

## SECTION 12: Ecological information

### 12.1. Toxicity

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| LC50 fish 1 | 45.4 mg/l (LC50; Other; 96 h; Salmo gairdneri; Static system; Fresh water; Experimental value) |

### 12.2. Persistence and degradability

| Buffer Solution pH 7.00 | |
|---|---|
| Persistence and degradability | Not established. |

| Potassium Phosphate, Monobasic (7778-77-0) | |
|---|---|
| Persistence and degradability | Not established. |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| Persistence and degradability | Biodegradability: not applicable. No test data on mobility of the substance available. |
| Biochemical oxygen demand (BOD) | Not applicable |
| Chemical oxygen demand (COD) | Not applicable |
| ThOD | Not applicable |

| Water (7732-18-5) | |
|---|---|
| Persistence and degradability | Not established. |

### 12.3. Bioaccumulative potential

| Buffer Solution pH 7.00 | |
|---|---|
| Bioaccumulative potential | Not established. |

| Potassium Phosphate, Monobasic (7778-77-0) | |
|---|---|
| Bioaccumulative potential | Not established. |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| Bioaccumulative potential | No bioaccumulation data available. |

| Water (7732-18-5) | |
|---|---|
| Bioaccumulative potential | Not established. |

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

Effect on the global warming : No known effects from this product.

GWPmix comment : No known effects from this product.

Other information : Avoid release to the environment.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations.

Ecology - waste materials : Avoid release to the environment.

## SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

Not regulated

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| RQ (Reportable quantity, section 304 of EPA's List of Lists) | 1000 lb |
| SARA Section 311/312 Hazard Classes | Immediate (acute) health hazard |

### 15.2. International regulations

**CANADA**

| Buffer Solution pH 7.00 | |
|---|---|
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

| Potassium Phosphate, Monobasic (7778-77-0) | |
|---|---|
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class E - Corrosive Material |

| Water (7732-18-5) | |
|---|---|
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

### EU-Regulations
No additional information available

### National regulations
No additional information available

### 15.3. US State regulations
California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

## SECTION 16: Other information

Revision date : 12/22/2016

Other information : None.

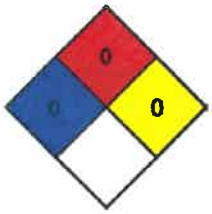
Full text of H-phrases: see section 16:

| | |
|---|---|
| H312 | Harmful in contact with skin |
| H314 | Causes severe skin burns and eye damage |
| H318 | Causes serious eye damage |
| H402 | Harmful to aquatic life |

NFPA health hazard : 0 - Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.




HMIS III Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : A

A - Safety glasses

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## ATTACHMENT 16

# SDS Buffer Solution pH 10.00

# Buffer Solution pH 10.00

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 12/09/2013 Revision date: 12/20/2016 Supersedes: 12/09/2013 Version: 1.1

## SECTION 1: Identification

### 1.1. Identification

Product form : Mixture

Product name : Buffer Solution pH 10.00

Product code : LC12500

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : For laboratory and manufacturing use only.

### 1.3. Details of the supplier of the safety data sheet

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

### 1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Reproductive toxicity Category 1B H360

Full text of H statements : see section 16

### 2.2. Label elements

**GHS-US labeling**

Hazard pictograms (GHS-US) :

GHS08

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : H360 - May damage fertility or the unborn child

Precautionary statements (GHS-US) : P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P280 - Wear protective gloves, eye protection
P308+P313 - IF exposed or concerned: Get medical advice/attention
P405 - Store locked up
P501 - Dispose of contents/container to comply with local, state and federal regulations

### 2.3. Other hazards

Other hazards not contributing to the classification : None.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substance

Not applicable

### 3.2. Mixture

| Name | Product identifier | % | GHS-US classification |
|---|---|---|---|
| Water | (CAS No) 7732-18-5 | 99.57 | Not classified |
| Sodium Tetraborate, Decahydrate | (CAS No) 1303-96-4 | 0.38 | Repr. 1B, H360 |
| Sodium Hydroxide | (CAS No) 1310-73-2 | 0.05 | Acute Tox. 4 (Dermal), H312<br>Skin Corr. 1A, H314<br>Eye Dam. 1, H318<br>Aquatic Acute 3, H402 |

Full text of hazard classes and H-statements : see section 16

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persist.

First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : May damage fertility or the unborn child.

### 4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

### 5.2. Special hazards arising from the substance or mixture

No additional information available

### 5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

Protective equipment : Safety glasses. Gloves.

Emergency procedures : Evacuate unnecessary personnel.

#### 6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

### 6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

### 6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor. Do not handle until all safety precautions have been read and understood. Obtain special instructions before use.

Hygiene measures : Wash contaminated clothing before reuse.

### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep container closed when not in use.

Incompatible products : Strong oxidizers. Strong acids.

Incompatible materials : incompatible materials. Heat sources.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

| Sodium Tetraborate, Decahydrate (1303-96-4) | | |
|---|---|---|
| ACGIH | ACGIH TWA (mg/m³) | 2 mg/m³ |
| ACGIH | ACGIH STEL (mg/m³) | 6 mg/m³ |
| NIOSH | NIOSH REL (TWA) (mg/m³) | 5 mg/m³ |

| Water (7732-18-5) |
|---|
| Not applicable |

| Sodium Hydroxide (1310-73-2) | | |
|---|---|---|
| ACGIH | ACGIH Ceiling (mg/m³) | 2 mg/m³ (Sodium hydroxide; USA; Momentary value; TLV - Adopted Value) |
| OSHA | OSHA PEL (TWA) (mg/m³) | 2 mg/m³ |
| IDLH | US IDLH (mg/m³) | 10 mg/m³ |
| NIOSH | NIOSH REL (ceiling) (mg/m³) | 2 mg/m³ |

### 8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure.

Personal protective equipment : Safety glasses. Gloves.

Hand protection : Wear protective gloves.

Eye protection : Chemical goggles or safety glasses.

Respiratory protection : Respiratory protection not required in normal conditions.

Other information : Do not eat, drink or smoke during use.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state : Liquid

Color : Colorless

Odor : None.

Odor threshold : No data available

pH : 10

Melting point : No data available

Freezing point : No data available

Boiling point : No data available

Flash point : No data available

Relative evaporation rate (butyl acetate=1) : No data available

Flammability (solid, gas) : Non flammable.

Vapor pressure : No data available

Relative vapor density at 20 °C : No data available

Relative density : No data available

Solubility : Miscible with water.

Log Pow : No data available

Auto-ignition temperature : No data available

Decomposition temperature : No data available

| | | |
|---|---|---|
| Viscosity, kinematic | : | No data available |
| Viscosity, dynamic | : | No data available |
| Explosion limits | : | No data available |
| Explosive properties | : | No data available |
| Oxidizing properties | : | No data available |

### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No additional information available

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

Not established.

### 10.4. Conditions to avoid

Incompatible materials. Extremely high or low temperatures.

### 10.5. Incompatible materials

Strong acids. Strong oxidizers.

### 10.6. Hazardous decomposition products

boron.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

| | | |
|---|---|---|
| Likely routes of exposure | : | Skin and eye contact |
| Acute toxicity | : | Not classified |

| **Sodium Tetraborate, Decahydrate (1303-96-4)** | |
|---|---|
| LD50 oral rat | 2660 mg/kg |
| LD50 dermal rabbit | 10000 mg/kg |
| ATE US (oral) | 2660.000 mg/kg body weight |
| ATE US (dermal) | 10000.000 mg/kg body weight |
| **Water (7732-18-5)** | |
| LD50 oral rat | ≥ 90000 mg/kg |
| ATE US (oral) | 90000.000 mg/kg body weight |
| **Sodium Hydroxide (1310-73-2)** | |
| ATE US (dermal) | 1350.000 mg/kg body weight |

| | | |
|---|---|---|
| Skin corrosion/irritation | : | Not classified<br>pH: 10 |
| Serious eye damage/irritation | : | Not classified<br>pH: 10 |
| Respiratory or skin sensitization | : | Not classified |
| Germ cell mutagenicity | : | Not classified |
| Carcinogenicity | : | Not classified |
| Reproductive toxicity | : | May damage fertility or the unborn child. |
| Specific target organ toxicity (single exposure) | : | Not classified |
| Specific target organ toxicity (repeated exposure) | : | Not classified |
| Aspiration hazard | : | Not classified |

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

## SECTION 12: Ecological information

### 12.1. Toxicity

| Sodium Tetraborate, Decahydrate (1303-96-4) | |
|---|---|
| EC50 Daphnia 1 | 1085 mg/l |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| LC50 fish 1 | 45.4 mg/l (LC50; Other; 96 h; Salmo gairdneri; Static system; Fresh water; Experimental value) |

### 12.2. Persistence and degradability

| Buffer Solution pH 10.00 | |
|---|---|
| Persistence and degradability | Not established. |

| Sodium Tetraborate, Decahydrate (1303-96-4) | |
|---|---|
| Persistence and degradability | Not established. |

| Water (7732-18-5) | |
|---|---|
| Persistence and degradability | Not established. |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| Persistence and degradability | Biodegradability: not applicable. No test data on mobility of the substance available. |
| Biochemical oxygen demand (BOD) | Not applicable |
| Chemical oxygen demand (COD) | Not applicable |
| ThOD | Not applicable |

### 12.3. Bioaccumulative potential

| Buffer Solution pH 10.00 | |
|---|---|
| Bioaccumulative potential | Not established. |

| Sodium Tetraborate, Decahydrate (1303-96-4) | |
|---|---|
| Bioaccumulative potential | Not established. |

| Water (7732-18-5) | |
|---|---|
| Bioaccumulative potential | Not established. |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| Bioaccumulative potential | No bioaccumulation data available. |

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

Effect on the global warming : No known effects from this product.

GWPmix comment : No known effects from this product.

Other information : Avoid release to the environment.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste disposal recommendations : Dispose of contents/container to comply with local, state and federal regulations.

Ecology - waste materials : Avoid release to the environment.

## SECTION 14: Transport information

**Department of Transportation (DOT)**

In accordance with DOT

Not regulated

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

| Buffer Solution pH 10.00 | |
|---|---|
| SARA Section 311/312 Hazard Classes | Delayed (chronic) health hazard |

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| RQ (Reportable quantity, section 304 of EPA's List of Lists) | 1000 lb |
| SARA Section 311/312 Hazard Classes | Immediate (acute) health hazard |

### 15.2. International regulations

**CANADA**

| Buffer Solution pH 10.00 | |
|---|---|
| WHMIS Classification | Class D Division 2 Subdivision A - Very toxic material causing other toxic effects |

| Sodium Tetraborate, Decahydrate (1303-96-4) | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class D Division 2 Subdivision A - Very toxic material causing other toxic effects |

| Water (7732-18-5) | |
|---|---|
| WHMIS Classification | Uncontrolled product according to WHMIS classification criteria |

| Sodium Hydroxide (1310-73-2) | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class E - Corrosive Material |

**EU-Regulations**

No additional information available

**National regulations**

| Sodium Tetraborate, Decahydrate (1303-96-4) |
|---|
| Listed on the Canadian IDL (Ingredient Disclosure List) |

### 15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

## SECTION 16: Other information

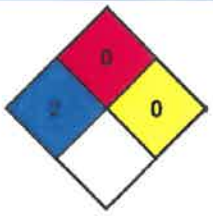
Revision date : 12/20/2016

Other information : None.

Full text of H-phrases: see section 16:

| | |
|---|---|
| H312 | Harmful in contact with skin |
| H314 | Causes severe skin burns and eye damage |
| H318 | Causes serious eye damage |
| H360 | May damage fertility or the unborn child |
| H402 | Harmful to aquatic life |

| | |
|---|---|
| NFPA health hazard | : 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given. |
| NFPA fire hazard | : 0 - Materials that will not burn. |
| NFPA reactivity | : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water. |




| | |
|---|---|
| HMIS III Rating | |
| Health | : 2 Moderate Hazard - Temporary or minor injury may occur |
| Flammability | : 0 Minimal Hazard - Materials that will not burn |
| Physical | : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives. |
| Personal protection | : B<br>B - Safety glasses, Gloves |

SDS US LabChem

*Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.*

## ATTACHMENT 17

SDS Dissolved-Oxygen-Solution

# Dissolved Oxygen Solution Safety Datasheet

Atlas Scientific™ Environmental Robotics

## Section 1 Product Description

| | |
|---|---|
| **Product Name** | Dissolved Oxygen Solution |
| **Recommended Use** | Equipment Calibration |
| **Synonyms** | None known |
| **Distributor** | Atlas Scientific<br>43-15 11th Street, Long Island City, NY 11101<br>718-387-2075 |
| **Chemical Information** | 800-227-1150 (8am-5pm M-F) |
| **Chemtrec** | 800-424-9300 (Transportation Spill Response 24 hours) |

## Section 2 Hazard Identification

**Classification of the chemical in accordance with paragraph (d) of §1910.1200**

Not a dangerous substance according to GHS classification criteria. No known OSHA hazards.

**GHS Classification**

## Section 3 Composition / Information on Ingredients

| Chemical Name | CAS # | % |
|---|---|---|
| Water | 7732-18-5 | 70 |
| Sodium Sulfite | 7757-83-7 | 30 |

## Section 4 First Aid Measures

**Emergency and First Aid Procedures**

| | |
|---|---|
| **Inhalation** | In case of accident by inhalation: remove casualty to fresh air and keep at rest. |
| **Eyes** | In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. |
| **Skin Contact** | After contact with skin, wash immediately with plenty of water. |
| **Ingestion** | If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label. |

## Section 5 Firefighting Procedures

| | |
|---|---|
| **Extinguishing Media** | Use media suitable to extinguish surrounding fire. |
| **Fire Fighting Methods and Protection** | Firefighters should wear full protective equipment and NIOSH approved self-contained breathing apparatus. |
| **Fire and/or Explosion Hazards** | Fire or excessive heat may produce hazardous decomposition products. |
| **Hazardous Combustion Products** | Phosphorus compounds, Potassium Oxide, Sodium Oxides |

## Section 6 Spill or Leak Procedures

| | |
|---|---|
| **Steps to Take in Case Material are Released or Spilled** | No health affects expected from the clean-up of this material if contact can be avoided. Follow personal protective equipment recommendations found in Section 8 of this (M)SDS |
| **Environmental Precautions** | Avoid breathing material. Avoid contact with skin and eyes. Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation. |

## Section 7 Handling and Storage

| | |
|---|---|
| **Handling** | Avoid contact with skin and eyes. |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| | |
|---|---|
| **Storage** | Keep container tightly closed in a cool, well-ventilated place. |
| **Storage Code** | Green - general chemical storage |

## Section 8 Protection Information

| | ACGIH | | OSHA PEL | |
|---|---|---|---|---|
| **Chemical Name** | **(TWA)** | **(STEL)** | **(TWA)** | **(STEL)** |
| **Sodium Sulfite** | N/A | N/A | N/A | N/A |

| | |
|---|---|
| **Control Parameters** | |
| **Engineering Measures** | Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure. |
| **Personal Protective Equipment (PPE)** | Lab coat, apron, eye wash, safety shower. |
| **Respiratory Protection** | No respiratory protection required under normal conditions of use. |
| **Respirator Type(s)** | None required where adequate ventilation is provided. If airborne concentrations are above the applicable exposure limits, use NIOSH/MSHA approved respiratory protection. Eye Protection Wear chemical splash goggles when handling this product. Have an eye wash station available. |
| **Skin Protection** | Avoid skin contact by wearing chemically resistant gloves, an apron and other protective equipment depending upon conditions of use. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work. |
| **Gloves** | No information available |

## Section 9 Physical Data

**Formula** See Section 3
**Molecular Weight** No data available
**Appearance** Colorless Depends upon product selection. The color additives do not affect product hazards. Liquid
**Odor** None
**Odor** Threshold No data available
**Dissolved Oyxgen** Solution
**Melting Point** Estimated 0°C
**Boiling Point** 100°C
**Flash Point** No data available
**Flammable Limits in Air** No data available

**Vapor Pressure** No data available
**Evaporation Rate (BuAc=1)** No data available
**Vapor Density (Air=1)** No data available

**Specific Gravity** Approx. 1
**Solubility in Water** Soluble
**Log Pow (calculated)** No data available
**Autoignition Temperature** No data available
**Decomposition Temperature** No data available
**Viscosity** No data available
**Percent Volatile by Volume** No data available

## Section 10 Reactivity Data

| | |
|---|---|
| **Reactivity** | Not generally reactive under normal conditions. |
| **Chemical Stability** | Stable under normal conditions. |
| **Conditions to Avoid** | None known. |
| **Incompatible Materials** | Water-reactive materials |
| **Hazardous Decomposition Products** | Sodium Oxides, Potassium Oxide, Phosphorus compounds |
| **Hazardous Polymerization** | Will not occur |


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## Section 11 Toxicity Data

**Routes of Entry** Ingestion, skin and eye contact.
**Symptoms (Acute)** No data available
**Delayed Effects** No data available

**Acute Toxicity**

| Chemical Name | CAS Number | Oral LD50 | Dermal LD50 | Inhalation LC50 |
|---|---|---|---|---|
| Water | 7732-18-5 | Oral LD50 Rat 90000 mg/kg | | |
| Sodium Sulfite | 7757-83-7 | Oral LD50 Rat 3200 mg/kg | Dermal LD50 Rabbit > 4640 mg/kg | |

**Carcinogenicity**

| Chemical Name | CAS Number | IARC | NTP | OSHA |
|---|---|---|---|---|
| Sodium Sulfite | 7757-83-7 | Not listed | Not listed | Not listed |

**Chronic Effects**
**Mutagenicity** No evidence of a mutagenic effect.
**Teratogenicity** No evidence of a teratogenic effect (birth defect).
**Sensitization** No evidence of a sensitization effect.
**Reproductive** No evidence of negative reproductive effects.
**Target Organ Effects**
**Acute** Respiratory system, Cardiovascular system, Musculoskeletal system
**Chronic** No information available

## Section 12 Ecological Data

**Overview:** This material is not expected to be harmful to the ecology.
**Mobility:** This material is expected to have high mobility in soil. It absorbs weakly to most soil types.
**Persistence:** Dissolved into water
**Bioaccumulation:** Bioconcentration is not expected to occur.
**Degradability:** No data
**Other Adverse Effects:** No data

| Chemical Name | CAS Number | Eco Toxicity |
|---|---|---|
| Water | 7732-18-5 | No data available |
| Sodium Sulfite | 7757-83-7 | |

## Section 13 Disposal Information

**Disposal Methods** Dispose in accordance with all applicable Federal, State and Local regulations. Always contact a permitted waste disposer (TSD) to assure compliance.
**Waste Disposal Code(s)** Not Determined

## Section 14 Transport Information

**Ground - DOT Proper Shipping Name**
Not regulated for transport by US DOT.

**Air - IATA Proper Shipping Name**
Not regulated for air transport by IATA.


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## Section 15 Regulatory Information

**TSCA Status** **All components in this product are on the TSCA Inventory.**

| Chemical Name | CAS Name | § 313 Name | § 304 RQ | CERCLA RQ | § 302 TPQ | CAA 112(2) TQ |
|---|---|---|---|---|---|---|
| Sodium Sulfite | 7757-83-7 | No | No | No | No | No |

## Section 16 Additional Information

**Revised** 09/16/2015 **Replaces** 09/16/2015 **Printed** 09/16/2015

The information provided in this (Material) Safety Data Sheet represents a compilation of data drawn directly from various sources available to us. Atlas Scientific makes no representation or guarantee as to the suitability of this information to a particular application of the substance covered in the (Material) Safety Data Sheet.

**Glossary**

| | |
|---|---|
| **ACGIH** | American Conference of Governmental Industrial Hygienists |
| **CAS** | Chemical Abstract Service Number |
| **CERCLA** | Comprehensive Environmental Response, Compensation, and Liability Act |
| **DOT** | U.S. Department of Transportation |
| **IARC** | International Agency for Research on Cancer |
| **N/A** | Not Available |
| **NTP** | National Toxicology Program |
| **OSHA** | Occupational Safety and Health Administration |
| **PEL** | Permissible Exposure Limit |
| **ppm** | Parts per million |
| **RCRA** | Resource Conservation and Recovery Act |
| **SARA** | Superfund Amendments and Reauthorization Act |
| **TLV** | Threshold Limit Value |
| **TSCA** | Toxic Substances Control Act |
| **IDLH** | Immediately dangerous to life and health |


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## ATTACHMENT 18

SDS peracetic-acid 35 with-h2so4

# SAFETY DATA SHEET

Helium

## Section 1. Identification

**GHS product identifier** : Helium

**Chemical name** : Helium

**Other means of identification** : helium (dot); Helium-4; He; o-Helium; UN 1046,Helium USP

**Product type** : Gas.

**Product use** : Synthetic/Analytical chemistry.

**Synonym** : helium (dot); Helium-4; He; o-Helium; UN 1046,Helium USP

**SDS #** : 001025

**Supplier's details** : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

**24-hour telephone** : 1-866-734-3438

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : GASES UNDER PRESSURE - Compressed gas

**GHS label elements**

**Hazard pictograms** :

**Signal word** : Warning

**Hazard statements** : Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

**Precautionary statements**

**General** : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

**Prevention** : Not applicable.

**Response** : Not applicable.

**Storage** : Protect from sunlight. Store in a well-ventilated place.

**Disposal** : Not applicable.

**Hazards not otherwise classified** : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

# Section 3. Composition/information on ingredients

**Substance/mixture** : Substance

**Chemical name** : Helium

**Other means of identification** : helium (dot); Helium-4; He; o-Helium; UN 1046,Helium USP

**Product code** : 001025

## CAS number/other identifiers

**CAS number** : 7440-59-7

| Ingredient name | % | CAS number |
|---|---|---|
| Helium | 100 | 7440-59-7 |

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

**Occupational exposure limits, if available, are listed in Section 8.**

# Section 4. First aid measures

## Description of necessary first aid measures

**Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

**Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

**Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

**Ingestion** : As this product is a gas, refer to the inhalation section.

## Most important symptoms/effects, acute and delayed

### Potential acute health effects

**Eye contact** : Contact with rapidly expanding gas may cause burns or frostbite.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : Contact with rapidly expanding gas may cause burns or frostbite.

**Frostbite** : Try to warm up the frozen tissues and seek medical attention.

**Ingestion** : As this product is a gas, refer to the inhalation section.

### Over-exposure signs/symptoms

**Eye contact** : No specific data.

**Inhalation** : No specific data.

**Skin contact** : No specific data.

**Ingestion** : No specific data.

## Indication of immediate medical attention and special treatment needed, if necessary

**Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

**Specific treatments** : No specific treatment.

# Section 4. First aid measures

**Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

**See toxicological information (Section 11)**

# Section 5. Fire-fighting measures

## Extinguishing media

**Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.

**Unsuitable extinguishing media** : None known.

**Specific hazards arising from the chemical** : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

**Hazardous thermal decomposition products** : No specific data.

**Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

# Section 6. Accidental release measures

## Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

**For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

**Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

## Methods and materials for containment and cleaning up

**Small spill** : Immediately contact emergency personnel. Stop leak if without risk.

**Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

# Section 7. Handling and storage

## Precautions for safe handling

**Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid breathing gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous.

# Section 7. Handling and storage

**Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

**Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

# Section 8. Exposure controls/personal protection

## Control parameters

### Occupational exposure limits

| Ingredient name | Exposure limits |
|---|---|
| Helium | **ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].** |

**Appropriate engineering controls** : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

## Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

## Skin protection

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

## Section 8. Exposure controls/personal protection

**Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

**Appearance**

**Physical state** : Gas. [Compressed gas.]

**Color** : Colorless.

**Odor** : Odorless.

**Odor threshold** : Not available.

**pH** : Not available.

**Melting point** : -272.2°C (-458°F)

**Boiling point** : -268.9°C (-452°F)

**Critical temperature** : -267.9°C (-450.2°F)

**Flash point** : [Product does not sustain combustion.]

**Evaporation rate** : Not available.

**Flammability (solid, gas)** : Not available.

**Lower and upper explosive (flammable) limits** : Not available.

**Vapor pressure** : Not available.

**Vapor density** : 0.14 (Air = 1) Liquid Density@BP: 7.8 lb/ft3 (125 kg/m3)

**Specific Volume (ft $^3$/lb)** : 96.1538

**Gas Density (lb/ft $^3$)** : 0.0104

**Relative density** : Not applicable.

**Solubility** : Not available.

**Solubility in water** : Not available.

**Partition coefficient: n-octanol/water** : 0.28

**Auto-ignition temperature** : Not available.

**Decomposition temperature** : Not available.

**Viscosity** : Not applicable.

**Flow time (ISO 2431)** : Not available.

**Molecular weight** : 4 g/mole

## Section 10. Stability and reactivity

**Reactivity** : No specific test data related to reactivity available for this product or its ingredients.

**Chemical stability** : The product is stable.

**Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.

**Conditions to avoid** : No specific data.

**Incompatible materials** : No specific data.

**Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

# Section 10. Stability and reactivity

**Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

# Section 11. Toxicological information

## Information on toxicological effects

### Acute toxicity

Not available.

### Irritation/Corrosion

Not available.

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

Not available.

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

## Potential acute health effects

**Eye contact** : Contact with rapidly expanding gas may cause burns or frostbite.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : Contact with rapidly expanding gas may cause burns or frostbite.

**Ingestion** : As this product is a gas, refer to the inhalation section.

## Symptoms related to the physical, chemical and toxicological characteristics

**Eye contact** : No specific data.

**Inhalation** : No specific data.

**Skin contact** : No specific data.

**Ingestion** : No specific data.

## Delayed and immediate effects and also chronic effects from short and long term exposure

### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Long term exposure

# Section 11. Toxicological information

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

**Potential chronic health effects**

Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

**Numerical measures of toxicity**

**Acute toxicity estimates**

Not available.

# Section 12. Ecological information

**Toxicity**

Not available.

**Persistence and degradability**

Not available.

**Bioaccumulative potential**

| Product/ingredient name | $LogP_{ow}$ | BCF | Potential |
|---|---|---|---|
| Helium | 0.28 | - | low |

**Mobility in soil**

**Soil/water partition coefficient ($K_{OC}$)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

# Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

## Section 14. Transport information

| | DOT | TDG | Mexico | IMDG | IATA |
|---|---|---|---|---|---|
| **UN number** | UN1046 | UN1046 | UN1046 | UN1046 | UN1046 |
| **UN proper shipping name** | HELIUM, COMPRESSED | HELIUM, COMPRESSED | HELIUM, COMPRESSED | HELIUM, COMPRESSED | HELIUM, COMPRESSED |
| **Transport hazard class(es)** | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| **Packing group** | - | - | - | - | - |
| **Environmental hazards** | No. | No. | No. | No. | No. |

**"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."**

**Additional information**

**DOT Classification** : **Limited quantity** Yes.
**Quantity limitation** Passenger aircraft/rail: 75 kg. Cargo aircraft: 150 kg.

**TDG Classification** : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
**Explosive Limit and Limited Quantity Index** 0.125
**Passenger Carrying Road or Rail Index** 75

**IATA** : **Quantity limitation** Passenger and Cargo Aircraft: 75 kg. Cargo Aircraft Only: 150 kg.

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Not listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

**SARA 302/304**

**Composition/information on ingredients**

No products were found.

**SARA 304 RQ** : Not applicable.

# Section 15. Regulatory information

## SARA 311/312

**Classification** : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

## State regulations

**Massachusetts** : This material is listed.

**New York** : This material is not listed.

**New Jersey** : This material is listed.

**Pennsylvania** : This material is listed.

## International regulations

### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

### Montreal Protocol (Annexes A, B, C, E)

Not listed.

### Stockholm Convention on Persistent Organic Pollutants

Not listed.

### Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

## Inventory list

**Australia** : This material is listed or exempted.

**Canada** : This material is listed or exempted.

**China** : This material is listed or exempted.

**Europe** : This material is listed or exempted.

**Japan** : **Japan inventory (ENCS)**: Not determined.
**Japan inventory (ISHL)**: Not determined.

**Malaysia** : Not determined.

**New Zealand** : This material is listed or exempted.

**Philippines** : This material is listed or exempted.

**Republic of Korea** : This material is listed or exempted.

**Taiwan** : This material is listed or exempted.

**Thailand** : Not determined.

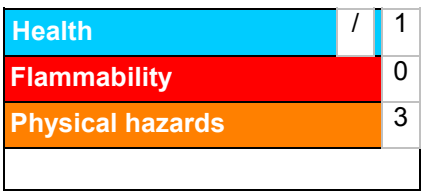
**Turkey** : Not determined.

**United States** : This material is listed or exempted.

**Viet Nam** : Not determined.

# Section 16. Other information

## Hazardous Material Information System (U.S.A.)




**Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.**

# Section 16. Other information

**The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.**

## National Fire Protection Association (U.S.A.)

**Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.**

**Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.**

## Procedure used to derive the classification

| Classification | Justification |
|---|---|
| GASES UNDER PRESSURE - Compressed gas | Expert judgment |

## History

**Date of printing** : 4/23/2018

**Date of issue/Date of revision** : 4/23/2018

**Date of previous issue** : 1/29/2018

**Version** : 1.01

**Key to abbreviations** : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

**References** : Not available.

## Notice to reader

**To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.**
**Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.**

## ATTACHMENT 19

SDS peracetic-acid 35 with-h2so4

# SAFETY DATA SHEET
# PERACETIC ACID 35% W/H2SO4

**SDS # :** 79-21-0--35-1
**Revision date:** 2015-04-07
**Format:** NA
**Version** 1

## 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Identifier**

**Product Name** PERACETIC ACID 35% W/H2SO4

**Other means of identification**

**CAS-No** 79-21-0
**Synonyms** Peracetic Acid; Ethaneperoxoic Acid; Peroxyacetic Acid; Acetyl Hydroperoxide

**Recommended use of the chemical and restrictions on use**

**Recommended Use:** Oxidizing agent for a variety of organic reactions

**Restrictions on Use:** Use as recommended by the label.

**Manufacturer/Supplier**

PeroxyChem LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: sdsinfo@peroxychem.com

**Emergency telephone number**

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
1 303/ 389-1409 (Medical - U.S. - Call Collect)

## 2. HAZARDS IDENTIFICATION

**Classification**

**OSHA Regulatory Status**
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

| | |
|---|---|
| Acute toxicity - Oral | Category 3 |
| Acute toxicity - Dermal | Category 4 |
| Acute toxicity - Inhalation (Vapors) | Category 3 |
| Skin corrosion/irritation | Category 1 Sub-category A |
| Serious eye damage/eye irritation | Category 1 |
| Specific target organ toxicity (single exposure) | Category 3 |
| Organic Peroxide | Type F |
| Flammable liquids | Category 3 |

**GHS Label elements, including precautionary statements**

**EMERGENCY OVERVIEW**

## Danger

**Hazard Statements**
H301 - Toxic if swallowed
H312 - Harmful in contact with skin
H314 - Causes severe skin burns and eye damage
H331 - Toxic if inhaled
H335 - May cause respiratory irritation

**Physical Hazards**
H242 - Heating may cause a fire
H226 - Flammable liquid and vapor

**Precautionary Statements - Prevention**
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P220 - Keep/Store away from clothing/combustible materials
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P234 - Keep only in original container
P235 - Keep cool

**Precautionary Statements - Response**
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P310 - Immediately call a POISON CENTER or doctor
P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P310 - Immediately call a POISON CENTER or doctor
P370 + P378 - In case of fire: Use water for extinction

**Precautionary Statements - Storage**
P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
P411 + P235 - Store at temperatures not exceeding 30 °C/ 86 °F. Keep cool
P410 - Protect from sunlight

**Hazards not otherwise classified (HNOC)**
No hazards not otherwise classified were identified.

**Other Information**
Do not store on wooden pallets. Avoid damage to containers. In case of decomposition: isolate container, douse container with cool water and dilute with large volumes of water. In case of leak or spill: Stop leak if this can be done without risk. Flush area with large quantities of water. Undiluted material should not be allowed to enter confined spaces. Risk of decomposition by heat or by contact with incompatible materials.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

| Chemical name | CAS-No | Weight % |
|---|---|---|
| Acetic Acid | 64-19-7 | 40 |
| Peracetic Acid | 79-21-0 | 35.5 |
| Water | 7732-18-5 | 17 |
| Hydrogen Peroxide | 7722-84-1 | 6.5 |
| Sulfuric Acid | 7664-93-9 | 1 |

Synonyms are provided in Section 1.

## 4. FIRST AID MEASURES

**General Advice**
Liquid and mist are corrosive and can cause burns, direct contact could cause irreversible dmage to eyes including blindness and/or irreversible destruction of skin tissue. Vapor/mist will irritate the nose, throat and lungs, but will usually subside when exposure ceases. The severity of the effects depends in the concentration and dose.

**Eye Contact**
Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids intermittently. Consult a physician.

**Skin Contact**
Immediately flush with plenty of water while removing contaminated clothing and/or shoes, and thoroughly wash with soap and water. Seek immediate medical attention/advice. Wash contaminated clothing with plenty of water to prevent fire hazard.

**Inhalation**
Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. If breathing difficulty or discomfort occurs and persists, obtain medical attention.

**Ingestion**
Clean mouth with water. Drink 1 or 2 glasses of water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician immediately.

**Most important symptoms and effects, both acute and delayed**
This product is irritating to the respiratory system and can cause pulmonary inflammation and edema, especially if it is inhaled in the aerosol form.
In case of accidental ingestion, necrosis may result from mucous membrane burns (mouth, esophagus and stomach). Oxygen rapid release may cause stomach swelling and hemorrhaging, which may product major, or even fatal, injury to organs if a large amount has been ingested.
Corneal lesions and irreversible damage if contact with the eyes.

**Indication of immediate medical attention and special treatment needed, if necessary**
This product can be corrosive to skin, eyes, and mucous membranes. Consideration should be given to careful endoscopy as stomach or esophageal burns, perforations or strictures may occur. Careful gastric lavage with an endotracheal tube in place should be considered. Observations may be warranted. Treatment is controlled removal of exposure followed by symptomatic and supportive care.

## 5. FIRE-FIGHTING MEASURES

**Suitable Extinguishing Media**
Water. Cool containers with flooding quantities of water until well after fire is out.

**Unsuitable extinguishing media**
Chemical type extinguishers are not effective with peracetic acid or hydrogen peroxide.

**Specific Hazards Arising from the Chemical**
Decomposes under fire conditions to release oxygen that intensifies the fire.

**Explosion data**
**Sensitivity to Mechanical Impact**
Not Available.
**Sensitivity to Static Discharge**
Not Available.

**Protective equipment and precautions for firefighters**
Wear self-contained breathing apparatus and protective suit. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautions** Isolate and post spill area. Remove all sources of ignition. Wear suitable protective clothing, gloves and eye/face protection. For personal protection see Section 8.

**Other** For further clean-up instructions, call PeroxyChem Emergency Hotline number listed in Section 1 "Product and Company Identification" above.

**Environmental Precautions** Prevent material from entering into soil, ditches, sewers, waterways, and/or groundwater. See Section 12, Ecological Information for more detailed information.

**Methods for Containment** Control runoff and isolate discharged material for proper disposal. Do not allow material to enter storm or sanitary sewer system.

**Methods for cleaning up** Hydrogen peroxide is an ingredient in this product; completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on combustible materials such as paper, fabrics, leather or wood can cause the material to ignite and result in a fire.

## 7. HANDLING AND STORAGE

**Handling** Handle product only in closed system or provide appropriate exhaust ventilation. Electric and light installations ought to be explosion-proof. Use only non-sparking tools.
IBC (Tote) - IBC should be emptied as thoroughly as possible and recycled without rinsing. Drums - Empty as thoroughly as possible. Triple rinse drums before disposal. Avoid contamination; impurities accelerate decomposition. Never return product to original container.

**Storage** Do not stored near reducing agents, fuels or other non-compatible materials. Keep in a dry, cool and well-ventilated place. Keep at temperatures below 30°C. Higher temperatures will accelerate decomposition resulting in loss of assay. Keep away from direct sunlight. Keep away from heat and sources of ignition i.e., steam pipes, radiant heaters, hot air vents or welding sparks. Use first in, first out storage system. Do not double-stack. Containers must be vented.

**Incompatible products** Oxidizing agents; Strong reducing agents; Combustible materials; Heavy metals such as iron, copper, chromium, nickel, aluminum and cobalt.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**

**Exposure Guidelines** .

| Chemical name | ACGIH TLV | OSHA PEL | NIOSH | Mexico |
|---|---|---|---|---|
| Acetic Acid<br>64-19-7 | STEL 15 ppm<br>TWA: 10 ppm | TWA: 10 ppm<br>TWA: 25 mg/m³ | IDLH: 50 ppm<br>TWA: 10 ppm<br>TWA: 25 mg/m³<br>STEL: 15 ppm<br>STEL: 37 mg/m³ | Mexico: TWA 10 ppm<br>Mexico: TWA 25 mg/m³<br>Mexico: STEL 15 ppm<br>Mexico: STEL 37 mg/m³ |
| Peracetic Acid<br>79-21-0 | STEL 0.4 ppm | - | - | - |
| Hydrogen Peroxide<br>7722-84-1 | TWA: 1 ppm | TWA: 1 ppm<br>TWA: 1.4 mg/m³ | IDLH: 75 ppm<br>TWA: 1 ppm<br>TWA: 1.4 mg/m³ | Mexico: TWA 1 ppm<br>Mexico: TWA 1.5 mg/m³<br>Mexico: STEL 2 ppm<br>Mexico: STEL 3 mg/m³ |
| Sulfuric Acid<br>7664-93-9 | TWA: 0.2 mg/m³ | TWA: 1 mg/m³ | IDLH: 15 mg/m³<br>TWA: 1 mg/m³ | Mexico: TWA 1 mg/m³ |
| **Chemical name** | **British Columbia** | **Quebec** | **Ontario TWAEV** | **Alberta** |
| Acetic Acid<br>64-19-7 | TWA: 10 ppm<br>STEL: 15 ppm | TWA: 10 ppm<br>TWA: 25 mg/m³<br>STEL: 15 ppm | TWA: 10 ppm | TWA: 10 ppm<br>TWA: 25 mg/m³<br>STEL: 15 ppm |

| | | | | |
|---|---|---|---|---|
| | | STEL: 37 mg/m³ | STEL: 15 ppm | STEL: 37 mg/m³ |
| Hydrogen Peroxide<br>7722-84-1 | TWA: 1 ppm | TWA: 1 ppm<br>TWA: 1.4 mg/m³ | TWA: 1 ppm | TWA: 1 ppm<br>TWA: 1.4 mg/m³ |
| Sulfuric Acid<br>7664-93-9 | TWA: 0.2 mg/m³ | TWA: 1 mg/m³<br>STEL: 3 mg/m³ | TWA: 0.2 mg/m³<br>thoracic | TWA: 1 mg/m³<br>STEL: 3 mg/m³ |

**Appropriate engineering controls**

**Engineering measures** Apply technical measures to comply with the occupational exposure limits. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. Ensure that eyewash stations and safety showers are close to the workstation location.

**Individual protection measures, such as personal protective equipment**

**Eye/Face Protection** Tightly fitting safety goggles. Face-shield.

**Skin and Body Protection** Rubber or neoprene footwear. Impervious clothing materials such as rubber, neoprene, nitrile or polyvinyl chloride. Wear liquid proof rubber or neoprene gloves. Hydrogen peroxide is an ingredient in this product; completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on combustible materials such as paper, fabrics, leather or wood can cause the material to ignite and result in a fire.

**Hand Protection** Rubber/latex/neoprene or other suitable chemical resistant gloves. Wash the outside of gloves with soap and water prior to removal. Inspect regularly for leaks.

**Respiratory Protection** When workers are facing concentrations above the exposure limit they must use appropriate certified respirators: Full face piece respirator with organic vapor/acid gas cartridge or canister. If break-through occurs, use airline supplied or self-contained breathing apparatus with full face piece.

**Hygiene measures** Clean water should be available for washing in case of eye or skin contamination. Remove and wash contaminated clothing before re-use. Wash skin prior to eating, drinking, chewing gum or using tobacco. Shower or bathe at the end of working. Launder work clothing separately from regular household laundry.

**General information** Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Information on basic physical and chemical properties**

**Appearance** Clear, colorless liquid
**Physical State** Liquid
**Color** Colorless
**Odor** stinging, Pungent vinegar-like
**Odor threshold** No information available
**pH** < 1
**Melting point/freezing point** -44 °C / -47 °F
**Boiling Point/Range** ~107 °C / 225 °F
**Flash point** 46 °C / 115 °F Closed cup
Open Cup - No measurable flash point up to 110°C
Fire Point - No fire point. This material will not sustain a flame
**Evaporation Rate** < 1 (n-butyl acetate=1)
**Flammability (solid, gas)**
**Flammability Limit in Air**
**Upper flammability limit:**
**Lower flammability limit:**
**Vapor pressure** 20 mm Hg at 25ºC

| | |
|---|---|
| **Vapor density** | No information available |
| **Density** | No information available |
| **Specific gravity** | 1.13 g/mL @ 20 °C |
| **Water solubility** | completely soluble |
| **Solubility in other solvents** | No information available |
| **Partition coefficient** | No information available |
| **Autoignition temperature** | 218 °C |
| **Decomposition temperature** | > 55 °C (SADT) (55-gal. drum) |
| **Viscosity, kinematic** | No information available |
| **Viscosity, dynamic** | No information available |
| **Explosive properties** | No information available |
| **Oxidizing properties** | Strong oxidizer |
| **Molecular weight** | No information available |
| **Bulk density** | Not applicable |

## 10. STABILITY AND REACTIVITY

**Reactivity** Reactive and oxidizing agent. Organic peroxide.

**Chemical Stability** Stable under normal conditions. Contamination or heat could initiate decomposition.

**Possibility of Hazardous Reactions** May produce explosive reactions with Acetic Anhydride. Contact with metals, metallic ions, alkalis, reducing agents and organic matter (such as alcohols or terpenes) may produce self-accelerated thermal decomposition.

**Hazardous polymerization** Hazardous polymerization does not occur.

**Conditions to avoid** Heat, flames and sparks; Temperatures above 30°C. Higher temperatures will accelerate decomposition resulting in loss of assay

**Incompatible materials** Oxidizing agents; Strong reducing agents; Combustible materials; Heavy metals. such as iron, copper, chromium, nickel, aluminum and cobalt.

**Hazardous Decomposition Products** Liable to produce overpressure in container. Acetic acid and oxygen that supports combustion.

## 11. TOXICOLOGICAL INFORMATION

**Product Information**

**LD50 Oral** LD50 Rat = 50 -500 mg/kg/bw (35% Peracetic acid)
LD50 rat = 1026-1780 mg/kg/bw (15% Peracetic acid)
LD50 rat = 185-3622 mg/kg/bw (2.6-6.11% Peracetic acid)

**LD50 Dermal** LD50 Rat = 1957 mg/kg/bw (15% Peracetic acid)
LD50 rat = 1147 mg/kg/bw (5% Peracetic acid)
LD50 rat = >2000 mg/kg/bw (Peracetic acid 0.15%-0.89%)

**LC50 Inhalation** LC50 (4-hr) Rat = 76-189 mg/m$^3$ (15% Peracetic acid)
LC50 (4-h) rat = 204 mg/m$^3$ (5% Peracetic acid)

**Serious eye damage/eye irritation** Corneal lesions and irreversible damage if contact with the eyes.

**Skin corrosion/irritation** Corrosive to skin.

**Sensitization** Did not cause sensitization on laboratory animals.

**Information on toxicological effects**

**Symptoms** Liquid and mist are corrosive and can cause burns, direct contact could cause irreversible dmage to eyes including blindness and/or irreversible destruction of skin tissue. Vapor/mist will irritate the nose, throat and lungs, but will usually subside when exposure ceases. The severity of the effects depends in the concentration and dose.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Chronic toxicity** Repeated inhalation of the mist may cause inflammation of the upper respiratory tract, chronic bronchitis and etching of the dental enamel.

**Carcinogenicity** Did not show carcinogenic effects in animal experiments. Topical applications do not produce skin tumors. Not recognized as carcinogenic by Research Agencies (IARC, NTP, OSHA, ACGIH).

**Mutagenicity** This product is not recognized as mutagenic by Research Agencies. Did not show mutagenic effects in animal experiments.

**Reproductive toxicity** This product is not recognized as reprotox by Research Agencies. No toxicity to reproduction in animal studies.

**STOT - single exposure** May cause respiratory irritation.
**STOT - repeated exposure** Not classified.

**Aspiration hazard** Aspiration risk: may cause lung damage if swallowed.

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

**Ecotoxicity effects** Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

| **Peracetic Acid (79-21-0)** | | | | |
|---|---|---|---|---|
| Active Ingredient(s) | Duration | Species | Value | Units |
| Peracetic Acid 15% | 96 h LC50 | Oncorhynchus mykiss (rainbow trout) | 0.53 | mg/L |
| Peracetic Acid 5% | 96 h LC50 | Bluegill sunfish | 1.1 | mg/L |
| Peracetic Acid | 33 d NOEC | Brachydanio rerio | 0.00225 | mg/L |
| Peracetic Acid 5% | 96 h LC50 | Oncorhynchus mykiss (rainbow trout) | 1.6 | mg/L |
| Peracetic Acid 5% | 48 h EC50 | Daphnia magna | 0.73 | mg/L |
| Peracetic Acid 12.5% | 48 h EC50 | Mytilus sdulis | 0.27 | mg/L |
| Peracetic Acid 15% | 21 d NOEC | Daphnia magna | 0.05 | mg/L |
| Peracetic Acid 5% | 72 h EC50 | Selenastrum capricornutum | 0.16 | mg/L |
| Peracetic Acid 5% | 120 h EC50 | Selenastrum capricornutum | 0.18 | mg/L |
| Peracetic Acid 5% | 72 h NOEC | Selenastrum capricornutum | 0.061 | mg/L |
| Peracetic Acid | 3 h EC50 | Respiration inhibition test (OECD 209) | 5.1 | mg/L |

**Persistence and degradability** Peracetic acid is completely miscible with water. Aqueous solutions of peracetic acid hydrolyze to acetic acid and hydrogen peroxide. Product is biodegradable.

**Bioaccumulation** Based on its low octanol-water partition coefficient and its rapid degradation in the environment, this product is not bioaccumuable.

**Mobility** Peracetic acid released in the environment will partition almost exclusively (>99%) to the water compartment. Only a minor part (<1%) will remain in the atmosphere, where it is expected to undergo rapid decomposition with a half life of 22 minutes. The fate of peracetic acid in the environment is mainly determined by its degradation.

**Other Adverse Effects** None known.

## 13. DISPOSAL CONSIDERATIONS

**Waste disposal methods** This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261). It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.

**US EPA Waste Number** D001 D002

**Contaminated Packaging** Non-returnable containers that held this material should be cleaned by triple-rinsing prior to recycle or disposal. Empty containers should be taken to an approved waste handling site for recycling or disposal.

## 14. TRANSPORT INFORMATION

**DOT**

| | |
|---|---|
| **UN/ID no** | UN 3109 |
| **Proper Shipping Name** | ORGANIC PEROXIDE TYPE F, LIQUID |
| **Hazard class** | 5.2 |
| **Subsidiary class** | 8 and 3 |
| **Packing Group** | II |

**TDG**

| | |
|---|---|
| **UN/ID no** | UN 3109 |
| **Proper Shipping Name** | ORGANIC PEROXIDE TYPE F, LIQUID |
| **Hazard class** | 5.2 |
| **Subsidiary class** | 8 and 3 |
| **Packing Group** | II |

**ICAO/IATA** Air regulation permit shipment of peracetic acid in non-vented containers for Air Cargo Only aircraft, as well as for Passenger and Cargo aircraft. HOWEVER, all peracetic acid containers are vented and therefore, air shipments of peracetic acid are not permitted. IATA air regulations state that venting of packages containing oxidizing substances is not permitted for air transport.

**IMDG/IMO**

| | |
|---|---|
| **UN/ID no** | UN 3109 |
| **Proper Shipping Name** | ORGANIC PEROXIDE TYPE F, LIQUID |
| **Hazard class** | 5.2 |
| **Subsidiary Hazard Class** | 8 and 3 |
| **Packing Group** | II |

**OTHER INFORMATION** Material is shipped in 5 gal. (45 lb.), 30 gal. (250 lb.) and 55 gal. (450 lb.) vented linear (not cross-linked) polyethylene containers, as well as linear (not cross-linked) polyethylene IBC's (330 gal.). Do not ship on wooden pallets.

## 15. REGULATORY INFORMATION

### U.S. Federal Regulations

**Clean Air Act (CAA) - Accidental Release Prevention**

Peracetic acid is listed as a Regulated Toxic Substance at 40 CFR 68.130. Pursuant to the threshold determination provisions for mixtures at 40 CFR 68.155(b)(1), the partial pressure of peracetic acid in VigorOx products (up to 35% solutions) are less than 10 mm Hg at 25°C, and thus the product, as sold, is not subject to the threshold determination under the Risk Management Planning regulations

**SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

| Chemical name | CAS-No | Weight % | SARA 313 - Threshold Values % |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Peracetic Acid - 79-21-0 | 79-21-0 | 35.5 | 1.0 |
| Sulfuric Acid - 7664-93-9 | 7664-93-9 | 1 | 1.0 |

**SARA 311/312 Hazard Categories**

| | |
|---|---|
| **Acute health hazard** | Yes |
| **Chronic health hazard** | No |
| **Fire hazard** | Yes |
| **Sudden release of pressure hazard** | No |
| **Reactive Hazard** | Yes |

**Clean Water Act**

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

| Chemical name | CWA - Reportable Quantities | CWA - Toxic Pollutants | CWA - Priority Pollutants | CWA - Hazardous Substances |
|---|---|---|---|---|
| Acetic Acid 64-19-7 | 5000 lb | | | X |
| Sulfuric Acid 7664-93-9 | 1000 lb | | | X |

**CERCLA**

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302):

| Chemical name | Hazardous Substances RQs | Extremely Hazardous Substances RQs | SARA RQ |
|---|---|---|---|
| Acetic Acid 64-19-7 | 5000 lb | | RQ 5000 lb final RQ<br>RQ 2270 kg final RQ |
| Peracetic Acid 79-21-0 | | 500 lb | |
| Hydrogen Peroxide 7722-84-1 | | 1000 lb | |
| Sulfuric Acid 7664-93-9 | 1000 lb | 1000 lb | RQ 1000 lb final RQ<br>RQ 454 kg final RQ |

## International Inventories

| Component | TSCA (United States) | DSL (Canada) | EINECS/ELINCS (Europe) | ENCS (Japan) | China (IECSC) | KECL (Korea) | PICCS (Philippines) | AICS (Australia) | NZIoC (New Zealand) |
|---|---|---|---|---|---|---|---|---|---|
| Acetic Acid 64-19-7 ( 40 ) | X | X | X | X | X | X | X | X | X |
| Peracetic Acid 79-21-0 ( 35.5 ) | X | X | X | X | X | X | X | X | X |
| Hydrogen Peroxide 7722-84-1 ( 6.5 ) | X | X | X | X | X | X | X | X | X |
| Sulfuric Acid 7664-93-9 ( 1 ) | X | X | X | X | X | X | X | X | X |

**Mexico - Grade** Serious risk, Grade 3

**CANADA**

**WHMIS Statement**

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**WHMIS Hazard Class** C - Oxidizing materials

E - Corrosive material
D2B - Toxic materials
B3 - Combustible liquid

## 16. OTHER INFORMATION

| | | | | |
|---|---|---|---|---|
| **NFPA** | **Health Hazards** 3 | **Flammability** 2 | **Stability** 2 | **Special Hazards** OX |
| **HMIS** | **Health Hazards** 3 | **Flammability** 2 | **Physical hazard** 0 | **Special precautions** H |

**NFPA/HMIS Ratings Legend** Severe = 4; Serious = 3; Moderate = 2; Slight = 1; Minimal = 0
Special Hazards: OX = Oxidizer
Protection = H (Safety goggles, gloves, apron, the use of supplied air or SCBA respirator is required in lieu of a vapor cartidge respirator)

**Uniform Fire Code** Organic Peroxide: Class 3--Liquid

**Revision date:** 2015-04-07
**Revision note** Initial Release

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**Prepared By:**

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**End of Safety Data Sheet**

## ATTACHMENT 20

# SDS Zorbell's Solution and ORP Standard 200mVv

ISO9001:2000 Certified

# Material Safety Data Sheet
# Zobell's Solution and ORP Standard, 200 mV

## Section 1 - Chemical Product and Company Identification

**MSDS Name:**
Zobell's Solution and ORP Standard, 200 mV
**Catalog Numbers:**
LC18010, LC27310
**Synonyms:**
Redox Buffer, 200 mV, 220 mV
**Company Identification:**
LabChem, Inc.
200 William Pitt Way
Pittsburgh, PA 15238
**Company Phone Number:**
(412) 826-5230
**Emergency Phone Number:**
(800) 424-9300
**CHEMTREC Phone Number:**
(800) 424-9300

## Section 2 - Composition, Information on Ingredients

| CAS# | Chemical Name: | Percent |
|---|---|---|
| 13746-66-2 | Potassium ferricyanide | 0.8-1.2 |
| 14459-95-1 | Potassium ferrocyanide, trihydrate | 1.2-1.6 |
| 7447-40-7 | Potassium chloride | 7.5 |
| 7732-18-5 | Water | balance |

## Section 3 - Hazards Identification

### Emergency Overview

***Appearance:*** *Yellow solution*
**Caution!** May cause eye and skin irritation. May cause respiratory and digestive tract irritation. Contact with acids liberates hydrogen cyanide, a very toxic, flammable gas. Light sensitive.
***Target Organs:*** *Respiratory tract, eyes*

### Potential Health Effects

**Eye:**
May cause mild eye irritation. Contact may cause transient eye irritation or chemical conjunctivitis.
**Skin:**
May cause skin irritation.
**Ingestion:**
May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause gastric disturbances and electrolytic imbalance. May be harmful if swallowed. May cause effects similar to inhalation.

**Inhalation:**
May cause respiratory tract irritation. May cause anoxia, characterized by weakness, headache, dizziness, confusion, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), weak and irregular heart beat, collapse, unconsciousness, convulsions, coma and death.

**Chronic:**
Long term inhalation of potassium ferricyanide in rats caused changes in urine composition and red blood cells. Prolonged or repeated skin contact with potassium ferrocyanide may cause dermatitis. Laboratory experiments with potassium chloride have resulted in mutagenic effects.

## Section 4 - First Aid Measures

**Eyes:**
Flush eyes with large amounts of water for 15-20 minutes. Get medical aid at once.

**Skin:**
Remove contaminated clothing. Flush skin with large amounts of water for 15-20 minutes. Get medical aid at once.

**Ingestion:**
In case of large amounts of ingestion, induce vomiting. Get medical aid at once.

**Inhalation:**
Remove from exposure area immediately. If breathing has stopped, give artificial respiration. Get medical aid at once.

**Notes to Physician:**
Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:**
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Move container from fire area if possible. Use any self-contained breathing apparatus with full face piece operated in pressure-demand mode.

**Extinguishing Media:**
Dry chemical, water spray, regular foam

**Autoignition Temperature:**
Not applicable

**Flash Point:**
Not applicable

**NFPA Rating:**
Health- 2, Flammability- 0, Instability- 1

**Explosion Limits:**
Lower: n/a Upper: n/a

## Section 6 - Accidental Release Measures

**General Information:**
Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:**

Absorb material with inert absorbent, such as sand, vermiculite, or diatomaceous earth, and transfer to a suitable disposal container labeled for disposal. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:**

Wash thoroughly after handling. Wash hands before eating. Remove contaminated clothing and wash before reuse. Avoid breathing vapors from heated material. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Avoid temperatures above 210°C (410°F).

**Storage:**

Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light. Do not store in direct sunlight. Isolate from oxidizing materials and acids.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:**

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits:**

| Chemical Name: | ACGIH | NIOSH | OSHA |
|---|---|---|---|
| **Potassium ferricyanide** | 1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)). | 1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)). | 5 mg/m3 TWA (listed under Cyanide anion). |
| **Potassium ferrocyanide** | 1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)). | 1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)). | 5 mg/m3 TWA (listed under Cyanide anion). |
| **Potassium chloride** | none listed | none listed | none listed |
| **Water** | none listed | none listed | none listed |

**OSHA Vacated PELs:**

No OSHA Vacated PELs are listed for any chemicals in this solution.

### Personal Protective Equipment

**Eyes:**

Wear splash-proof goggles. An eye wash fountain should be available in the immediate work area. Do not wear contact lenses when working with chemicals.

**Skin:**

Wear appropriate protective gloves to prevent skin exposure.

**Clothing:**

Wear appropriate protective clothing to prevent skin exposure.

**Respirators:**

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

# Material Safety Data Sheet
# Zobell's Solution and ORP Standard, 200 mV

## Section 9 - Physical and Chemical Properties

| | |
|---|---|
| **Physical State:** | Liquid |
| **Color:** | Yellow |
| **Odor:** | None |
| **pH:** | Slightly acidic |
| **Vapor Pressure:** | Not available |
| **Vapor Density:** | Not available |
| **Evaporation Rate:** | Same as water |
| **Viscosity:** | Not available |
| **Boiling Point:** | >100°C |
| **Freezing/Melting Point:** | <0°C |
| **Decomposition Temperature:** | Not applicable |
| **Solubility in water:** | Soluble |
| **Specific Gravity/Density:** | Not available |
| **Molecular Formula:** | Not applicable |
| **Molecular Weight:** | Not applicable |

## Section 10 - Stability and Reactivity

**Chemical Stability:**
Stable under normal temperatures and pressures. Component salts decompose when heated.

**Conditions to Avoid:**
High temperatures, light.

**Incompatibilities with Other Materials:**
Strong oxidizing agents, strong reducing agents, strong acids, strong bases, bromine trifluoride.

**Hazardous Decomposition Products:**
Nitrogen oxides, carbon monoxide, carbon dioxide, cyanides, oxides of potassium, chlorine.

**Hazardous Polymerization:**
Not known to occur.

## Section 11 - Toxicological Information

**RTECS:**

CAS# 13746-66-2: LJ8225000
CAS# 14459-95-1: unlisted.
CAS# 7447-40-7: TS8050000
CAS# 7732-18-5: ZC0110000

**LD50/LC50:**

CAS# 13746-66-2:
Oral, mouse: LD50 = 2970 mg/kg

CAS# 14459-95-1:
Not available.

CAS# 7447-40-7:
Draize test, rabbit, eye: 500 mg/24H Mild;
Oral, mouse: LD50 = 1500 mg/kg;
Oral, rat: LD50 = 2600 mg/kg

CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg

**Carcinogenicity:**
CAS# 13746-66-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 14459-95-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7447-40-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:**
No information available.

**Teratogenicity:**
No information available.

**Reproductive:**
No information available.

**Mutagenicity:**
CAS# 7447-40-7: Unscheduled DNA Synthesis: Oral, rat = 1500 ug/kg.; Mutation in Microorganisms = Mouse, Lymphocyte = 2048 mg/L.; DNA Damage = Hamster, Ovary = 260 mmol/L.; Cytogenetic Analysis: Hamster, Lung = 12 gm/L.

**Neurotoxicity:**
No information available.

## Section 12 - Ecological Information

No information found.

## Section 13 - Disposal Considerations

**Dispose of in accordance with Federal, State, and local regulations.**

## Section 14 - Transport Information

**US DOT**

**Shipping Name:** Not regulated.
**Hazard Class:**
**UN Number:**
**Packing Group:**

## Section 15 - Regulatory Information

**US Federal**

**TSCA:**
CAS# 13746-66-2 is listed on the TSCA inventory.

CAS# 14459-95-1 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).
CAS# 7447-40-7 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

**SARA Reportable Quantities (RQ):**

None of the chemicals in this material have an RQ.

**CERCLA/SARA Section 313:**

This material contains Potassium chloride (listed as Water Dissociable Nitrate Compounds), 100%, (CAS# 7447-40-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**OSHA - Highly Hazardous:**

None of the chemicals in this product are considered highly hazardous by OSHA.

## US State

**State Right to Know:**

CAS# 13746-66-2 and CAS# 14459-95-1 can be found on the following state right to know lists: California, (listed as Iron salts (soluble)), California, (listed as Cyanides, inorganic salts), New Jersey, (listed as Cyanide anion), Pennsylvania, (listed as Iron salts (soluble)), Pennsylvania, (listed as Cyanide anion), Minnesota, (listed as Iron salts (soluble)), Massachusetts, (listed as Cyanide anion).
CAS# 7447-40-7 and CAS# 7732-18-5 are not present on state lists from California, Pennsylvania, Minnesota, Massachusetts, Florida, or New Jersey.

**California Regulations:**

None of the chemicals in this product are listed.

## European/International Regulations

**Canadian DSL/NDSL:**

CAS# 13746-66-2 is listed on Canada's DSL List.
CAS# 14459-95-1 is not listed on the DSL or NDSL list.
CAS# 7447-40-7 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

**Canada Ingredient Disclosure List:**

CAS# 13746-66-2 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.
CAS# 14459-95-1 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.
CAS# 7447-40-7 is not on the Ingredient Disclosure List.
CAS# 7732-18-5 is not on the Ingredient Disclosure List.

# Section 16 - Other Information

MSDS Creation Date: August 30, 2006
Revision Date: October 26, 2009

*Information in this MSDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc. assumes no liability resulting from the use of this MSDS. The user must determine suitability of this information for his application.*

# APPENDIX C

Heat Illness Prevention Program

# HEAT ILLNESS
# PREVENTION PROGRAM

| | | |
|---|---|---|
| **CORPORATE HEALTH AND SAFETY DIRECTOR** | : | **Brian Hobbs, CIH, CSP** |
| **EFFECTIVE DATE** | : | **10/2019** |
| **REVISION DATE** | : | **03/2024** |
| **REVISION NUMBER** | : | **3** |

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## 1. PURPOSE

Roux Associates, Inc. and its affiliated **companies**, Roux Environmental Engineering and Geology, D.P.C, and Remedial Engineering (collectively, "Roux") has established this heat illness prevention program to assist in preventing workplace accidents, injuries, and illnesses associated with temperature extremes. Roux is committed to taking every precaution to protect employees who might be exposed to heat stress, including establishing safe work practices, heat illness prevention controls, and emergency preparedness, which will be detailed in this plan.

## 2. SCOPE AND APPLICABILITY

Roux's Heat Illness Prevention Program applies to all employees who may be exposed to heat stress in the field.

## 3. ROLES AND RESPONSIBILITIES

The Heat Illness Prevention Program Administrator for Roux is the Corporate Health and Safety Director (CHSD), Brian Hobbs, CIH, CSP. The daily administration of the program is delegated to the Operations Manager (OM) and Office Health and Safety Manager (OHSM). The CHSD has the authority, responsibility, and overall accountability for the comprehensive implementation of this program.

All managers and supervisors shall implement and maintain the heat illness prevention program in work areas where there is a potential for heat stress.

### Management Responsibilities

Management (i.e., Project Managers, Project Principals, OM) must provide the following to promote compliance and foster a good safety culture:

- Comply with applicable standards.
- Inform employees of the provisions of the heat illness prevention program and ensure understanding.
- Provide sufficient water, shade, rest areas, and other heat illness controls for employees.
- Assist with establishing work practices to minimize heat stress risks, such as acclimatization, required rest periods, employee monitoring, and strategic scheduling.
- Encourage employees to report hazardous conditions or heat illness symptoms.
- Provide training to any employee who could possibly be exposed to the risk of heat illness.

### Employee Responsibilities

Employees are expected to actively participate in the organization's heat illness prevention program, which includes the following responsibilities:

- Receive appropriate training with regard to heat stress.
- Understand core concepts of heat illness prevention and follow guidelines to mitigate risks.
- Recognize the signs and symptoms of heat illness and immediately report them.
- Cooperate with workplace inspections and incident investigations.

### Effective Communication

All Roux employees shall be accountable for ensuring there is effective communication with both the field team and their subcontractors. Communication between Roux employees project leads (e.g., Project Principal, Project Managers) and subcontractors (if applicable) will be established and maintained so that employees can quickly

contact should there be a change in condition or someone at the Site exhibits signs/symptoms of heat stress. These types of incidents would follow Roux's Incident Investigation and Reporting Management Program 2.12 and Roux's Injury Illness Prevention Program 2.22.

## 4. HAZARD IDENTIFICATION AND ASSESSMENT

Prior to scheduled fieldwork, the project team shall ensure a hazard assessment is conducted as it relates to heat stress. This will include a determination of how much heat and exertion employees are likely to be exposed to based on the work activity.

Factors that can increase heat stress include the following:

- Temperatures at the work site;
- Humidity;
- A lack of air movement or exchange;
- The amount of time employees spend working in the heat;
- The time of day work takes place;
- Sources of radiant heat (e.g., sunlight, fire, or hot furnace);
- Work activities that produce heat (e.g., welding);
- Physical contact with warm or hot objects or liquids;
- The clothing and PPE employees are required to wear; and/or
- Physically strenuous work.

Results of the hazard analysis should be used to determine appropriate controls for mitigating heat stress, whenever possible, for planning acclimatization, and for developing work schedules that rotate workers to limit employee exposure. Typically, the Site Supervisor (SS) or Site Health and Safety Officer (SHSO) shall conduct worksite observations to ensure all employees follow heat illness prevention procedures and that hazards are sufficiently controlled. However, all employees should be continuously evaluating work site conditions and be able to recognize heat stressors in order to prevent heat illnesses.

## 5. TRAINING

All Roux employees shall be trained on the topics listed below prior to beginning work, which may potentially expose workers to heat stress.

### Training Topics

- The environmental, behavioral, and personal risk factors for heat illness, such as radiant heat sources, exertion, clothing and PPE, and use of alcohol or drugs.
- Types of heat illnesses, common symptoms, and appropriate emergency response for each.
- The knowledge that mild symptoms may quickly become more severe or life-threatening.
- The importance of immediately reporting any signs or symptoms of heat illness to the supervisor.
- The employer's responsibility to provide shade, water, access to first aid, and cool-down rests during work and the employee's freedom to exercise their rights under this standard without fear of retaliation.

- The employer's heat stress plan and its procedures:
  - Procedures for employees who are newly assigned to work in high-heat areas.
  - The organization's acclimatization methods, as applicable.
  - Heatwave procedures.
  - Heat illness and emergency response, including contact information.
- The importance of frequent consumption of water and the taking of rest breaks.
- How heat illness prevention applies to employees' specific tasks.

**Increasing Training Effectiveness:**

- The SS/SHSO will hold daily tailgates with the field team to go over daily work tasks and basic safety information including Job Safety Analysis (JSA) review as well as incorporate elements such as current weather and effects on the work activities for the day.
- If a heat wave or high heat is anticipated, OHSMs and/or OMs will provide communications to Roux employees prior to their shifts and remind them of any special high heat procedures.

## 6. DRINKING WATER

Employees shall be given access to potable drinking water. Access to water will be provided as near as possible to where employees are working, and there shall be enough locations so employees will have sufficient water. Water should be fresh and pure, free of taste or smell that would discourage employees from drinking, comfortably cool, and obtained from an approved source.

The recommendation is that during warm or hot weather, employees drink four 8-ounce glasses of water, or a total of one quart per hour, throughout the entire work shift. Easy access to sufficient potable drinking water throughout the work shift encourages employees to drink.

During a heat wave, water shall be replenished more often to keep available and cool. Water containers (and all spouts and levers) must be kept clean. If able, provide single-use drinking cups with appropriate waste receptacles. Accessible sanitation facilities shall also be maintained at work Sites as appropriate.

**SS/SHSO is responsible for the following:**

- Drink sufficient water before, during, and after work shifts to maintain hydration.
- Encourage frequent drinking of small amounts of water throughout the shift. In high-heat environments, remind field staff and subcontractors that drinking extra water may be necessary.
- Discourage the choice of drinks with caffeine or sugar that may possibly dehydrate employees instead of water. Also, discourage the drinking of alcohol.
- Monitor the water supply.
- If employees become dehydrated and are unable to alleviate symptoms with the steps below, get them immediate medical attention.

**Field Staff/Subcontractors are responsible for the following:**

- Drink sufficient water before, during, and after work shifts to maintain hydration. Drink up to 4 cups of water per hour, especially during hot weather.
- Be aware that in high-heat situations, you may need to drink more water.

- Monitor yourself and others for signs of dehydration. If you feel dehydrated:
  - Follow Roux's Incident Notification Flowchart;
  - Rest in the shaded resting area; and
  - Drink water in small amounts, but frequently.

## 7. ACCESS TO SHADE

Access to shaded areas will be provided to Roux staff, as needed. Employees are encouraged to use these areas when they feel overheated. Roux's SS/SHSO shall oversee the proper implementation of shaded areas and will communicate these locations on a daily basis with the Field Team.

Depending on the Site, shaded areas can include the following:

- Pop-up Tents
- Canopies
- Umbrellas
- Structures mechanically ventilated or open to air movement
  - Garage
- Conex-mounted RV canopies
- Full and thick tree canopies that block direct sunlight
- Buildings
- Enclosed areas only if they provide cooling comparable to shade in open-air
  - Vehicles with air conditioning

### Shaded Area Requirements

The shade shall be strong enough to cool employees down and other shadows should not be visible in the shade. The shade will be provided by Roux when the air temperature exceeds 80°F. If the temperature is less than 80°F, shade will be available and provided upon request. The SS/SHSO will monitor conditions to determine when the air will exceed (and is exceeding) 80°F. For most Sites, air will be monitored hourly and shade will be set up immediately if 80°F is exceeded.

Shade shall be located as close as practical to areas where employees are working and is easily accessible. These areas will be considered safe and free from other hazards. Shaded areas should be large enough to accommodate all employees who are on a break, resting, or recovering without crowding. Should natural vegetation be used for shade, the SS/SHSO will evaluate shade for effectiveness.

### Field Staff Responsibilities

Field Staff should take ordinary rest breaks in the shaded areas and monitor themselves for signs of heat stress, and go to the shaded area when they need to cool down. Any issues or problems with shaded areas should be reported to the SS/SHSO for the Site.

If shaded areas are used for a preventative cool-down, the SS/SHSO will ensure the affected employees will remain in the shade until they begin to feel better. The SS/SHSO will continue to monitor the employees and ask them if

they are experiencing symptoms of a heat illness. Employees shall not be sent back to work before symptoms have ended and at a minimum at least 10 minutes of rest.

## 8. MONITORING AND SCHEDULING

### Monitoring

The SS/SHSO and Field Team will continue to monitor themselves and others for signs of heat illness. The SS/SHSO will monitor when the air temperature exceeds 80°F. Throughout the summer, weather and temperature will be monitored at least two weeks ahead, and the work schedule will be planned to accommodate the expected weather.

### Scheduling

Scheduling accommodations may include:

- Working during cooler hours of the day
- Working at night
- Stopping work early
- Rescheduling work activities
- Increasing frequency of breaks

In general, strenuous work activities shall be rescheduled to the coolest parts of the day.

Special precautions are required for temperatures above 80°F, 95°F, and heat waves. These precautions are provided in the sections below.

## 9. ACCLIMATIZATION AND NEW EMPLOYEE PROCEDURES

Roux requires employees to be acclimatized in order for them to better tolerate heat in the workplace. Acclimatization is the physical process of adapting to a different thermal environment, allowing a better toleration of heat. Acclimatization procedures require gradual exposure that gives the employee time to adjust to each level of exposure. Acclimatization is essential for new employees but is necessary for all employees when the temperature significantly changes. Heat stress is much more likely if these procedures are not followed.

The SS/SHSO is responsible for observing new employees during their first 14 days of employment in high-heat areas.

Re-acclimatization is necessary if employees are absent from high-heat environments for a week or more or the temperature increases significantly.

## 10. HEATWAVE AND EXTREME HEAT PROCEDURES

### Heat Wave Procedures

A heat wave is defined as consistent temperatures over 80°F or if the temperature is 10° higher than the average daily temperatures in the preceding 5 days.

SS/SHSO and Project Management (e.g., PP, PM) shall closely observe and monitor employees during a heat wave. The Field Teams should institute a ratio of one SS to 20 or fewer employees, a mandatory buddy system, or

a consistent practice for supervisors to check on employees. Pre-shift meetings to review high-heat procedures with employees will be carried out to emphasize work-rest schedules, drinking water, shade, etc.

### Extreme Heat Procedures

When work-site temperatures equal or exceed 95°F, the employer will enact extreme heat procedures:

- Employees will be closely observed by the SS/SHSO for signs of heat illness. New employees will be supervised for acclimatization.
- Effective communication and monitoring will be assured through the use of periodic check-ins with the SS/SHSO via phone. Communications between employees and Project Management (e.g., PP/PM) will be established and maintained. Mandatory 10-minute break periods are required for every two hours worked. SS/SHSO must enforce this rule.
- Pre-shift safety tailgate meetings will occur to review procedures and to remind employees to drink water and take cool-down rests if needed. SS/SHSO shall remind employees to rest and drink water. Employees should drink more water than usual.

## 11. EMERGENCY RESPONSE PROCEDURES

Roux is dedicated to providing prompt appropriate care for all employees who report or show symptoms of heat illness. If an employee shows signs of heat illness, they will be monitored and shall not be left alone or sent home without being offered first aid or emergency medical services. If on-Site personnel require any medical treatment, the following steps will be taken:

1. Notify Roux's Project and Corporate Management Team for any work-related injury and/or illness occurrence, and communicate with the contracted Occupational Health Care Management Provider, AllOne Health (AOH), immediately following the notifications provided above.
2. Based on discussions with the Project Team, Corporate Management, and the AOH evaluation, if medical attention beyond onsite First Aid is warranted, transport the injured / ill person (IP) to the Urgent Care Center, or notify the Fire Department or Ambulance Emergency service and request an ambulance or transport the victim to the hospital, and continue communications with Corporate Management Team. An Urgent Care/Hospital Route map with locations and directions is provided within Site Specific Health and Safety Plans.
3. First aid medical support will be provided by onsite personnel trained and certified in First Aid, Cardio Pulmonary Resuscitation (CPR), Automatic External Defibrillation (AED), and Blood-Borne Pathogens (BBP) Awareness, until relieved by emergency medical services (EMS).
4. The SHSO and Project Manager will perform a Loss Investigation (LI) and the Project Team will complete the final Loss Report.

## 12. HEAT-RELATED ILLNESSES

### Heat Stress

Heat stress is a significant potential hazard and can be associated with heavy physical activity and/or the use of personal protective equipment (PPE) in hot-weather environments. For these reasons, the company will provide potable drinking water and access to shade or other areas of relief (i.e., air-conditioned vehicles and work trailers). Supervisors, prior to supervising personnel in the field as well as all personnel involved with the fieldwork of a project, are trained in this HASP that includes preventing heat-related illnesses and the below procedures in response to heat-related symptoms and illness. Since much of our work is dependent upon environmental factors beyond our control, we must closely monitor air temperature and humidity and be aware of avoiding radiant heat sources and providing as much air circulation as possible wherever we work. Physical factors that need to be evaluated as part of our Job Safety Analysis (JSA) reviews include the level of physical activity and duration of work

and the type (i.e., color, weight breathability) of the clothing we select. In addition, personal factors such as age, weight, fitness, drug/alcohol use, and prior history of heat-related illness need to be considered.

Heat cramps are brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body, resulting in painful muscle cramps. The signs and symptoms of heat stress are as follows:

- Severe muscle cramps, usually in the legs and abdomen;
- Exhaustion, often to the point of collapse; and
- Dizziness or periods of faintness.

First aid treatment includes, but is not limited to, shade, rest, and fluid replacement. Typically, the individual should recover within one-half hour while being monitored constantly. If the individual has not improved substantially within 30 minutes and the body temperature has not decreased, the individual should be transported to a hospital for medical attention.

**Heat Exhaustion**

Heat exhaustion may occur in a healthy individual who has been exposed to excessive heat while working or exercising. The circulatory system of the individual fails as blood collects near the skin to rid the body of excess heat through transference. The signs and symptoms of heat exhaustion are as follows:

- Rapid and shallow breathing;
- Weak pulse;
- Cold and clammy skin with heavy perspiration;
- Skin appears pale;
- Fatigue and weakness;
- Dizziness; and
- Elevated body temperature.

First aid treatment includes, but is not limited to, cooling the victim, elevating the feet, and replacing fluids. If the individual is not substantially improved within 30 minutes and the body temperature has not decreased, the individual should be transported to the hospital for medical attention.

**Heat Stroke**

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a MEDICAL EMERGENCY requiring immediate cooling of the victim and transport to a medical facility. The signs and symptoms of heat stroke are as follows:

- Dry, hot red skin;
- Body temperature approaching or above 105 degrees F;
- Confusion, altered mental state, slurred speech;
- Seizures;
- Large (dilated) pupils; and
- Loss of consciousness – the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to a medical facility. Heat stress is a significant hazard if any type of protective equipment (semi-permeable or impermeable) that prevents evaporative cooling is worn in hot-weather environments.

## 13. OTHER HEAT CONTROLS

### Clothing and PPE

Employees should choose clothing that is reflective, light-colored, lightweight, loose-fitting, and breathable. Clothing should cover the exposed parts of the body. In direct sun, hard hats with a brim or bill may be helpful. Should specialized cooling garments be applicable, please consult with your OM/OHSM/CHSD.

### Managing Employee Risk Factors

It is recommended that employees are aware of how their health can affect their risk of heat stress. The following increases ones risk for a heat related illness:

- A poor level of physical fitness
- Obesity
- Chronic or acute illnesses
- Conditions such as diabetes, heart disease, or high blood pressure
- Certain medications, such as diuretics
- Age (60+)

Employees should:

- Maintain their health outside of work
- Be aware of the effects of medications
- Drink adequate amounts of water
- Eat light, cool meals during work shifts and save heavy meals until after the shift is over
- Do not skip meals:  food helps replace electrolytes when sweating
- Take breaks as needed
- Do not consume alcohol prior to working in a hot environment

# APPENDIX D

Personal Protective Equipment (PPE) Management Program

# PERSONAL PROTECTIVE EQUIPMENT MANAGEMENT PROGRAM

| | | |
|---|---|---|
| **CORPORATE HEALTH AND SAFETY DIRECTOR** | : | **Brian Hobbs, CIH, CSP** |
| **EFFECTIVE DATE** | : | **01/2019** |
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## 1. PURPOSE

Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C., and Remedial Engineering (collectively, "Roux") has instituted the following program to establish guidelines for the selection of personal protective equipment (PPE) for use by Roux personnel performing field activities in hazardous environments. PPE is not meant to be a substitute for engineering, work practice, and/or administrative controls, but PPE should be used in conjunction with these controls to protect employees in the workplace. Clothing, body coverings, and other accessories designed to prevent worker exposure to workplace hazards are all types of PPE. To ensure adequate PPE employee-owned PPE is evaluated on a case-by-case basis to insure its adequacy, maintenance and sanitation.

## 2. SCOPE AND APPLICABILITY

These guidelines apply to all PPE selection decisions to be made in implementing the Roux program. The foundations for this program are the numerous Occupational Health and Safety Administration (OSHA) standards related to PPE cited in 29 CFR 1910 Subpart I, 29 CFR 1926 Subpart E, and the hazardous environment work employee protection requirements under the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 and 1926.65. To ensure hazard assessments are documented, the levels of protection, types of protection, and tasks requiring protection are covered in site-specific Health and Safety Plans (HASPs) and Job Safety Analyses (JSAs).

## 3. PROCEDURES

Due to the varied nature of site activities and the different potential hazards associated with different sites, several aspects must be considered when selecting PPE. The following text describes PPE selection logic and provides guidelines and requirements for the appropriate selection and use of PPE.

### 3.1 Introduction

To harm the body, chemicals must first gain entrance. The intact skin and respiratory tract are usually the first body tissues that are exposed to chemical contaminants. These tissues provide barriers to some chemicals but, in many cases, are damaged themselves or are highly permeable by certain chemical compounds. PPE, therefore, is used to minimize or eliminate chemical compounds from coming into contact with these first barrier tissues.

Proper PPE selection is essential in preventing exposures. The Project Manager (PM) or health and safety personnel making the selection will have to consider several factors. The level of protection, type, and kind of equipment selected depends on the hazardous conditions. In some cases, additional selection factors include cost, availability, compatibility with other equipment, and performance. All these factors must be accurately assessed before work can be safely carried out.

#### 3.1.1 Training

Training shall be provided to all field-based employees in properly using and caring for PPE. Training shall include, but not be limited to, the initial 40-hour HAZWOPER training, annual 8-hour HAZWOPER refresher training, and site-specific PPE training. The training program includes when PPE is necessary, what types of PPE are required; how to don, doff, adjust, and wear PPE; the limitations of PPE; the proper care, maintenance, useful life, signs of PPE failure and emergency procedures to follow in the event of PPE failure and disposal of PPE. In addition, retraining shall be conducted when workplace changes require a change in PPE when an employee demonstrates a lack of knowledge or improper use of PPE is identified.

### 3.2 Types of PPE

The type and selection of PPE must meet certain general criteria and requirements as required under OSHA 29 CFR 1910.132 (General Industry) and 1926.95 (Construction). In addition to these general requirements, specific requirements and specifications exist for some types of PPE that form the basis of the protective clothing scheme. All manufacturer's recommendations for PPE care and use shall be followed. All PPE shall be maintained in a sanitary and reliable condition. Additionally, proper fit and size shall be evaluated to ensure adequate employee protection. Should PPE become defective, it shall be immediately removed from service and discarded.

The following is a list of the common types of specific PPE and the specific requirements for the PPE type, where applicable:

1. Hard Hats - Regulated by 29 CFR 1910.135 and 1926.100; and specified in ANSI Z89.1.
2. Face Shields and Safety Glasses - Regulated by 29 CFR 1910.133 and 1926.102; and specified in ANSI Z87.1.
3. Respiratory Protection - Regulated by 29 CFR 1910.134 and 1926.103.
4. Hand Protection - Regulated by 29 CFR 1910.138
5. Foot Protection - Regulated by 29 CFR 1910.136 and 1926.96; and specified in ANSI Z41.1.
6. Protective Clothing (e.g., fully encapsulated suits, aprons) - Specified in NFPA 1991/1992/1994.

#### 3.2.1 PPE Inspection, Cleaning Maintenance, and Storage

The Office Health and Safety Manager (OHSM) or their designee is responsible for procuring PPE, in accordance with this management program. Single-use/disposable PPE should be purchased and used whenever practicable.

##### 3.2.1.1 PPE Inspection

Roux employees must inspect PPE regularly, before and after each use, to check for defects and damage. Garments and other PPE in central storage must be inspected at least annually or as recommended by the manufacturer by the OHSM, Equipment Manager and/or their designee. Defective or damaged equipment must be tagged as out-of-service, immediately removed from the work site and discarded.

##### 3.2.1.2 PPE Cleaning and Maintenance

All Roux employees are responsible for routine cleaning of their assigned PPE. Decontamination of PPE is addressed within Roux's Site Control and Decontamination Program as well as specified within site-specific health and safety plans. As appropriate, Roux employees should be issued single-use PPE when practicable to minimize the requirement for decontamination. When performing routine cleaning of reusable PPE:

- Always follow the manufacturer's recommendations to avoid damaging the PPE. For example, some cleaning solutions compromise the integrity of protective helmets' shells.
- Clean and maintain PPE according to the manufacturer's recommendations. Before being re-issued, PPE should be thoroughly sanitized.
- Disassemble, wash, and sanitize reusable respirators after each use, refer to Roux's Respiratory Protection Management Program.

Employees are not authorized to repair PPE without prior approval from the Health and Safety Department. Reusable PPE may require maintenance by the manufacturer to maintain integrity and certification. Many

manufacturers specify which repairs, if performed by the end-user, will void product warranty, therefore Roux employees are not typically authorized to perform such maintenance or repairs.

#### 3.2.1.3 PPE Storage

Certain equipment failures can be directly attributed to improper storage. The OHSM or Equipment Manager (or another designated person) is responsible for implementing procedures for appropriate PPE storage, for equipment that is centrally stored. Both central storage and dedicated PPE provided to employees should be stored using the following:

- Store goggles and safety glasses in protective cases.
- Store PPE (such as helmets, boots, etc.) in clean, dust-proof containers or bags out of direct sunlight.
- PPE should ideally be stored under climate-controlled conditions. PPE, stocked gear bags, and/or go-kits should not be stored in hot, cold, or other extreme environmental conditions, and they should not be stored in vehicles (government-owned or rentals) for even short periods of time. Do not store helmets on the rear window shelf of a vehicle.
- Store different kinds of clothing and gloves separately to prevent errors in selection.
- Hang or fold protective clothing in accordance with manufacturers' recommendations.
- Never store contaminated PPE near new protective clothing or street clothing. Potentially contaminated, reusable clothing must be stored (usually bagged) away from new PPE, in a well-ventilated area, with good air flow around each item, until the garment is decontaminated or disposed.
- See Roux's Respiratory Protection Management Program for detailed procedures on storing respirators.

### 3.3 Fitting, Donning and Doffing PPE

Roux shall provide appropriately sized PPE for Roux employees. Improper fitting such as tight-fitting garments, can tear, especially at the knees, crotch, shoulders, back, and elbows due to movement. Protective clothing that is too large can easily snag and/or limit a user's dexterity. The Roux PM shall ensure site/project-specific PPE is kept in a sufficient stock of appropriately sized PPE (e.g., Level C ensembles). The OHSM, Equipment Manager and/or their designee shall ensure a sufficient stock of appropriately sized PPE is maintained in central storage locations.

The Site Supervisor (SS)/Site Health and Safety Officer (SHSO) is responsible for ensuring that site-specific procedures for donning and doffing PPE are incorporated into site-specific HASPs. Donning and doffing procedures may differ depending on the type of PPE and clothing (e.g., Level D, Modified Level D, Level C) utilized. Figures 1-4, provide examples of procedures that can be used to don and doff Levels A through D and are provided as a reference. Site-specific conditions may warrant adjustments to such procedures. Consult the CHSD for additional information.

Site-specific donning and doffing procedures should include the use of an assistant where necessary. Donning and doffing certain types of PPE without assistance could risk PPE failure or damage. Care must be taken to prevent the spread of contaminants on the PPE. Decontamination procedures should limit the potential for cross contamination and may include gross decontamination of outer boots, gloves, and suits as necessary to prevent tracking of contaminants into the contamination reduction zone (CRZ) and clean zone(s).

### 3.4 Controlling Hazards Associated with PPE Use

PPE use can pose potential health and safety hazards, which range from minor discomfort to life-threatening height stroke. The magnitude of the potential hazard can vary and will depend on various factors, including an individual's fitness level, the type of PPE worn, the work demands, individual work practices, duration of work and environmental conditions. The use of PPE can also lead to reduced efficiency and work performance.

Among hazards associated with PPE use, heat stress emerges as a prevalent and significant hazard. Particularly, the use of substantial and/or impermeable attire, such as heavy coveralls, Tyvek suits, splash suits, or Level A or B suits, alongside strenuous work, amplifies the risk of heat stress. Regular monitoring for indications of heat stress is imperative for workers operating in such conditions. Roux's Heat Illness Prevention Program lays out requirements for signs and symptoms as well as preventative measures to mitigate the potential for heat illness. In addition, cold environments can pose adverse risk, such examples include use of non-insulated steel-toe safety shoes in frigid conditions which has the potential to increase the risk of frostbite, while safety gloves worn for chemical protection may inadequately insulate hands from the cold.

It is the responsibility of Project Teams to integrate site-specific protocols to manage PPE hazards into such site-specific HASPs. These protocols can encompass considerations like work/rest ratios, crew rotations, and other accommodations for exceptionally demanding conditions.

The following measures are recommended for controlling hazards posed by PPE use:

- Prioritize through the hierarchy of controls with a focus on elimination, substitution, engineering, work practice and administrative control implementation rather than sole reliance on PPE. PPE shall be considered the last line of worker protection.
- Workers should maintain physical fitness to be able to withstand the potential physical strain of PPE use. A physically fit individual will endure less physiological strain, manifesting in a lower heart rate, reduced body temperature (indicating diminished retained body heat), more effective sweating, slightly lower oxygen consumption, and carbon dioxide production. Furthermore, acclimatization to extreme environmental conditions, such as high temperatures, can influence work performance and physical capacity.
- Understand the symptoms of PPE failure. Workers encountering any of these symptoms while donning PPE should promptly notify their onsite SHSO and/or SS:
    - Perception of odors when wearing a respirator
    - Skin irritation
    - Acute discomfort
    - Difficulty breathing
    - Unusual fatigue
    - Dizziness
    - Inability to see, hear, or speak clearly
    - Uncomfortable restriction of movement
    - Rapid pulse, nausea, or chest pain
- Implement a buddy system. Especially in situations where there is a need for increased level of protection (e.g. Level A-C) workers should work in pairs or teams, and are instructed to monitor the integrity of their team/partners gear and remain alert for symptoms of PPE failure.

### 3.5 PPE Selection

For site-specific work, the Project Manager in consultation with the Health and Safety Department has overall responsibility for coordinating the selection and distribution of PPE to field staff and for ensuring that the selected PPE is appropriate for the site-specific hazards. Generally speaking Roux employees are not engaged in emergency response or perform work at uncontrolled hazardous waste sites, if the case the CHSD shall be made aware of the work and consult with the Project Team on appropriate PPE selection. Most work falls under environmental sampling of low concentration water/soil/perimeter air. Therefore work is carried out in Level D PPE. Upgrades would be based on more information as it becomes available. The United States Environmental Protection Agency (EPA) has created Guidelines for PPE Ensemble Selection to assist workers in selecting PPE ensembles for specific activities and tasks and determining which ensembles and air monitoring equipment should be used to address specific chemicals. Guidelines to Ensembles for Specific Activities/Tasks Where Chemical Exposure is Possible is provided as a reference as Appendix A.

### 3.6 Protective Clothing Selection Criteria

#### 3.6.1 Chemicals Present

The most important factor in selecting PPE is the determination of what chemicals the employee may be exposed to. The number of chemicals on field investigations may range from a few to several hundred. The exact chemicals or group of chemicals present at the site (certain groups tend to require similar protection) can be determined by collecting and analyzing air, soil, water, or other site media samples. When data are lacking, research into the hazardous materials used or stored at the site can be used to infer potential chemical exposures on the site.

The most appropriate clothing shall be selected once the known or suspected chemicals have been identified and considered based on the type of work to be performed.

Protective garments are made of several different substances for protection against specific chemicals. There is no universal protective material. All will decompose, permeate, or otherwise fail to protect under given circumstances. Fortunately, most manufacturers make guides to using their products (i.e., Dupont's Tyvek™ Permeation Guide). These guides are usually for gloves and coveralls and typically provide information regarding chemical degradation rates (failure of the material to maintain structural integrity when in contact with the chemical) and may provide information on the permeation rate (whether or not the material allows the chemical to pass through). When permeation tables are available, they shall be used with degradation tables to determine the most appropriate protective material for the specific chemical hazard(s).

During most site work, chemicals are usually in mixed combinations, and the protective materials are not in continuous contact with pure chemicals for long periods; therefore, the selected material may be adequate for the particular chemical of most concern and type of work being performed, yet not the "best" protecting material for all site chemicals and activities. Selection shall depend upon the most hazardous chemicals based on their hazards and concentrations. Sometimes, layering (i.e., using several layers of protective materials) affords the best protection.

#### 3.6.2 Concentration of the Chemical(s)

One of the major criteria for selecting protective material is the concentration of the chemical(s) in air, liquid, and solid state. Airborne and liquid chemical concentrations should be compared to the OSHA standards and American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH) guidelines to determine the level of skin or other absorptive

surface (e.g., eyes) protection needed. While these standards are not designed specifically for skin exposed directly to the liquid, they may provide skin designations indicative of chemicals known to have significant skin or dermal absorption effects. For example, airborne levels of PCBs on-site may be low because they are not very volatile, so the inhalation hazard may be minimal; however, PCB-containing liquid coming in direct contact with the skin may cause overexposure. Thus, PCBs have been assigned a skin designation in the OSHA and ACGIH exposure limit tables.

### 3.6.3 Physical State

The characteristics of a chemical may range from nontoxic to highly toxic, depending on its physical state. Inorganic lead in soil would not be considered toxic to site personnel unless it became airborne since it is generally not absorbed through the intact skin. However, organic lead in a liquid could be readily absorbed through the skin. Soil is frequently contaminated with hazardous materials. Concentrations will vary from a few parts per million to nearly one hundred percent by volume. The degree of hazard depends on the type of soil and concentration of the chemical. Generally speaking, "dry" soils that have not become airborne do not pose a hazard to site personnel if they take minimal precautions, such as wearing lightweight gloves.

### 3.6.4 Length of Exposure

The length of time a material is exposed to a chemical increases the probability of a breakthrough. Determinations of actual breakthrough times for short-term exposures indicate that several materials that would be considered inadequate under long-term exposures can be used. Different materials that would be considered inadequate under long-term exposures can be used. It should be kept in mind that during the manufacturer’s permeation testing, a pure (100% composition) liquid is usually placed in direct contact with the material, producing a worst-case situation.

### 3.6.5 Abrasion

When selecting protective clothing, the job the employee is engaged in must be taken into consideration. Persons moving drums or performing other manual tasks may require added protection for their hands, lower chest, and thighs. Using leather gloves and a heavy apron over other normal protective clothing will help prevent damage to the normal PPE and thus reduce worker exposures.

### 3.6.6 Dexterity

Although protection from skin and inhalation hazards is the primary concern when selecting PPE, the ability to perform the assigned task must be maintained. For example, personnel cannot be expected to perform work that requires fine dexterity if they must wear thick gloves. Therefore, the PPE selection process must consider the task being performed and provide PPE alternatives or techniques that maintain dexterity while still protecting the worker (e.g., wearing tight latex gloves over more bulky hand protection to increase dexterity).

### 3.6.7 Ability to Decontaminate

If disposable clothing cannot be used, the ability to decontaminate the materials selected must be taken into consideration. Once a chemical makes contact with the material, the PPE must be cleaned before reusing it. If the chemical has completely permeated the material, the clothing cannot be adequately decontaminated, and the material should be discarded.

### 3.6.8 Climactic Conditions

The human body works best with few restraints from clothing. Protective clothing adds a body burden by increasing weight, restricting movement, and preventing the body's natural cooling process. In severe situations, a modified work program must be used.

Some materials act differently when they are very hot and very cold. For example, PVC becomes almost brittle in frigid temperatures. If there are any questions about the stability of the protective materials under different conditions, the manufacturer should be contacted before using PPE in the field.

### 3.6.9 Work Load

Like climactic conditions, the type of work activity may affect work duration and personnel's ability to perform certain tasks. Similarly, the amount of protective materials a person wears will affect their ability to perform certain tasks. For example, a person in a total encapsulating suit, even at 72˚F, cannot work for more than a short period of time without requiring a break.

The work schedule should be adjusted to maintain the health of the employees. Modified work practices may include allowing more time for individual job tasks and implementing work/rest cycles per NIOSH and ACGIH thermal stress recommendations. Special consideration should be given to the selection of clothing that protects the worker and adds the least burden when personnel are required to perform strenuous tasks. Excessive bodily stress frequently represents the most significant hazard encountered during fieldwork.

### 3.6.10 Types of Protective Materials

1. Cellulose or Paper: suitable for nuisance dust and coarse fibers.
2. Natural and Synthetic Fibers
    a. Tyvek™: suitable small-sized hazardous particles, including lead, asbestos, and mold.
    b. Tychem™: is suitable for a variety of hazards, from light liquid splashes to heavy exposures to industrial chemicals and agents.
    c. Nomex™: is suitable for flame-resistance, radiation resistance, acids, alkalis, fluorocarbon refrigerants (CFCs), and non-polar solvents.
3. Elastomers
    a. Polyethylene: suitable for polar substances and solvents.
    b. Saran™ : suitable for flame-resistance, acids, alkalis, oils, and organic solvents.
    c. Polyvinyl Chloride (PVC): suitable for alcohols, oils, inorganic acids, alkalis, and salts.
    d. Neoprene: suitable for polar/non-polar substances, petroleum mixtures, and ≤ 200 F heat resistance.
    e. Butyl Rubber: suitable for polar substances and solvents.
    f. Viton: suitable for non-polar substances, petroleum mixtures, and ≤ 200 F heat resistance.
    g. Nitrile: suitable for polar/non-polar substances and petroleum mixtures.

## 3.7 Protection Levels

### 3.7.1 Level A Protection

Level A protection (a fully encapsulated suit) is used when skin hazards exist or when no known data positively rule out skin and other absorption hazards. Per the Roux Respiratory Protection Management

Program, Roux employees are not authorized to enter an IDLH atmosphere; therefore, the program does not allow supplied air respirators (SARs) or self-contained breathing apparatus (SCBA). At no time will Level A work be performed without the consent of the CHSD and OM.

The following conditions warrant the use of Level A protection:

- Hazardous substances have been identified and require the highest level of protection for skin, eyes, and the respiratory system;
- The atmosphere contains less than 19.5% oxygen or an atmosphere immediately dangerous to life and health (IDLH) that have not been ruled out;
- Site operations involve a high potential for splash, skin immersion, or exposure to suspected skin hazards;
- Direct-reading instruments indicate high levels of unidentified but potentially hazardous vapors or gases in the air (e.g., Total atmospheric readings on the Photoionization Detector (PID), Flame Ionization Detector (FID), and similar instruments indicate 500 to 1,000 ppm of unidentified substances); and
- Direct-reading instruments are not available to test the air and suspected highly toxic substances may be present.

It may be necessary to base the decision to use Level A protection on indirect evidence. Other conditions that may indicate the need for Level A protection include:

- Confined spaces;
- Sites containing known skin hazards;
- Sites with no established history to rule out skin and other absorption hazards;
- Site exhibiting signs of acute mammalian toxicity (e.g., dead animals, illnesses associated with past entry into the site by humans);
- Sites at which sealed drums of unknown materials must be opened;
- Visible indicators such as leaking containers or smoking chemical fires; and
- Extremely hazardous substances (e.g., cyanide compounds, concentrated pesticides, Department of Transportation Poison "A" materials, suspected carcinogens, and infectious substances) are known or suspected to be present, and skin contact is possible.

| Table 1: Recommended Level A Ensemble Components | | | |
|---|---|---|---|
| **Component** | **Type** | **Manufacturer / Recommended Material** | **Notes** |
| Respirator | Positive-pressure full- facepiece SCBA or positive-pressure supplied-air respirator with escape SCBA[1] | NIOSH approved respirator | See Roux's Respiratory Protection Program. Roux employees are not approved to utilize Supplied Air (SAR) and/or Self-contained breathing apparatus (SCBA). |
| Suit | Totally encapsulated chemical- and vapor-protective suit | DuPont® Tychem™ or Responder CSM™ | Other material types may be substituted based on known contaminants. |
| Inner Gloves | Light weight | Nitrile, Neoprene, PVC, or Viton® | Other material types may be substituted based on known contaminants. |
| Outer Gloves | Integral part of suit | See Appendix A for additional information | Confirm chemical performance rating for suspected contaminants. Glove material may have different performance ratings than suit material. All fully-encapsulating suit materials must be compatible with substances involved. |
| Inner Boot | Integral Part of Suit | - | - |
| Outer Boot | HazMat boot[2] | – | Confirm chemical performance rating of outer boot for suspected contaminants. Provides slip/abrasion resistance. |
| Hard Hat | Standard[3] | - | - |

[1] Must be NIOSH approved.
[2] Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
[3] Must comply with the applicable ANSI standard.

### 3.7.2 Level B Protection

Level B protection is utilized when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body is unlikely. At no time will Level B work be performed by Roux personnel without the consent of the CHSD and OM.

The following conditions suggest a need for Level B protection:

- The type and atmospheric concentration of toxic substances have been identified, and they require the highest level of respiratory protection;

- IDLH atmospheres where the substance or concentration in the air does not present a severe skin hazard;
- The type and concentrations of toxic substances do not meet the selection criteria permitting the use of air-purifying respirators and
- It is highly unlikely that the work being done will generate high concentrations of vapors, gases, particulates, or splashes of materials that will affect personnel's skin.

**Table 2: Recommended Level B Ensemble Components**

| Component | Type | Manufacturer / Recommended Material | Notes |
|---|---|---|---|
| Respirator | Positive-pressure full- facepiece SCBA or positive-pressure supplied-air respirator with escape SCBA[1] | NIOSH approved respirator | See Roux's Respiratory Protection Program. Roux employees are not approved to utilize Supplied Air (SAR) and/or Self-contained breathing apparatus (SCBA). |
| Suit | Chemical-resistant clothing (liquid-splash protective suit with integral boot and hood)[2] | DuPont® Tychem® CPF 3 | Other material types may be substituted based on known contaminants. |
| Inner Gloves | Light/medium weight | Nitrile, Neoprene, PVC, Viton®, or PE/EVAL | Other material types may be substituted based on known contaminants. |
| Outer Gloves | Medium/heavy weight | Butyl MIL-G12223, Nitrile, Neoprene, PVC, Viton®, PE/EVAL, or heavy weight Nitrile or Neoprene | Confirm chemical performance rating. Other material types may be substituted based on known contaminants. |
| Inner Boot | Safety work boot | – | Other boot types may be substituted based on known contaminants and physical hazards. Puncture resistant shanks may be required. |
| Outer Boot | Heavy weight Latex booties or outer boots[2] | Latex booties are used to protect suit for light duty applications. NFPA-rated outer boots may be required based on anticipated site conditions and tasks. | Other outer boot coverings may be substituted based on known contaminants/anticipated tasks. |
| Hard Hat | Standard[3] | - | - |

[1] Must be NIOSH approved.
[2] Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
[3] Must comply with the applicable ANSI standard.

### 3.7.3 Level C Protection

Level C protection is utilized when skin and respiratory hazards are well defined, and the criteria for using negative pressure respirators have been fulfilled (i.e., known contaminants and contaminant concentrations, acceptable oxygen levels, approved filter/cartridge available, known cartridge service

life, etc.). Level C protection may require an emergency escape respirator during specific initial entry and site reconnaissance situations or when applicable after that.

**Table 3: Recommended Level C Ensemble Components**

| Component | Type | Manufacturer / Recommended Material | Notes |
|---|---|---|---|
| Respirator | Full-face air-purifying respirator with appropriate cartridge[1] | NIOSH approved respirator | See Roux's Respiratory Protection Program for information about the brand, model, acceptable configurations, and specific care instructions for the standard issue respirator. Half-faced respirators may be donned if hazard assessment warrants. |
| Suit | Puncture/tear resistant suit material with boot and hood[2] | DuPont® Tychem® CPF 2/CPF 3 or Saranex | Other material types may be substituted based on known contaminants, if considered more appropriate. |
| Inner Gloves | Light weight | Nitrile, Neoprene | Other material types like Neoprene, PVC, Viton®, or PE/EVAL may be substituted based on known contaminants, if considered more appropriate. |
| Outer Gloves | Medium/heavy weight | Butyl, Nitrile, or other work glove | Confirm chemical performance rating. Other material types may be substituted based on known contaminants, if considered more appropriate. |
| Inner Boot | Safety work boot | – | Other boot types may be substituted based on known contaminants and physical hazards. Puncture resistant shanks may be required. |
| Outer Boot | Heavy weight Latex booties or outer boots[2] | Latex booties are used to protect suit for light duty applications. NFPA rated outer boots may be required based on anticipated site conditions and tasks. | Other outer boot coverings may be substituted based on known contaminants. |
| Hard Hat | Standard[3] | - | - |
| Eye Protection | Safety glasses/goggles[3,4] | - | - |

1 Must be NIOSH approved.
2 Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
3 Must comply with the applicable ANSI standard.
4 In the case a ½ face respirator is worn eye protection is required.

### 3.7.4 Level D Protection

Level D is the basic work uniform. Level D is worn when the atmosphere contains no known hazard. Work functions preclude splashes, immersion, potential for inhalation, or direct contact with hazard chemicals. For most Roux field jobs Level D is the standard minimum level of protection worn.

**Table 4: Recommended Level D Ensemble Components**

| Component | Type | Manufacturer / Recommended Material | Notes |
|---|---|---|---|
| Respirator | None | - | - |
| Suit | Coveralls, street clothes, or disposable Tyvek suit | – | Other types may be substituted as appropriate. |
| Inner Gloves | N/A | | |
| Outer Gloves | As appropriate for physical hazards and for comfort | – | - |
| Boot | Safety work boot | – | Roux's standard safety boot is 6", steel/composite safety toe, and electrical hazard (EH) rated. |
| Outer Boot Covering | As appropriate | – | – |
| Hard Hat | Standard[3] | - | - |
| Eye Protection | Safety glasses/goggles[3] | - | - |
| High Visibility Clothing | High Visibility Vest /Jacket[3] | - | ANSI Class 2 Safety Vests/Jackets are the standard. Class 3 Safety vests/jackets shall be worn in worksites with 50+ MPH traffic. |
| Hearing Protection | Ear muffs/plugs | - | Workers exposed to excessive noise shall don hearing protection. Refer to Roux's Hearing Conservation Program for more information. |

[1] Must be NIOSH approved.
[2] Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
[3] Must comply with the applicable ANSI standard.

### 3.7.5 Level E Protection

Level E protection is used when radioactivity above 10 millirems per hour (mrems/hr) is detected at the site. Personal protective equipment for Level E includes:

- Coveralls;
- Air purifying respirator (i.e., P100 or equivalent);
- Time limits on exposure;
- Appropriate dermal protection for the type of radiation present, and

- Radiation dosimetry and ambient monitoring.

### 3.7.6 Additional Considerations

Fieldwork will contain a variety of situations due to chemicals in various concentrations and combinations. These situations may be partially ameliorated by following the work practices listed below:

1. Foot protection is needed on every site. If the ground to be worked on is contaminated with liquid, and it is necessary to walk in the chemicals, some sort of protective shoe coverings or "booties" can be worn over the boots. Shoe coverings should be designed with soles to help prevent slips. Using disposable shoe coverings when contacting liquid contamination can on and reduce overall decontamination requirements. If non-liquids are to be encountered, a Tyvek™ bootie could be used. The advantage of booties is questionable if the ground contains any sharp objects. Boots should be worn with either cotton or wool socks to help absorb perspiration.
2. If the site requires hard hats, chin straps should be used if a person will be stooping over where his/her hat may fall off. Respirator straps should not be placed over the hard hats, as this will affect the respirator's fit.

   Some types of protective materials conduct heat and cold readily. In cold conditions, natural material clothing should be worn under protective clothing. Protective clothing should be removed before allowing a person "to get warm." Applying heat, such as with a space heater, to the outside of the protective clothing may drive contaminant permeation. In hot weather, under clothing will absorb sweat. It is recommended that workers use all cotton undergarments.
3. Body protection should be worn and taped to prevent anything from running into the top of the boot. Gloves should be worn and taped to prevent substances from entering the top of the glove. Duct tape is preferred, but masking tape can be used. When aprons are used, they should be taped across the back for added protection. However, this should be done so that the person has mobility.
4. Atmospheric conditions such as precipitation, temperature, wind direction, humidity, wind velocity, and pressure determine the behavior of contaminants in air or the potential for volatile materials to become airborne. These parameters should be considered in determining the need for and the level of protection.
5. A program must be established for periodic air monitoring during site operations. Without an air monitoring program, any changes to air quality would go undetected and might jeopardize on-site personnel. Monitoring can be done with various types of air pumps and filtering devices, followed by laboratory analysis of the filtration media, personnel dosimeters, and periodic walk-throughs by personnel carrying real-time direct-reading survey instruments.
6. For operations in the exclusion zone, different levels of protection may be selected, and various types of chemical-resistant clothing may be worn. This selection should be based on the job function, reason for being in the area, and the potential for skin contact with, or inhalation of, the chemicals present.
7. Escape masks must be readily available when levels of respiratory protection do not include an SCBA and the possibility of an IDLH atmosphere exists. The use and placement of escape masks should be made on a case-by-case basis. Escape masks should be strategically located at the site in areas with higher potential for vapors, gases, or particulates.

## 3.8 Decontamination of PPE

Roux prefers the use of single use PPE to minimize the requirement for significant decontamination. The following procedures shall be considered should a field project require the need for decontamination of PPE. Roux has also developed a Site Control and Decontamination Management Program.

### 3.8.1 Site-Specific Decontamination Plans

The Project Manager (or another authorized individual) is responsible for formulating the site-specific PPE decontamination plan as an integral part of the Health and Safety Plan (HASP). The SHSO/SS' responsibilities include ensuring the plan's implementation and adapting it as site conditions evolve. Refer to Roux's Site Control and Decontamination Management program for additional requirements.

The decontamination plan, often created in conjunction with PPE selection, must be established prior to workers entering potentially contaminated areas. The plan should address the following key aspects:

- Decontamination Hazard Evaluation and Risk Assessment: Assessing risks associated with decontamination processes.
- PPE for Decontamination Line Assistants: Specifying appropriate PPE for personnel involved in decontamination.
- Roles and Responsibilities During Decontamination: Defining tasks and duties during the decontamination process.
- Layout and Quantity of Decontamination Stations: Determining the number and arrangement of decontamination stations, along with the designated PPE decontamination procedures at each station.
- Decontamination Equipment: Identifying the necessary equipment for effective decontamination.
- Decontamination Methods: Describing the methods and protocols for decontaminating personnel and equipment.
- Preventing Contamination of Clean Areas: Outlining procedures to prevent contamination of uncontaminated zones.
- Minimizing Contact with Contaminants During CPC Removal: Providing guidelines to reduce wearer exposure during the removal of Chemical Protective Clothing (CPC).
- Disposal Procedures for Inadequately Decontaminated Clothing and Equipment: Ensuring proper disposal practices for items that have not been adequately decontaminated.

The initial decontamination plan, which is developed in conjunction with the initial site hazard assessment, should be based on worst-case assumptions about the extent and type of contamination.

### 3.8.2 Emergency Decontamination of PPE

The designated SHSO/SS (or another authorized individual) assumes responsibility for addressing emergency decontamination within the site-specific Health and Safety Plan (HASP). Emergency decontamination may become necessary due to events such as fires, explosions, sudden violent storms, or medical emergencies. The emergency decontamination plan must clearly delineate emergency egress routes, as well as procedures for both decontamination and egress.

Some key points to consider regarding emergency decontamination.

- Immediate Notification: The SHSO/SS (or their designated counterpart) must be promptly informed of any circumstances requiring emergency decontamination. Additionally, they are accountable for tracking all personnel during the process.
- Urgent Medical Treatment: If urgent medical attention is necessary, decontamination of PPE may be delayed until the victim's condition stabilizes.
- Balancing Priorities: When feasible, decontamination should occur without hindering essential first aid. However, if a worker is exposed to an extremely toxic or corrosive substance, immediate decontamination is crucial to prevent severe injury or fatality.

- Heat-Related Illness: In cases of heat-related illness, protective clothing must be promptly removed (refer to Roux's Heat Illness Prevention Program).

Emergency Facilities:

- For workers potentially exposed to corrosive materials, quick drenching or flushing facilities must be provided in accordance with 29 CFR 1910.151(c) and 1926.50(g).
- Similarly, if workers face other hazards (such as splash or dust) that could harm the eyes or body, readily accessible wash stations are essential. These stations should be properly located and maintained, including regular water changes, as per the manufacturer's instructions.

### 3.8.3 Protection of Decontamination Line Assistants

Should work require a decontamination corridor the following shall be used as guidance. The SHSO/SS (or other designated person) must for ensuring that decontamination line assistants receive appropriate PPE and addressing their protection within the site-specific HASP. Key zones—namely, the Exclusion Zone (EZ), Contamination Reduction Zone (CRZ), and Clean Support Zone—must be clearly marked both in the field and within the site-specific HASP. The following should be considered when preparing for protection of decontamination line assistants.

1. Task Hazard Analysis: A thorough analysis must be conducted for line assistants to determine the optimal PPE level required. Factors influencing this decision include:
    - Expected or Visible Contamination on Responders
    - Type of Contaminant and associated respiratory and skin hazards
    - Total Vapor/Gas Concentrations in the CRZ
    - Presence of Particulates and specific inorganic or organic vapors in the CRZ
    - Results of Wipe Tests (refer to Section 5.4)
    - Slope and Configuration of the CRZ
2. PPE Levels: Depending on the situation:
    - Line assistants may need to wear the same PPE level as workers in the EZ.
    - Alternatively, line assistants may be adequately protected by using PPE one level lower (e.g., wearing Level C protection while decontaminating workers who are wearing Level B)."

### 3.8.4 Procedures to Minimize PPE Contamination

Proper work practices and procedures should be implemented at sites to minimize the potential for contact with chemicals of concern while onsite. The following guidance should be considered when developing site specific procedures:

- Opt for single-use Personal Protective Equipment (PPE) when feasible to minimize decontamination needs.
- Ensure complete sealing of PPE closures and interfaces, including pockets, zippers, and other potential openings.
- Position gloves and boots underneath the sleeves and pant legs of outerwear to reduce exposure.
- Place hoods outside the collar if they are not already attached.
- Utilize disposable outerwear and equipment when suitable to facilitate easy disposal and reduce decontamination efforts.
- Secure all junctions with tape to block contaminants from entering gloves, boots, jackets, and suits.

- Adopt work practices that limit contact with hazardous substances, such as avoiding unnecessary exposure.
- Employ remote techniques for sampling, handling, and opening containers, like using drum grapples and pneumatic impact wrenches.
- Store monitoring and sampling devices in bags designed with openings for sample ports and sensors.
- Cover contaminant sources with plastic sheeting or overpacks to shield PPE from contamination.

### 3.8.5 PPE Disposal

The PM in coordination with the field team shall ensure the safe disposal of all wastes generated from PPE use. PPE must be placed in appropriate containers, labeled, and prepared for disposal separately from other forms of waste. Refer to Roux's General Waste Corporate Management Program for further guidance.

# APPENDIX A
# EPA's
# GUIDELINES TO ENSEMBLES FOR SPECIFIC ACTIVITIES/TASKS
# WHERE CHEMICAL EXPOSURE IS POSSIBLE

**GUIDELINES TO ENSEMBLES FOR SPECIFIC ACTIVITIES/TASKS**
**WHERE CHEMICAL EXPOSURE IS POSSIBLE**

**IMPORTANT: READ FOOTNOTES AND ASSUMPTIONS/JUSTIFICATIONS PRIOR TO USING TABLE**

**Notes:**

1. This table is for use by trained environmental professionals only. To use this table:
   a. Scan the activity description to find activities (bolded) that most closely matches those you plan to engage in.
   b. Review Hazard/Conditions section to make sure the hazards of the planned activity match those listed. Note the Required Work Practices and be ready to follow them.
   c. For those activities most likely to be conducted as part the response, select Targeted Minimum PPE (Personal Protective Equipment).
   d. Necessary equipment needs to be available and used unless other information becomes available which necessitates an upgrade or allows a downgrade in the protection level. The work area must be continuously re-evaluated to ensure workers have the proper safety equipment.
   e. When working in hazardous environments, workers must always be aware of their surroundings. In addition to this Table, workers entering these environments need to use "common sense" prior to proceeding.
2. These ensembles focus on chemical protection and may not be adequate for all hazards. This Table can be used as a starting point but does not circumvent proper evaluation by an industrial hygienist in appropriate situations. See Table 2 for more specific chemical agents.
3. Suits, gloves, boots listed in the Minimum PPE column will not be appropriate for all activities, hazards and conditions. The listings should be used as a guide only. Confirm PPE compatibility with specific chemical contaminants.
4. A comprehensive Task Hazard Analysis must be performed prior to final selection of ensembles/PPE material types.
5. Hardhat (Class A or C), safety glasses/other eye protection are typically required but may not be specified here. In noisy environments (above 85dB) hearing protection is required. In areas where there is traffic, heavy machinery, or other hazards involving worker visibility problems a Class 2 High Visibility Vest must be worn. Activities requiring vests include natural disaster responses, demolitions, and excavations.
6. PPE makes and models referenced in these tables are only suggestions. Other comparable, adequate makes and models may be used.

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Emergency Response and/or Initial Entry/Assessment – Low Hazard Expected (Sites/Facilities):**<br>• Air and Radiation Monitoring Sweep<br>• Visual Assessment<br>• Note Taking<br>• Photo-documentation | • Suspected low hazard based on site history/visual evidence.<br>• No CBRN suspected.<br>• No visible/suspected vapors.<br>• No potential for IDLH atmosphere.<br>• Unknown physical hazards.<br>• Some site background information.<br>• No intrusive work expected.<br>• Low potential for chemical splash/contact (based on expected tasks/ known conditions).<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Level B** (Downgrade/upgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/$O_2$ per HASP/ SOSGs)<br>**Respirator: Scott or MSA Full Face**<br>**Suit Type:** [I]Tychem CPF-3 (with boot, hood)/ChemTape<br>**Inner Glove:** [II]Nitrile (6 mil min recommended)<br>**Outer Glove:** [II]Neoprene, Nitrile, (28 mil min recommended)<br>**Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or**<br>**Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection.<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br>**DECON**: Dry or soap & water |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Emergency Response and/or Initial Entry/Assessment of Unknown – Potential Moderate Hazard (Sites/Facilities):**<br>• Air and Radiation Monitoring Sweep<br>• Visual Assessment<br>• Note Taking<br>• Photo-documentation | • Possible high hazard chemicals based on site history/visual evidence (spills, corrosion, industrial practices, etc.).<br>• No CBRN suspected.<br>• No visible/suspected vapors.<br>• **No** reasonable potential for **IDLH** atmosphere.<br>• Unknown physical hazards.<br>• Little/ no site background information.<br>• No intrusive work expected.<br>• Low potential for chemical splash/contact.<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Level B** (Downgrade/upgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/$O_2$ per HASP/ SOSGs)<br>**Respirator: Scott or MSA Full Face**<br>**Suit Type:** [I]Tychem Responder (with boot, hood)/ChemTape<br>**Inner Glove:** [II]Nitrile (6 mil min recommended)<br>**Outer Glove:** [II]Neoprene, Nitrile, (28 mil min recommended)<br>**Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or**<br>**Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection.<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br>**DECON**: Dry or soap & water |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Emergency Response and/or Initial Entry/Assessment of Unknown - Suspected High Hazard (Sites/Facilities):**<br>• Air and Radiation Monitoring Sweep<br>• Visual Assessment<br>• Note Taking<br>• Photo-documentation | • Potential for high hazard chemicals/ IDLH based on site history/visual evidence (visible/expected reactions, spills, vapors, fumes, smoke, known releases, etc.).<br>• No CBRN suspected.<br>• Potential for chemical reactions.<br>• Unknown physical hazards.<br>• Little/ no site background information or information suggesting high hazard.<br>• Intrusive work possible.<br>• Potential for chemical splash/contact.<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Level A** (Downgrade/upgrade (Trelleborg, etc.) based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/$O_2$ per HASP/ SOSGs)<br>**Respirator: Scott or MSA Full Face**<br>**Suit Type:** Encapsulating [I]Tychem Responder/Responder CSM (with boot, hood, gloves)/ChemTape<br>**Inner Glove:** [II]Nitrile (6 mil min recommended)<br>**Outer Glove:** [II]Neoprene, Nitrile, (28 mil min recommended)<br>**Outer Steel Toe/Steel Shank Boot:** [IV]Tingley HazProof Model 82330 and rely on suit boot material for permeation protection.<br>(ASTM F-2413/ANSI Z41)<br>**DECON**: Dry or soap & water: water source for emergency DECON; other DECON agents on hand. |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Drum/Tank Sampling**<br>• Container opening<br>• Continuous air monitoring<br>• Product sampling | • Unknown chemicals.<br>• No CBRN.<br>• Potential splash hazard.<br>• Physical hazard controls in place.<br>• Assumes no initial hazardous atmosphere.<br>• Ensure availability of water source for emergency DECON/shower/eyewash.<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Level B** (Upgrade/Downgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/$O_2$ per HASP/ SOSGs)<br>**Respirator: Scott or MSA Full Face**<br>**Suit Type:** [I]Tychem Responder (with boot, hood)/ChemTape<br>**Inner Glove:** [II]Nitrile, Neoprene, Viton, PVC<br>**Outer Glove:** [II]Heavy Duty Butyl, Nitrile,<br>**Other:** ANSI Approved Splash Shield<br>**Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or**<br>**Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection.<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br>**DECON:** Dry DECON or soap and water; water source for emergency DECON and eyewash suggested. |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Hazardous Categorization Testing** (**HAZCAT**)<br>• Opening sample containers in controlled environment<br>• Working with small sample quantities in well ventilated area<br>• Conducting HAZCAT testing with appropriate lab equipment | • Assumes known chemical classes and site situation/background.<br>• No CBRN suspected.<br>• Assumes immediate suit removal if contaminated and frequent glove changes.<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Level B** (Upgrade/Downgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/$O_2$ per HASP/ SOSGs)<br>**Respirator: Scott or MSA Full Face**<br>**Suit Type:** [I]Tychem CPF4 (with hood, boot)<br>**Inner Glove:** [II]Nitrile<br>**Outer Glove:** [II]Viton or 4-H (use surgie over the 4-H for dexterity)<br>**Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or**<br>**Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection.<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br>**DECON:** Dry or soap and water; water source for emergency DECON and eyewash suggested |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Oil Spill Response/Recovery Operations – Fresh Product:**<br>• Recovery operations (vac truck, skimmers, boom deployment where direct contact expected)<br>• Product sampling<br>• Continuous air monitoring at/near source of spill | • Crude oil/diesel/kerosene/gasoline spill.<br>• Assumes fresh/ongoing spill, close proximity to source.<br>• Assumes early phase while evaporation of light organics, benzene/other aromatics is still occurring (24-48 hours or if spill is on-going).<br>• Assumes down-wind location.<br>• Continuous air monitoring required for %LEL, Organics, $\%O_2$ (and $H_2S$ as necessary for sour crude).<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Modified Level C:** 1/2 face respirator w/safety glasses/goggles as needed for splash protection. Downgrade as appropriate based on air monitoring.<br>**Respirator: Scott or MSA ½ Face**<br>**Respirator Cartridge:** [III] Multi-Phase Cartridge (Scott 642 Multi-purpose; MSA with/GME P-100 or equivalent).<br>**Suit Type:** [I]Tychem CPF4 w/boot [jet fuel use Tychem BR]<br>**Inner Glove:** [II]Neoprene (for protection at DECON line only, not for prolonged contact)<br>**Outer Glove:** [II]Viton-Butyl Rubber (assumes potential for direct contact with fresh material – based on benzene/aromatic constituents) SEE NEXT ROW FOR WEATHERED PRODUCT.<br>**Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or**<br>**Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection.<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br>**DECON:** Dry DECON/ Soap and water as feasible |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Oil Spill Response Assessment/Recovery – Weathered Product**<br>• Shoreline clean-up assessment (SCAT)<br>• Environmental sampling/weathered product sampling<br>• Recovery Operations for weathered material<br>• Assessment via boat/on or near water – use appropriate flotation device with ensemble. | • Crude oil/diesel/kerosene/gasoline spill.<br>• Assumes weathered oil (over 24-48 hours, depending on spilled material and ambient temperatures).<br>• Assumes operations are remote from source of spill.<br>• Assumes no other potential for airborne aromatics/benzene/flammable vapors. | **Modified Level D** (Upgrade/Downgrade based on potential for contact and air monitoring with FID/PID, LEL/$O_2$ Meter.<br><br>**If contact with material suspected, use following:**<br>**Suit Type:** [I]Tychem F w/boot [jet fuel-Tychem BR] (Tychem SL may be an option for weathered crude/diesel – see manufacturer's information)<br>**Inner Glove:** [II]Nitrile<br>**Outer Glove:** [II]Nitrile (Best Nitri-solv 727)<br><br>**Outer Boot Cover:** [V]Latex HazMaster Booty<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br>**DECON:** Dry DECON/Soap and water as feasible |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Demolition/Excavation Operations:**<br>• Heavy equipment operation<br>• Excavation/Trenching<br>• Continuous air monitoring when soil is disturbed or demolition activities conducted.<br>• Fuel Oil underground tank removal.<br>• Drum Excavation activities EXCLUDED. | • Demolition activities generating potentially hazardous particulates (asbestos, lead, silica, etc.).<br>• Excavation activities that could expose soil contaminated with low levels of known hazardous chemicals to the surrounding area /in the trench/ excavation.<br>• No potential for IDLH atmosphere.<br>• Site background information available.<br>• Known physical hazards.<br>• Workers will have minimal/ no contact with contaminants (i.e., operators in a cab, inspectors/ observers at a safe distance).<br>• Continuous air monitoring required in trench for %LEL, Toxics, and $\%O_2$ when workers are in trench and for particulate when activities generating particulate are conducted.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Modified Level C:** 1/2 face respirator w/safety glasses. Downgrade or upgrade as appropriate based on air monitoring.<br>**Respirator: Scott or MSA ½ Face**<br>**Respirator Cartridge:** [III] Multi-Phase Cartridge (Scott 642 Multi-purpose P-100; MSA with/GME P-100 or equivalent).<br>**Suit Type:** [I]Proshield Next Gen<br>**Inner Glove:** NA<br>**Outer Glove:** Leather<br><br>**Outer Steel Toe Boot: NA**<br>**Steel Toe Boot Cover**: [V]Latex HazMaster Booty (if chemical in soil is possible)<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br>**DECON:** Dry DECON/ Soap and water as feasible |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Natural Disaster Response (Hurricane, Tornado, Flood, Earthquake) - Orphan Container Recovery:**<br>• Routine hand collection/pick-up of small containers from debris piles/lines<br>• Land based operations - conducted on foot<br><br>**Note:** Physical Hazards may necessitate PPE modifications. | • Unknown materials – confident identification based on visual observations.<br>• **Required Work practice:** re-evaluate prior to moving suspicious containers. Air monitoring and PPE upgrade may be required.<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Modified Level D:** Upgrade/downgrade based on suspicious containers (not easily identified visually) and air monitoring with PID/FID, radiation detector, LEL/$O_2$ per HASP/ SOSGs<br><br>**Suit Type:** [I]Tychem CPF-3 w/boot<br>**Inner Glove:** [II]Nitrile<br>**Outer Glove:** [II]Nitrile (Best Nitri-solv 727) or Leather<br>**Outer Boot Cover:** [V]Latex HazMaster Booty<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br><br>**DECON:** Dry DECON/Soap and water as feasible |
| **Natural Disaster Response (Hurricane, Tornado, Flood, Earthquake) - Orphan Container Recovery:**<br>• Routine Drum recovery from debris lines/piles/ other – conducted on land<br><br>**Note:** Physical Hazards may necessitate PPE modifications. | • Unknown materials – confident identification based on visual observations.<br>• **Required Work practice:** re-evaluate prior to moving suspicious containers. Air monitoring and PPE upgrade may be required.<br>• **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals.<br>• **Required Work Practice:** Must follow standard air monitoring protocol. | **Modified Level D:** Upgrade/downgrade based on suspicious containers (not easily identified visually) and air monitoring with PID/FID, radiation detector, LEL/$O_2$ per HASP/ SOSGs<br><br>**Suit Type:** [I]Tychem CPF-3 w/boot<br>**Inner Glove:** [II]Nitrile<br>**Outer Glove:** [II]Nitrile (Best Nitri-solv 727) or Leather<br>**Outer Boot Cover** [V]Latex HazMaster Booty<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br><br>**DECON:** Dry DECON/Soap and water as feasible |

| Activity Description | Hazards/Conditions | Targeted Minimum PPE |
|---|---|---|
| **Natural Disaster Response (Hurricane, Tornado, Flood, Earthquake) – Flood water sampling:**<br>• Water Sampling of flood waters where potential for contact with hands/feet is high<br><br>**Note:** Physical Hazards may necessitate PPE modifications. | • Unknown contaminants<br>• Potential for pathogens suspected<br>• Low potential for acute exposure to hazardous chemicals<br>• Assumes open air/well ventilated areas<br>**Required Work Practice:** Monitor all poorly ventilated areas in appropriate PPE/Respiratory Protection for organic vapors (PID & FID), %LEL/flammable atmospheres, $H_2S$ prior to entry | **Modified Level D:** Upgrade based on more information as it becomes available.<br><br>**Suit Type:** [I]Proshield Next Gen<br>**Inner Glove:** [II]Nitrile<br>**Outer Glove:** [II]Nitrile (Best Nitri-solv 727)<br>**Outer Boot**: Waders (butyl, neoprene) as needed.<br>**Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41<br><br>**DECON:** Dry DECON/Soap and water as feasible |
| **Environmental Sampling (Low Concentration Water/Soil/Perimeter Air):**<br>• Multi-media Sampling<br>• Documentation (written/photo)<br>• Inspection of clean-up operations | • Known Chemical Contaminants.<br>• Airborne concentrations well below PELs.<br>• Minimal chance of skin exposure to chemicals.<br>• Insects possible. | **Level D:** Upgrade based on more information as it becomes available.<br>**Suit Type:** [I]Proshield 1 (if ticks, etc. maybe a problem)<br>**Inner Glove:** [II]Nitrile<br>**Outer Glove:** NA<br>**Outer Boot:** NA<br>**Steel Toe Boots:** ASTM F-2413/ANSI Z41<br>**DECON:** NA |

i. Tychem and Proshield suits can be purchased from Safeware: 800-331-6707, http://www.safewareinc.com , (see also LSS, http://www.labsafety.com, Dupont: 1-800-931-3456, http://www2.dupont.com/Personal_Protection/en_US/index.html )

ii. Nitrile Inner/Outer Gloves; Viton; Butyl Rubber; 4-H (polymeric) can be purchased from Safeware: 800-331-6707, http://ww.safewareinc.com ; Airgas: 1-866-718-0685, http://www.airgas.com (see also North Safety, http://www.northsafety.com); Best Gloves, http://www.bestglove.com ; Lab Safety Supply (LSS), http://www.labsafety.com; Airbill, http://www.airbill.com)

iii. Multi-Phase Cartridge (Scott 642 Multi-purpose; MSA with/GME P-100 or equivalent) can be purchased from LSS: 1-800-356-0673, http://www.labsafety.com (see also Safeware, http://www.safewareinc.com; Scott Safety, http://www.scotthealthsafety.com/; MSA, http://www.msanet.com/)

iv. Tingley HazProof Overboots or similar can be purchased from LSS: 1-800-356-0673, http://www.labsafety.com; National Safety, Inc.: 1-800-213-7092, http://www.nationalsafetyinc.com

v. Latex Hazmaster Booties, Nuke Boot or similar can be purchased from Safeware: 800-331-6707, http://www.safewareinc.com; Airbill: 1-215-632-2000, http://www.airbill.com; (see also Airgas, http://www.airgas.com; LSS, http://www.labsafety.com

# APPENDIX E

Subsurface Utility Clearance Management Program

# SUBSURFACE UTILITY CLEARANCE MANAGEMENT PROGRAM

| | | |
|---|---|---|
| **CORPORATE HEALTH AND SAFETY DIRECTOR** | : | **Brian Hobbs, CIH, CSP** |
| **EFFECTIVE DATE** | : | **01/2019** |
| **REVIEW DATE** | : | **03/2024** |
| **REVISION NUMBER** | : | **4** |

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## APPENDICES

Appendix A – Roux Subsurface Utility Clearance Checklist/ Utility Verification/Site Walkthrough Record

Appendix B – Private Utility Technology Applications and Considerations

## 1. PURPOSE

Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C., and Remedial Engineering (collectively, "Roux") has instituted the following program for completing proper utility mark-outs and for conducting subsurface clearance activities. This establishes a method to ensure, to the greatest extent possible, that utilities have been identified and contact and/or damage to underground utilities and other subsurface structures will be avoided. For the purpose of this program, a structure is defined as any underground feature that may present a potential source(s) of energy, such as, but not limited to, utility vaults, bunkers, piping, electrical boxes, wires, conduits, culverts, utility lines, underground tanks, and ducts.

## 2. SCOPE AND APPLICABILITY

The Subsurface Utility Clearance Management Program applies to all Roux employees, its contractors, and subcontractors. Employees are expected to follow this program for all intrusive work involving Roux or other personnel (e.g., contractors/subcontractors) working for Roux unless the client's requirements are more stringent. Intrusive work activities can include, but are not limited to, digging or scraping the ground surface, including, but not limited to, excavation; test pitting or trenching; soil vapor sampling or the installation of soil borings, soil vapor monitoring points and wells, or monitoring wells; and drilling within concrete slabs on grade.

Deviation from the program, regardless of the specific work activity or location, must be pre-approved based on the client's site knowledge, experience, site conditions, and additional documentation on the site. Any exceptions shall be documented through the Roux Subsurface Utility Clearance Variance Form located within the Roux Health & Safety Online Application or through OKTA. Approval is required by the Project Principal (PP) and the Operations Manager (OM) in consultation with the Office Health and Safety Manager (OHSM) or Corporate Health and Safety Director (CHSD) prior to mobilization. Depending on the work location, more stringent federal, state, local, or client requirements may apply. It is the responsibility of the Project Team to identify such requirements prior to mobilization.

## 3. PROCEDURES

### 3.1 Before Intrusive Activities/Job Planning Process

Prior to intrusive work at a site, the Project Manager (PM) shall ensure that the notification of the State One Call or equivalent service (Nationwide-811) is completed a minimum of 48-72 hours (One-Call State Law Directory) before intrusive work activities (this timeline excludes Saturdays, Sundays, Legal Holidays and 811 observed holidays). This notification is required by law for all states. State-specific/local laws related to utility location may vary. The project team is responsible for understanding requirements that may affect their work site.

Obtain, review, and field verify relevant historical site data that may include: as-builts/site plans; easement/right-of-way information; historical aerial photos/development plans; local/state permitting records; previous site investigation/boring logs; and/or interviews with site representative/client. Interviews with site or client personnel should ask the following:

- Employee(s) Name and Relationship with the site;
- Types of utilities, including structure and location of utilities on-site;
- Depth of known utilities; and

- Any other relevant information as it pertains to the site.

Prior to intrusive work activities, information pertaining to the site should be included in Roux's Subsurface Utility Clearance Checklist and Utility Verification/Site Walkthrough forms. This form is located within the Roux Health & Safety Online Application or through OKTA.

***If there is the potential for unexploded ordinances or munitions, consultation with your OM and CHSD is required prior to site operations.***

### 3.1.1 Project Kick-Off Meeting

During the project kick-off meeting for intrusive activities, the PM will review the Roux Subsurface Utility Clearance Checklist, Utility Verification / Site Walkthrough Record (Appendix A) and the below bullet points with the project field team:

- Confirm that the State One Call or equivalent is received and that the ticket number is confirmed, reviewed, and valid for the time of work. If intrusive work activities are not conducted during this valid time period, the One Call ticket must be renewed, and the site must be remarked;
- Review the work scope to be performed with the site owner/tenant to determine if it may impact any utilities;
- Determine the need for utility owner companies to be contacted or to have their representatives on site;
- Where mark-outs terminate at the property boundary, consider the use of private utility locating / (e.g., Radio Frequency Detection, Electromagnetic Induction), Ground Penetrating Radar (GPR) , and other applicable geophysical inspection services. The use of private utility locating firms, however, does not eliminate the legal requirement for the subcontractor (e.g., driller, excavation firm) to submit a request for Public Utility Mark-outs. Also, the information provided by the service may be inaccurate and unable to locate subsurface utilities and structures in urban areas, landfills, urban fill areas, below-reinforced slabs, etc. They should not be relied upon as the only means of performing utility clearance;
    - A mark-out is defined as the process of contracting with a competent and qualified company to confirm the presence or absence of underground utilities and structures. This process will clearly mark out and delineate identified utilities so that intrusive work activities can be performed without causing disturbance or damage to the subsurface utilities and structures. After utility mark-outs are completed, soft Digging must completed prior to intrusive work. Section 3.4 Preferred Methods of Clearing the Subsurface (Pre-Clearing) outlines requirements for pre-clearing techniques in order of preference.
- Documented description of the dig site, which is included in the project's Health and Safety Plan (HASP), and one call report will be maintained in the field and distributed amongst Roux personnel, its contractors, and subcontractors; and
- Documentation of the actual placement of mark outs in the field shall be collected using dated pictures, videos, and/or sketches with distance from markings to fixed objects. All documentation shall be maintained within the project file.

## 3.2 Utility Mark Out

- Ensure the Mark-out / Stake-out Request Information Sheet (or one-call report) is complete and accurate for the site, including address and cross streets, and review for missing utilities. Ensure ticket life is still valid for work.

  - Note: utility mark-out organizations do not have contracts with all utilities, and it is often necessary to contact certain utilities separately, such as the local water and sewer authorities, local transportation departments, and railroad operators. In the event the Project Teams anticipate subsurface work will impact public utilities, railroad operations, or public roadways, coordination with the utility owners/operators is required.

- Have written confirmation prior to mobilizing to the site that the Project Team or Roux personnel performing the intrusive activity has correctly completed the mark-out notification process, including requesting mark-outs, waiting for mark-outs to be applied to ground surfaces at the site, and receiving written confirmation of findings (via fax or email) from utility operators for all known or suspected utilities in the proposed area of intrusive activity, and provided utility owner written confirmation to Roux personnel for review and project files documentation.
- Do not begin any intrusive activity until all utility mark-outs have been completed (i.e., Did all utilities mark-out the site?) and any unresolved mark-out issues are finalized. Perform a site walk to review the existing utilities and determine if the utility locators have located said utilities.

  (Note: The Tolerance Zone is defined as three feet from the outside edge of any subsurface structure.)
- For non-subscribing utility owners or if public one-call service is not available, perform due diligence and request further information regarding utility type, construction details, location, and burial depth directly from public service providers/utility owners. Request utility mark-out by each public service provider/utility owner as applicable. Confirm contact and response by each public utility owner on the Subsurface Utility Clearance Checklist.
- If utilizing a Private Mark out, ensure the contractor has a plan regarding what types of technology will be used based on Table 1 in Appendix B: Private Utility Technology Applications and Considerations. If possible, it is recommended that multiple technologies be used to sweep each location/work area. Use a tracer wire to locate the utility (when tracer wires are present). Record the results of the private utility mark-out on the Utility Verification/Site Walkthrough Record form.

### 3.3 Site Visit/Utility Walkthrough

Before mobilization with the subcontractor or during the pre-work safety tailgate with the subcontractor, perform a site walkthrough after utility mark-outs have been completed to determine whether additional potential hazards are present and look for visible signs of utilities that may be present. Outlined below are considerations regarding a site walk before intrusive activities. Before initiating any intrusive work, verify that the utilities marked on-site align with the information provided in the One Call response notification/ticket and with site plans and documents. If any discrepancies arise, address them promptly to ensure accuracy and do not start intrusive work until they are rectified.

- Identify overhead utilities that may impede equipment mobilization or work zones to ensure adequate Occupational Safety and Health Administration (OSHA) clearance distance(s), as specified within the site-specific Health and Safety Plan (HASP) and 29 CFR 1926.1408 Table A.

The presence of any of the following may indicate potential subsurface structures:

- Locations of buildings, equipment, and features like area lights, signs, sprinkler systems, phones, drains, natural gas meters, manholes, etc.;
- Warning tape, which is often a sign of underground services;
- Material like pea gravel, sand, or other non-native materials can indicate the presence of tanks or lines or any deviations from the established native soil or backfill conditions;

- Red concrete, which is often used for electrical duct banks;
- Evidence of damaged utilities, such as piping materials, insulation, or odors present in the work area; and
- Other utilities, including fire hydrants, electrical transformers, pipeline markers, valve covers, steam lines, valve box covers, clean-outs, etc.

By observing the path between the main service line and the connection point (e.g., a utility meter at the exterior of the site building), it may be possible to determine the likely routing of on-site utilities. However, this method should not be relied upon solely, and proper risk mitigation strategies should be in place before proceeding with any ground disturbance activities. Look outside your work zone for other potential utilities that may cross through your work zone.

For sites with potential underground storage tanks present (UST), the following guidance applies:

- Identify if the product piping is either rigid or flexible.
- Conduct a visual examination of the tank field, observation wells, dispensers, vent stacks, and UST fill points to determine their location.
- Locate and become familiar with the emergency shutoff button/switch, if present.
- Determine the orientation, arrangement, and location of the tanks, as well as their size and capacity, through the examination of visible features at grade, such as fill ports and extractor covers, and by consulting any available as-built drawings.

Before commencing any subsurface intrusive work, field staff should thoroughly address any discrepancies in utility company mark-outs or the absence of mark-outs.

### 3.3.1 Project Management-Field Personnel

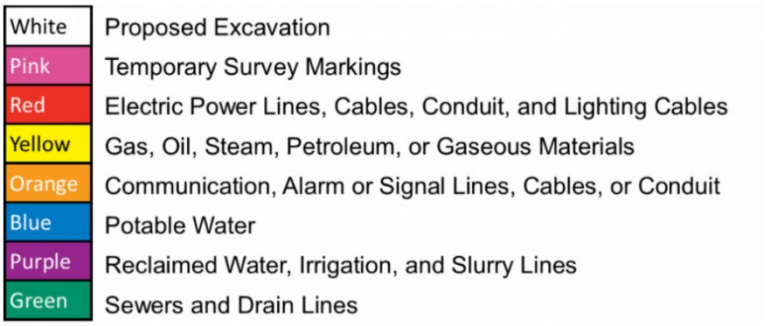
Whenever possible, it is advisable to assign the same project personnel to both utility location and clearance tasks as well as intrusive activities. This continuity ensures that site knowledge and utility information gathered during the clearance phase remain up-to-date. Having this historical perspective helps minimize the risk potential of utility strikes.

In cases where maintaining the same personnel throughout the project isn't feasible, a thorough knowledge transfer regarding site utilities, locations, clearance results, and proposed intrusive activities becomes essential. The PM must ensure that there is a successful handoff of information when there is a change in field personnel.

### 3.3.2 Utility Markings

The utility marking color code includes various uniform colors. The following APWA uniform color code (ANSI Z535.1) is provided below. While certain government agencies or large industrial facilities may use additional colors, Roux's policy is to consider any unlisted paint marking or pin flag color as a subsurface utility marking unless proven otherwise.

If utilities or subsurface anomalies are identified but their type or classification remains uncertain, it is advised to employ pink paint or pin flag (Temporary Survey Marking) for marking. Once the utility type is definitively established, the pink marks should be updated to accurately represent the correct type of utility.

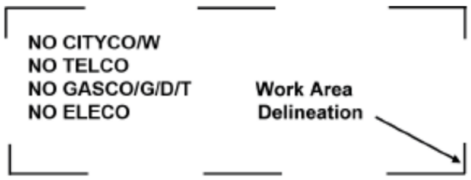



Understanding the markings left by locators during the 811 process is crucial for avoiding utility-related issues. Typically, these markings are done when Roux staff members are not physically present on-site. To enhance understanding/accuracy, it is advisable for staff to be present during the 811 process or engage in conversations with locators, both public and private, while on-site. Additionally, utility marks must adhere to the proper standards outlined in the Uniform Color Code.

***Common Abbreviations***

*Source: Common Ground Alliance*

| **Facility Identifier** | | **Underground Construction Descriptions** | | **Infrastructure Materials** | |
|---|---|---|---|---|---|
| CH | Chemical | C | Conduit | ABS | Acrylonitrile - Butadiene - Styrene |
| E | Electric | CDR | Corridor | ACP | Asbestos Cement Pipe |
| FO | Fiber Optic | D | Distribution Facility | CL | Cast Iron |
| G | Gas | DB | Direct Buried | CMC | Cement Mortar Coated |
| LPG | Liquefied Petroleum | DE | Dead End | CML | Cement Mortar Lined |
| PP | Petroleum Products | JT | Joint Trench | CPP | Corrugated Plastic Pipe |
| RR | Railroad Signal | HP | High Pressure | CMP | Corrugated Metal Pipe |
| S | Sewer | HH | Hand Hole | CU | Copper |
| SD | Storm Drain | MH | Manhole | CWD | Creosote Wood Duct |
| SS | Storm Sewer | PB | Pull Box | HDPE | High Density Polyethylene |
| SL | Street Lighting | R | Radius | MTD | Multiple Tile Duct |
| STM | Steam | STR | Structure (vaults, junction inlets, lift station) | PLA | Plastic (conduit or pipe) |
| SP | Slurry System | T | Transmission Facility | RCB | Reinforced Concrete Box |
| TEL | Telephone | | | RCP | Reinforced Concrete Pipe |
| TS | Traffic Signal | | | RF | Reinforced Fiberglass |
| TV | Television | | | SCCP | Steel Cylinder Concrete Pipe |
| W | Water | | | STL | Steel |
| W | Reclaimed Water "Purple" | | | VCP | Vertrified Clay Pipe |




### 3.4 Preferred Methods of Clearing the Subsurface (Pre-Clearing)

At least one of the methods listed below shall be carried out during pre-clearing activities. The Project Team is responsible for evaluating risks associated with the Scope of Work to determine which method is selected. If none of the following pre-clearing activities are performed, a Subsurface Utility Clearance Variance must be submitted to the OM. This Subsurface Utility Clearance Variance must provide clear lines of evidence that there are no utilities present within the intrusive work zone. Examples include demolition permits of the site, utility closure documents indicating no live utilities on-site, as-builts, site history, etc.

The following approaches shall be considered and implemented based on the Scope of Work.

- ***Soft Digging***
  - This is the preferred method of utility clearance when clearing higher-risk utilities. Soil should be cleared through the use of a vacuum truck/equivalent, an accompanying air knife (preferred), or a water lance to break up and loosen the soil for removal with the vacuum.
- ***Hand Digging***
  - Soil should be broken up and removed using a shovel or other appropriate hand tools without excessive force. Limit the use of dig bars or other tools that, if used incorrectly, can significantly damage utilities.
- ***Hand Augering***
  - The hand auger must be turned slowly using even hand pressure without excessive force. Rounded edge augers are preferred. Hand augers should not be used in pea stone/pea gravel where utilities may be present and could potentially be damaged by the hand auger. The abrupt absence of soil recovery in a hand auger could indicate utilities as pea gravel or sand may have spilled out of the auger (exception: native soil conditions that typically result in poor hand auger recoveries). If any resistance is encountered while operating the hand auger for pre-clearance, the equipment will be removed, and the exploratory test hole will be visually inspected by onsite personnel for any obstructions or indications of subsurface structures.

#### 3.4.1 Guidance for Tools and Equipment

Personnel performing pre-clearance activities shall keep tools and equipment in safe working order and be properly inspected before use. If tools or equipment are broken, they will be tagged and removed from service. The following specify additional guidelines regarding tools and equipment:

- Hand-digging tools must have a non-conductive handle, such as fiberglass, wood, or composite, or fully insulated handles and potential contact surfaces.
- Blades on shovels and post-hole diggers should have rounded or blunt edges.
- Pick axes or pointed spades should not be used for physical clearance.
- Crowbars, pinch-bars, or pry bars should not be used to break hardened soil or backfill except when authorized by the Site Supervisor (SS). This should only be used to loosen materials like bricks or larger stones.

- Electric-powered equipment must have ground fault protection.
- Should there be refusal or difficulty with advancing hand tools, the contractor shall stop work and notify the Roux SS or Site Health and Safety Officer (SHSO) immediately.

### 3.5 During Intrusive Activities

#### 3.5.1 Concrete/Paving Surface Removal

Remove any surface coverings (i.e., pavement, brush, debris, etc.) to ensure workers have clear visibility of the work area and subsurface conditions. Avoid mechanical jackhammering over known lines unless they are de-energized, locked-out/tagged-out, and potential repairs are planned or if the utility has been completely disconnected prior. When cutting or coring, go only as far as needed to penetrate the surface cover. When removing a large surface area, begin at the perimeter of the removal zone. This initial step helps identify any utilities passing through the work zone. For extensive areas, using a concrete saw might not be practical. Instead, heavy equipment is often employed. During this process, a designated spotter should guide the heavy equipment. Their role is to watch for warning signs of utilities. It's crucial that the heavy equipment does not have "teeth" that could potentially pass through the surface and damage utilities.

#### 3.5.2 Pre-Clearance Procedures

Install pre-clearance exploratory test holes using one of the techniques, as outlined in Section 3.4, for the first 5-ft below land surface (BLS) at each location before conducting intrusive mechanized activities. Should utilities be located at a greater depth than 5-ft BLS consult with the OM, OHSM and CHSD regarding adjustments to the pre-clearance requirements to go greater than 5-ft BLS. Some Clients may require greater than 5-ft BLS for pre-clearance test holes; Project teams should be aware of such Client requirements prior to work.

***Pre-clearance exploratory test holes should be defined in the SOW/proposal provided to the client to prevent project delays and to allow adequate time for the PM and PP to evaluate alternative approaches for the project. Alternative approaches will need to be pre-approved by the OM through a Subsurface Utility Clearance Variance.***

Both single-point and three-point clearance are acceptable as long as the following criteria are met below. For single-point clearance, the exploratory test hole is advanced at the exact location of the proposed borehole. If three-point clearance is performed, it must be done in a triangular pattern around the proposed borehole and in a configuration that would not allow utilities to enter the borehole.

- The size of the pre-clearance exploratory test hole should be, at a minimum, twice the diameter of any downhole tool or boring device.
- For direct push applications (CPT, Geoprobe®, etc.), the borehole clearance diameter shall be at least 125% of the diameter of the largest tool being pushed through the subsurface (e.g., tip, rod, sampler, etc.), to the minimum required depth.
- For excavations, all utilities need to be marked and then exposed by soft-digging or by hand following the protocols in this program. Pre-clearing for excavations may be performed by the "moat" technique (i.e., soft Digging around the perimeter). In these cases, dig in small lifts (<12" for first 5 feet) using a dedicated spotter.)
- For Tolerance Zone work, unless otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of pre-clearance test holes specified in Section 3.4 to expose the utility. Once structures have been verified, a minimum clearance of three feet must be maintained between the utility and any powered equipment. If considered a high-risk utility, additional requirements may be necessary and required by the Operator of the utility. Consultation with the OM and CHSD may be appropriate.

The PM, field team lead, or personnel performing oversight is to:

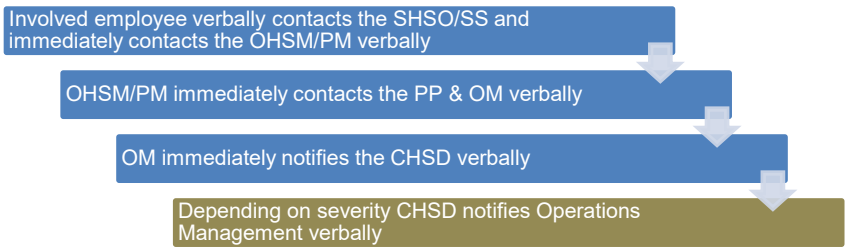
- Ensure the mark-out remains valid. (In certain states, there are limits regarding the duration of time after the mark-out was applied to the ground surface work can be started or interrupted.) Additionally, the mark-outs must be maintained, documented, and in many cases, refreshed periodically to be considered valid. This will be accomplished through calls to the one call center.
- Ensure intrusive activities are only performed within the safe boundaries of the mark-out as detailed in the One-Call Report.
- Halt all work if intrusive activities have resulted in the discovery of an unmarked utility. Roux personnel shall notify the facility owner/operator and the one call center. All incidents such as this will be reported as per Roux Incident Investigation and Reporting Management Program.
- Halt all work if intrusive activities must take place outside of the safe boundaries of a mark-out and only proceed after new mark-outs and subsurface utility clearance are performed.
- Halt the intrusive activities and immediately consult with the PP if an unmarked utility is encountered.
- Complete any loss reports associated with subsurface utility strikes as necessary.
- If a utility cannot be found as marked, Roux personnel shall notify the facility owner/operator directly or through the one-call center. If the facility operator is not responsive, then the one-call center must be notified. Following notification, the excavation/mechanical intrusive work may continue unless otherwise specified in state law.
- Contractors/subcontractors must contact the one-call center to refresh the ticket when the excavation continues past the life of the ticket. State law dictates ticket life. Project teams must be aware of their state-specific requirements.

### 3.6 Stop Work Authority

Each Roux employee has Stop Work Authority that he or she will execute upon determination of any imminent safety hazard, emergency situation, or other potentially dangerous situation, such as hazardous weather conditions. This Stop Work Authority includes subsurface clearance issues such as the adequacy of a mark-out or identification during intrusive operations of an unexpected underground utility. Authorization to proceed with work will be issued by the PM/PP in consultation with the OHSM after such action is reviewed and resolved. The PM will initiate and execute all management notifications and contact emergency facilities and personnel when this action is appropriate.

### 3.7 Reporting Utility Incidents

Roux field personnel engaged in any utility strike (e.g., subsurface/aboveground) must promptly stop work, shutdown any equipment and get to a safe location at the Site. Then notify the PM to discuss the incident. In case of injuries, field personnel must call 911 or the local emergency services number and then inform the PM. Additional notifications shall follow Roux's Incident Notification Process. Depending on the utility strike additional notifications shall be made to utility operators and/or clients/site contacts.



# Appendix A
# Roux Subsurface Utility Clearance Checklist

## Appendix A

## Roux Subsurface Utility Clearance Checklist/Utility Verification/Site Walkthrough Record

***Roux Subsurface Utility Clearance Checklist*** ***Date of Revision: 3/2024***

**Work site set-up and work execution**

| ACTIVITY | Yes | No | N/A | COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE |
|---|---|---|---|---|
| Daily site safety meeting conducted, SPSAs performed, JSAs reviewed, appropriate work permits obtained (if applicable). | | | | |
| HASP is available and reviewed by site workers / visitors. | | | | |
| Subsurface Utility Clearance Procedure has been reviewed with all site workers. | | | | |
| Mechanical intrusive work activities may not be performed at any location without authorization from the Roux Site Supervisor (SS). Clearance activities may not be performed at any location unless the SS is physically present. | | | | |
| Work area secured; traffic control established as needed. Emergency shut-off switch located. Fire extinguishers / other safety equipment available as needed. | | | | |
| Utility mark-outs (public / private) clear and visible. Provide Excavator's Stake-Out Reference Number / Request Date / Time. | | | | |
| Tolerance zone work identified. Intrusive work activities cannot be performed in areas that are in direct conflict with any markings made by public or private locators. | | | | |
| Unless the PP & OM authorizes it, all boreholes and test pit locations must be physically cleared before using mechanized equipment. Required minimum physical clearance depths and diameters are as follows:<br>• Physically clear to a depth of 5 feet bls.<br>• The size of the pre-clearance exploratory test hole must be, at a minimum, twice the diameter of any downhole tool or boring device.<br>• For direct push applications (CPT, Geoprobe®, etc.) the borehole clearance diameter shall be at least 125% to the diameter of the largest tool being pushed through the subsurface (e.g., tip, rod, sampler, etc.). | | | | |
| Work execution plan reviewed and adhered to (ground disturbance methods, clearance depths, any special utility protection requirements, or any other execution requirements; especially for Tolerance Zone work). | | | | |

| | | | | |
|---|---|---|---|---|
| Mechanical intrusive work is prohibited within 3-feet distance in all directions from subsurface structures that will be intentionally exposed during pre-clearance. Any removal of material within 3-feet of the subsurface structure may only proceed by hand using non-conductive tools/compressed air if authorized by state law and the owner/operator of the utility. | | | | |
| All equipment onsite must maintain the appropriate horizontal distance from any point on the equipment to the nearest overhead electrical power line. Refer to site-specific HASP and local/utility company requirements. | | | | |
| Verbal endorsement received from Roux PM and OM for any required field deviations to work execution plan. | | | | |

**Key Reminders for Execution**

The Subsurface Utility Clearance Protocol should be referenced to determine all requirements while executing subsurface work. The bullet points below are intended as general reminders only and should not be relied upon solely.

- The size of the pre-clearance exploratory test hole must be at a minimum twice the diameter of any downhole tool or boring device to minimum required depth of 5 feet bls.
- For direct push applications (CPT, Geoprobe®, etc.) the borehole clearance diameter shall be at least 125% of the diameter of the largest tool being pushed through the subsurface (e.g., tip, rod, sampler, etc.), to the minimum required depth of 5 feet bls.
- The tolerance zone is defined as three feet plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct banks, and other non-cylindrical utilities) of a utility and three feet from the outside of any subsurface structure.
- For excavations, all utilities need to be marked and then exposed by hand, following the protocols in this program. Pre-clearing for excavations may be performed by the “moat” technique (i.e., soft digging around the perimeter). In these cases, dig in small lifts (<12” for first five feet) using a dedicated spotter.) For Tolerance Zone work, unless otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of hand-dug test holes to expose the utility. Once structures have been verified, a minimum clearance of three feet must be maintained between the utility and any powered equipment.

## Utility Verification/Site Walkthrough Record

**Employee Name:**_____

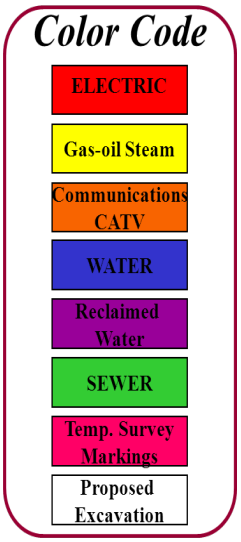
**Date:** _____

**Instructions:** For each utility suspected at the job site, indicate the location on the job site, approximate burial depth, and means of detecting the utility. Leave blank if that utility is not believed to be present.

| Utility | Description of Utility Location Identified Onsite | Approx. Depth (bls) | Method / Instrumentation used to determine Utility Location | Utility Owner Response (Date/Time) | Mark Out Indicates (Clear / Conflict) |
|---|---|---|---|---|---|
| **Electrical Lines** | | | | | |
| **Gas Lines** | | | | | |
| **Pipelines** | | | | | |
| **Steam Lines** | | | | | |
| **Water Lines** | | | | | |
| **Sanitary and Stormwater Sewer lines** | | | | | |
| **Pressured Air-Lines** | | | | | |
| **Tank Vent Lines** | | | | | |
| **Fiber Optic Lines** | | | | | |
| **Underground Storage Tanks** | | | | | |
| **Phone Lines/ Other** | | | | | |

* bls - below land surface

**Site Sketch Showing Utilities:**




**Other Comments / Findings:**

Completed by: _____

Signature: _____ Date: _____

# Appendix B
# Private Utility Technology Applications and Considerations

## Appendix B – Private Utility Technology Applications and Considerations

| **Technology ⇒ Utility/Object ⇓** | Radio Frequency Electro-Magnetic Detector (connection to utility, or induction without connection) | Radio Frequency Electro-Magnetic Detector (passive sweep) | Ground Penetrating Radar (GPR)⊙ | Acoustic Plastic Pipe Locator | Beacon, Sonde or Conductive Rodder Insertion | EM-61 (time domain electromagnetics) Ξ | |
|---|---|---|---|---|---|---|---|
| Power/Instrument Line (Energized/Signaled) □ | ❋ G | G | G | R | R | G | |
| Power Line (Non-energized) □ | ❋ G | R | G | R | R | G | |
| Sewer/Water Line (Metallic) □ | ❋ G | Y | G | Y | G | G | |
| Sewer/Water Line (Non-metallic) | R | R | G | G | ❋ G | R | |
| Instrument / Telecomm Lines (Non-energized) | ❋ G | R | G | R | R | Y Only if metallic | |
| Hydrocarbon Transmission Line (Pipeline)◆ □ | ❋ G | R | G | R | R | G | |
| Metallic/Non-Metallic Line (with Tracer Wire) | ❋ G | Y | G | Y | Y | G metallic | Y non-metallic |
| Metallic/Non-Metallic Line (without Tracer Wire) | G metallic | R non-metallic | R | ❋ G | Y | Y | G metallic | R non-metallic |
| Metal or Fiberglass UST | R | R | ❋ G | R | R | G metallic | R non-metallic |

### Additional Considerations

| **Technology ⇒ Variable ⇓** | Radio Frequency Electro-Magnetic Detector | Ground Penetrating Radar (GPR)⊙ | Acoustic Pipe Locator | Beacon, Sonde, or Conductive Rodder Insertion | EM-61 Ξ |
|---|---|---|---|---|---|
| Moist Soil | G | Y | G | G | G |
| Dry Soil | Y | G | Y | G | G |
| Clay | Y | R | G | G | G |
| Concrete w/Rebar | R | Y | G | G | R |
| Long Horizontal Profile | G | G | G | G | G |
| Short Horizontal but Deep Vertical Profile | Y | G | R | R | G |
| Access to Line✚ | G | N/A | G | G | G |
| No Access to Line✚ | G (induction or passive) | G | R | R | G |
| | R (direct connect) | | | | G |
| Ferrous Metal | G | G | G | G | G |
| Non-ferrous Metal | Y | G | G | G | G |
| Adjacent or crossing conductive utility(ies) | Y | N/A | N/A | N/A | Y |

Each site will be unique. Do not use this table as the sole criteria for technology selection. Use it as a starting point to assess available, applicable technology(s).

❋ Indicates best technology for given object. Site structures, rebar in concrete, shallow groundwater tables, perched storm water, etc. can significantly affect performance and reliability of any electro/magnetic method. Other utilities which cross or are adjacent to the target line can cause the EM signal to bleed or jump to the other utility line.

□ Metallic lines that have power running through them or can be connected to a tracer signal generator.

◆ Natural gas pipeline locating technicians must be trained/certified (in the U.S. requires DOT and Office of Pipeline Safety standards, other regions may have similar certification or requirements).

⊙ Most sensitive to interpretation. The skill, training and experience of operator are critical.

Ξ Emerging technology with limited availability.

✚ Access: induce unique electronic signature, apply acoustical impulse or insert conductive rodder/beacon/sonde.

**Green** Generally, an applicable technology **Yellow** May or may not be applicable **Red** Not generally applicable

# APPENDIX F

Heavy Equipment Exclusion Zone Policy

# HEAVY EQUIPMENT EXCLUSION ZONE MANAGEMENT PROGRAM

| | | |
|---|---|---|
| **CORPORATE HEALTH AND SAFETY DIRECTOR** | : | **Brian Hobbs, CIH, CSP** |
| **EFFECTIVE DATE** | : | **01/2019** |
| **REVIEWED DATE** | : | **03/2024** |
| **REVISION NUMBER** | : | **3** |

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3. PROCEDURES ..... 1
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## 1. PURPOSE

The Exclusion Zone Management Program aims to establish the minimum clearance distance that must be maintained between workers and heavy equipment while equipment is in operation (i.e., engaged or moving). The intent is to have no personnel or equipment entering the Exclusion Zone while the equipment is in operation or moving to ensure that Roux and Subcontractor employees are unnecessarily exposed to the hazards of the equipment.

## 2. SCOPE AND APPLICABILITY

This Management Program applies to all Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C., and Remedial Engineering (collectively, "Roux") employees and their subcontractors performing fieldwork and are potentially exposed to heavy equipment. Heavy equipment includes, but is not necessarily limited to, excavation equipment, drill rigs, vacuum trucks, forklifts, lull telehandlers, man lifts, bobcats, delivery trucks, etc.

## 3. PROCEDURES

As specified in the following sections of this program, Exclusion Zones must be established and maintained during activities involving the movement/operation of heavy equipment. The Exclusion Zone requirements apply to all personnel on the site but are primarily focused on personnel required to work near the equipment. The exclusion zone is in effect when heavy equipment is moving or engaged (e.g., movement of an arm or bucket of an excavator, rotation of an auger, lifting of a load with a forklift, raising/lowering of a man lift, etc.).

1. The Exclusion Zone must meet the following minimum requirements:
   - A minimum distance of 10 feet from all heavy equipment and loads being moved by the equipment;
   - Greater than the swing/reach radius of any moving part on the heavy equipment (i.e., for large equipment, this may mean an exclusion zone distance larger than 20 feet);
   - Greater than the fall zone of equipment and their contents; and
   - Greater than the tip-over distance of the heavy equipment.

   The size of the Exclusion Zone will need to be determined on a task-specific basis considering the size of the heavy equipment in use and the task being performed. Prior to all heavy equipment operations, the Exclusion Zone(s) distance must be specifically identified in the Job Planning Process and incorporated in the pre-job tailgate meeting with the subcontractor(s), including any updates to our Job Safety Analysis (JSA).

2. The spotter (or another authorized individual) is responsible for enforcing the Exclusion Zone and not conducting any other task. The spotter should be positioned immediately outside of the Exclusion Zone within a clear line of sight of the equipment operator. The spotter must signal the operator to stop work if anyone or anything has the potential to enter or compromise the Exclusion Zone. The operator should stop work if the spotter is not within their line of sight. If a spotter must be within the Exclusion Zone, they must be in a designated area outside the swing/tip radius, fall zone, line of fire of lifted loads, etc. If multiple pieces of equipment are being used, one spotter may be adequate so long as there is a clear line of sight and the spotter can control the zone(s). Radios would be required since hand signals would not be adequate if two pieces of equipment are in operation at the same time in the Exclusion Zone.

3. If an individual must enter the Exclusion Zone, the designated Spotter must signal the Equipment Operator to stop the equipment. Once the equipment is no longer moving (e.g., movement of an arm of an excavator is STOPPED, lifting of a load with a forklift STOPPED, raising/lowering of a man lift is STOPPED, etc.), the operator must bring the boom/arm to the ground ensuring a “Zero Energy State” and DISENGAGE THE CONTROLS and STOP and SIGNAL BY “SHOWING HIS HANDS.” This signal will indicate that it is safe for the person to enter the limits of the Exclusion Zone to perform the required activity. The equipment must remain completely stopped/disengaged until all personnel exited the Exclusion Zone's boundaries and the designated Spotter has signaled by “SHOWING HIS HANDS” to the Equipment Operator that it is safe to resume operations.
4. When entering the limits of the Exclusion Zone, personnel must, at a minimum:
    - Establish eye contact with the operator and approach the heavy equipment in a manner that is in direct line of sight to the Equipment Operator;
    - Never walk under any suspended loads or raised booms/arms of the heavy equipment; and
    - Identify a travel path free of Slip/Trip/Fall hazards.
5. The Exclusion Zone should be delineated using cones with orange snow fences or solid poles between the cones, barrels, tape, or other measures. For work in rights-of-way, rigid barriers, such as Jersey barriers or temporary chain link fences, should be used. For certain types of widespread or moving/mobile equipment operations, such delineation may not be practicable around equipment or individual work areas. In such instances, it is expected that the entire operation will be within a larger secure work area or that additional means will be utilized to ensure the security of the work zone.

All subcontractors who provide heavy equipment operations to field projects must implement a program that meets or exceeds the expectations described above as well as any additional requirements that may be required on a client or site-specific basis. Logistics involving heavy equipment should be understood and discussed prior to the field event during the job planning phase.

### 3.1 Exceptions

It is recognized that certain heavy equipment activities may require personnel to work within the limits of the Exclusion Zone as specified in this program. Such activities may include certain excavation clearance tasks, drill crew activities, or construction tasks. However, any such activity must be pre-planned, emphasizing limiting the amount and potential exposure of any activity required within the zone. The critical safety steps to mitigate the hazards associated with working within the Exclusion Zone must be defined in the JSA and potentially other project-specific plans (i.e., critical lift plans, etc.), and approved by the Roux Project Principal (PP), Office Health and Safety Manager (OHSM) and client representative, if required, prior to implementation.

## 4. TRAINING

Many Roux projects have different requirements that are client-specific or site-specific in nature. However, all Roux employees are provided initial training, as well as annually thereafter, on our Heavy Equipment Exclusion zone policy.

## 5. STOP WORK AUTHORITY

All Roux employees and their subcontractors have stop-work authority. Upon initial hire, all Roux employees are provided initial safety orientation, including stop work authority. All Roux employees and subcontractors are encouraged to stop work whenever any task or operation presents unreasonable risk or employees are

unsure how to carry out work safely. This includes upon observing any questionable safety-related behavior or condition, they are to stop work immediately and discuss the behavior or condition with the individual(s) involved. Upon stopping work, the following actions will be taken:

- Notify the affected parties to include the Project Manager (PM) and Site Health and Safety Officer (SHSO);
- Work to correct the situation or not proceed until the situation is corrected by the PM or SHSO;
- Resume work only when told to proceed by either the PM or SHSO;
- The SHSO will document the Stop-Work intervention in the field logbook;
- Stop-Work interventions will be reported to the PP for review to ensure the interventions are closed; and
- The PP will share learnings from the interventions, as appropriate, throughout the firm, to demonstrate the importance of the Stop-Work interventions.

Please note: Any form of retribution or intimidation directed at any individual or company for exercising their right to issue a stop work authority will not be tolerated.

# APPENDIX G

Roux Daily Tailgate Health and Safety Meeting Log/Daily Site Safety Checklist

ROUX

# DAILY TAILGATE HEALTH & SAFETY MEETING LOG

Job Name _____ Date(s) _____

Job # _____ Client Site # _____

Activities Planned _____

_____

_____

| JSAs Utilized | Roux PM Reviewer |
|---|---|
| | |
| | |
| | |
| | |
| | |

| Potential Hazards | Mitigative Measures |
|---|---|
| | |
| | |
| | |
| | |
| LPO Scheduled for: | |

| Meeting Attended by: | | Date | Date | Date | Date | Date |
|---|---|---|---|---|---|---|
| Name | Company | | | | | |
| | | | | | | |
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Initials

NOTE: THIS IS A TWO-SIDED FORM; PLEASE COMPLETE BOTH SIDES

# DAILY SITE SAFETY CHECKLIST

**Job Name** _____ **Date(s)** _____

**Job #** _____ **Client Site #** _____

**Weather** _____

| | |
|---|---|
| •"On the Job" interactive meeting held before work starts | •Provide details of work planned for the day |
| •Conducted at least once per day | •Review the Job Safety Analysis (JSA) and work hazards |
| •Involves everyone working at the Site | •Required PPE for the planned work |
| •Should familiarize everyone with work area & vicinity | •SPSAs are discussed |
| •Work permit procedures | •HASP is reviewed |
| •Emergency access/exits & "rally" point | •Ensure safety equipment is on Site |
| •Emergency contacts/phone #s, hospital route | •Test required safety equipment (such as emergency stop controls) |
| •Should be interactive | •Can also include inspection of tools and equipment to be used |

Instructions: Please use form for up to five consecutive days. Write in date, place checkmark to indicate item has been completed, then initial at bottom of column to verify.

| # | CHECKLIST ITEM | DATE | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| 1 | The HASP (including emergency phone #s) has been reviewed & signed by Roux staff & subcontractors. | | | | | |
| 2 | Personnel are LPS and OSHA-40 (as applicable) trained and SSE are identified and have an on-site mentor. | | | | | |
| 3 | Emergency meeting point known, First Care facility and ER identified. | | | | | |
| 4 | Applicable JSAs have been identified and approved by Roux management. | | | | | |
| 5 | Roux personnel & subcontractors have discussed hazards associated with Site-specific work. | | | | | |
| 6 | Any potential slips, trips or fall hazards have been identified. | | | | | |
| 7 | All workers have appropriate PPE, including long sleeves and have signed in for the day (2nd Page). | | | | | |
| 8 | No person on-Site has the appearance of being under the influence of motor skill altering substances and are familiar with D&A policy. | | | | | |
| 9 | Critical equipment on-Site is noted and is in safe working order. | | | | | |
| 10 | Site control has been established and exclusion zone is identified (using safety cones or barricades to mark out work area). | | | | | |
| 11 | Appropriate permits has been obtained and potential ignition sources were identified if applicable for Hot Permits | | | | | |
| 12 | If applicable, all third party permits to construct are on hand and access is permissible. | | | | | |
| 13 | Lock Out / Tag Out procedures have been followed where applicable, for electric and water. | | | | | |
| 14 | Electrical power operated tools shall be properly grounded and used with a GFCI. | | | | | |
| 15 | Traffic Safety Control measures have been put in place where applicable. | | | | | |
| 16 | All vessels containing flammable/corrosive material are labeled and MSDSs are available for all chemicals. | | | | | |
| 17 | Subsurface work : Drilling, trenching, etc. conducted according to required Protocol, including pre-field preparations, utility mark-out and "hand" clearing | | | | | |
| 18 | Excavated soils are properly stored; excavations are properly shored/sloped and barricaded. | | | | | |
| 19 | Good housekeeping procedures are meet; food and beverages are consumed outside of the work area. | | | | | |
| 20 | A first aid kit, eye wash bottle/station, and fire extinguishers are available for use. | | | | | |
| 21 | No smoking signs are visibly posted in areas of potential flammable vapors. | | | | | |
| Initial at right to verify that these actions have taken place | | | | | | |

Comments and Exceptions _____

_____

NOTE: THIS IS A TWO-SIDED FORM; PLEASE COMPLETE BOTH SIDES

# Professional Profiles

# PROFESSIONAL PROFILE

**CONTACT INFORMATION**
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Burlington, MA 01803


**EDUCATION**
BS, Environmental Science,
Springfield College, 1997

## Ian T. Reed

### Vice President | Principal Hydrogeologist

**EXPERIENCE SUMMARY**
Over 20 years of experience: Vice President – Roux, New England Office (current); Principal/Office Manager – Roux Associates, New England Office (2012-2017); Senior Hydrogeologist/Project Manager, Roux (2005-2012); Project Hydrogeologist, Roux (2001-2005); Associate Hydrogeologist, Aqua Science Engineer, Inc. – San Francisco, CA (1998-2001); Associate Geologist, Parsons ES – Boston, MA (1997-1998); Emerald Excavating – Plymouth, MA (1993-997).

**TECHNICAL SPECIALTIES**
Development, implementation, and management of comprehensive site investigations, implement remedial work plans, environmental investigations, and construction management.

Development and implementation of project/regulatory closure strategies for challenging sites in New England and New York.

Management and support for construction/redevelopment projects including Brownfields regulatory stewardship. Regulatory liaison and customer support with extensive experience in New England and New York.

Investigation and remedial implementations of impacted sediments including development and implementation of investigations in navigable waterways in New England. Scopes have included conventional sediment sample collections as well as innovative qualitative analysis (Sediment Profile Imagining). Sediment remediation scopes have included dredging, sheet pile installations, and engineered natural systems.

Management of environment and construction projects for oil and gas industry including pipeline maintenance and repairs, facility compliance, engineering support and construction management in MA, CT, RI, NY, and NJ.

Management and support of litigation projects for both petroleum and industrial clients. Currently technical expert for major oil company on challenging petroleum site investigation and remediation strategies.

Management and strategic support for challenging insurance claim cases in Massachusetts and New Hampshire. General duties performed have included both federal, state and local reporting, project and construction management, litigation support, soil/sediment excavation/dredge/removal management, emergency response management, soil and groundwater sampling, soil gas surveys, stream gauging, sediment investigations, soil immunoassay/XRF testing and hazardous materials surveys/ demo management, GIS data evaluations and mapping, UXO geophysical surveys, treatment system installations, Cone Penetration Testing, phytoremediation implementation, data tabulation and report preparation.

**REPRESENTATIVE PROJECTS**

- **Project Principal, Major Oil Company**. Manager of a complex dredging project on the Allegheny River to remove petroleum impacted sediments. Included the Site Investigation, Remedial Investigation, Alternative Feasibility Study, regulatory permitting and planning for upcoming dredge of 1,000 tons of sediment. Project requires the relocation of the largest documented population of a federally listed endangered mussel species.
- **Project Principal, Major Oil Company, Active Bulk Storage and Pipeline Facilities.** Manager of environment and construction projects at both active terminals and pipeline facilities on the east coast (Florida to Maine). Work scopes have included various types of

permitting, pipeline corrosion/dent inspections and repairs, OWS design and installation, Method 21/LDAR inspections, AST annual inspections, building upgrades including demo surveys and general construction management, containment dike surveys and secondary containment evaluations and designs. Safety awards received by Major Oil Company multiple times over the last several years.

- **Project Principal, Major Oil Company, Pipeline Facilities.** Provided engineering and technical support for securing > 100 wetland and various construction permits (state, local, federal). Developed risk reduction plans, engineering design for stream & RR crossings. Work scopes included assisting with foreign lines, dent anomalies (>1,000). Permits include CWA Order of Conditions, DOT access, road opening/construction, NHESP VMP & OMP, Water Quality Cert., and US Army Corp.
- **Project Principal, Major Petroleum Co., Former Petroleum Refinery, Upstate New York.** This Site is one of the 1st refineries in the US, at one time encompassing 700+ acres of land now in various stages of investigation, cleanup, and redevelopment. Roux currently has several roles and manages many aspects of the overall project. Serving as technical consultant for this client reviewing all regulatory submittals and overall strategy to achieve site closure through both the NY State Brownfields and Spills Programs. Serves as liaison to regulators, local stake holders and construction/redevelopment firms. Additional value added has included significant identified cost efficiencies during both remediation and redevelopment.
- **Expert/Technical Witness and Project Principal, Major Oil Company, Rochester, New York.** Oversaw large-sale investigation of several 100+ acre former refinery. Assisted with 3rd party negotiations and regulatory liaison.
- **Project Manager, Oil Company, Albany, New York**. Project Manager in-charge for large scale dredging project on the Hudson River to remove petroleum impacted sediments and soil. Included the removal of 3,000 tons of sediment, installation of sheet pile wall, carbon trench and phyto-remediation plot. Work performed in accordance with Stip. Agreement with NYSDEC. Included various stages of client advocacy. Project was completed on-time and under budget resulting in significant cost savings to the client.
- **Project Manager, Oil Company, Newington, New Hampshire.** Project Manager in-charge for large scale remediation and regulatory closure of former petroleum terminal on navigational waterway.
- **Project Principal, Multiple Spill Sites for Insurance Co., New Hampshire and Massachusetts.** Assist local insurance company with complex emergency response spills including development of closure strategy and oversight/management of response actions.
- **Project Manager, Demolition of Former Bulk Storage Facilities, New England, and New York.** Oversaw and managed team during the demolition of several facilities including completing the hazardous materials surveys, ACM removal, building demo and soil excavations.
- **Litigation Project Manager, Several Projects.** Managed litigation teams for several large-scale litigation, allocation, and facility assessment projects. Included the development and design of significant GIS and database systems to assist in the review of large quantities of both analytical and geographic information.
- **Project Manager for Several Secondary Containment System Evaluation Projects on Petroleum Bulk Storage Facilities in Several States.** Included both aerial and conventional surveys/mapping, use of 3D AutoCAD/GIS for evaluating secondary containment requirements in accordance with local, state, and federal programs. Project work also included the development of complex containment system designs and engineering oversight.
- **Project Manager, Major Oil Company, Everett, Massachusetts.** Project Manager-in-Charge for massive exploration, investigation, and rehabilitation of storm water collection system for former refinery and active petroleum bulk storage facility. Included the mapping of 5 miles of piping, extensive reconstruction, and abandonment of large-scale and deep structures in an active loading rack and terminal. Included the oversight of numerous subcontractors performing permit required CSEs with Marine Chemist certs.
- **Field Manager, USARMY, Seneca, New York and Falmouth, Massachusetts.** Oversaw numerous geophysical surveys, locating unexploded ordinance (UXO) and radioactive materials at a former US Army Depot (storing tactical nuclear weapons) and at on a former anti-tank weapons range. Responsible for performing extensive and thorough geophysical surveys using GPS and GIS mapping. Required compliance of strict UXO and radiation safety programs.
- **Project Manager, Oil Company, Upstate New York.** Project Manager in-charge and point of contact with NYSDEC project managers for emergency response following release of 30,000 gallons of Jet Fuel from a bulk storage facility in New York. Oversaw initial cleanup, following by rapid subsurface investigation to identify leak location and product plume.
- **Task/Field Manager, Major Oil Company, Several Locations.** Manager for multiple bulk petroleum storage and distribution facilities/terminals located in New England and New York.

Schedule, coordination, and oversight of all field operations including remediation system O&M, subsurface investigations, product recovery, surface water sampling, groundwater sampling events, waste management including soil excavation/removal.

- **Hydrogeologist/Field Manager, Stratford, Connecticut.** Site Assessments for Major Design Plant including Phase II Site Assessments of various industrial properties. Assessments included property inspection and review of state and federal documents, aerial photographs, and environmental databases. Historical land use research and interviews with property occupants and municipal personnel were conducted as part of these assessments.
- **Field Manager, Retail Service Station, Manteca, California.** Oversaw down-gradient groundwater investigation, domestic well sampling, cone penetration testing.

**PROFESSIONAL TRAININGS**

Operator Qualification (OQ) Training (several tasks)

OSHA 29 CFR 1910.120 40-Hour Safety Training

OSHA 29 CFR 1910.120 8-Hour Annual Refresher

Confined Space Safety Training

DOT HM-181/126F Certificate

Red Cross Certified, First Aid and CPR

ExxonMobil Loss Prevention System Training

Radiation Safety and Monitoring/Measurement

PROFESSIONAL PROFILE

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**EDUCATION**

MS, Environmental Engineering Science, University at Buffalo, 2008

BS, Biology, State University of New York at Fredonia, 1994

# Michael Lesakowski

## Vice President | Principal Scientist | Co-Operations Manager

**EXPERIENCE SUMMARY**

Over twenty-five years professional experience in environmental engineering, science, and consulting at numerous contaminated sites throughout the northeast United States as Vice President (Roux Environmental Engineering and Geology, DPC), President, Principal Scientist, Sr. Project Manager and Project Manager (TurnKey Environmental Restoration, LLC), Executive Vice President, Project Manager and Environmental Scientist (LCS, Inc.) and Environmental Scientist (GZA GeoEnvironmental of NY).

**TECHNICAL SPECIALTIES**

Expert in all aspects of the New York Brownfield Cleanup Program, including technical assessment and analysis of the site investigation/remedy selection process, and site remediation. Expert in the business of the NY BCP sites, including cost/credit analysis and structured liability transfers of contaminated properties. Mr. Lesakowski has investigated and remediated over 100 NY brownfield projects, including ten renewable energy redevelopment projects on remediated brownfield sites. He has managed assessments, investigations and remediation projects on properties with a multitude of historic uses (e.g., petroleum storage refineries and terminals, gas stations, automobile dealerships, rail yards, foundries, dry cleaners, steel manufacturing, metallurgical plants, metal plating operations, junk yards), media types (surface and subsurface soil, groundwater, sediments, soil vapor, indoor air, building materials) and contaminants (e.g., volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], polychlorinated biphenyls [PCBs], heavy metals, per- and polyfluoroalkyl substances [PFAS]). Mr. Lesakowski has managed remediation projects, ranging from simple underground storage tank (UST) removals to large-scale soil excavations, in situ soil stabilization, and complex groundwater remediation programs, such as biological and/or chemical in situ groundwater treatment and permeable reactive barriers for VOCs and PFAS.

**REPRESENTATIVE PROJECTS**

**GLR Holdings Site, Niagara Falls, New York**

Manager and Principal Investigator/Remediator for Remedial Investigation (RI), Interim Remedial Measure (IRM) and Remedial Alternatives Analysis under the NYSDEC guidance for a former automotive repair facility with significant soil, groundwater and soil vapor chlorinated volatile organic compounds impact. The RI included a hydrogeologic assessment, including soil borings using a hollow stem auger drill rig, installation, development and sampling of groundwater monitoring wells, an on-site and off-site soil vapor assessment and dye test to trace drains and sewers to evaluate potential preferential pathways. The remediation approach included:

- Soil excavation and disposal.
- In situ enhanced biodegradation of groundwater.
- The newly constructed building included an active subslab depressurization system to protect the occupants from potential soil vapor intrusion.

The site was redeveloped as a restaurant.

**Seneca Market I, LLC Site, Watkins Glen, New York**

Manager of Site Investigation and Remediation at a former drycleaner, bus garage and asphalt plant under NYSDEC guidance with significant chlorinated volatile organic compounds impact. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. The remediation approach involved:

- Underground storage tank removal;
- In-ground hydraulic lift removal;

- Hazardous soil excavation and disposal proximate a commercial building;
- Enhanced biodegradation of groundwater;
- Groundwater extracted during excavation was treated with granular activated carbon and discharged to the municipal sewer system
- An active sub-slab depressurization system to protect the occupants from potential soil vapor intrusion; and
- Portions of the site included an engineered soil cover system.

The Property was redeveloped with an up-scale hotel.

### 330 Maple Road Site, Amherst, New York

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance for a small arms shooting range with hazardous lead and semi-volatile organic compounds (SVOCs) in soil. The RI involved collecting over 1,000 soil samples on 26-acre parcel slated for future mixed-use commercial and residential development. Bench-scale testing was completed to select a substrate to treat the characteristic hazardous soil to below toxicity characteristic leaching procedure (TCLP) thresholds. Remedial Action included:

- Physical removal of lead shot from the soil matrix;
- In-situ stabilization of characteristically hazardous lead-impacted soil; and
- Excavation and off-site disposal of lead and SVOC-impacted soil.

The site was remediated to allow for residential re-use.

### 275 Franklin Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site formerly used as drycleaner in western New York with significant soil and groundwater chlorinated VOC impacts. The investigation included a hydrogeologic assessment, including soil borings and overburden and bedrock monitoring well installation, development, and sampling. Soil was successfully remediated using a combination of soil vapor extraction and excavation and off-site disposal. Groundwater remediation involved in-situ treatment of impacted groundwater at the downgradient property boundary whereby groundwater migrated through a permeable reactive barrier. An active sub-slab depressurization system design and installation is planned in the new building during construction.

### Niagara Street and Pennsylvania Avenue Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site formerly used as gasoline and service station in Buffalo, New York with significant petroleum impacts. The investigation included a hydrogeologic assessment, including soil borings and overburden monitoring well installation, development, and sampling. Remedial Action included:

- Demolition of the former service station building and product dispenser canopy and disposal of construction and demolition debris;
- Removal and recycling of approximately 80 tons of concrete at Iron City in Lackawanna, New York;
- Removal of five underground storage tanks, including all associated dispensing units and underground product piping;
- Excavation of petroleum-impacted soil/fill followed by off-site transportation and disposal a commercial landfill;
- Extraction and treatment of approximately 6,000-gallons of groundwater from the excavation during remediation activities using bag filtration and granular activated carbon and discharge to the municipal sewer; and
- Placement and compaction of approximately crusher run stone backfill to the approximate pre-existing grade.

### 1501 College Avenue Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former heavy industrial and manufacturing facility in Niagara Falls, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and overburden monitoring well installation, development, and sampling. Remedial Action included:

- Disposal of galbestos roofing and building materials;
- Collection and removal of seven (7) roll-off containers of abandoned drums and containers of off-spec former carbon electrode manufacturing materials;
- Waste petroleum oil was vacuumed out of two abandoned tanker trucks;
- Cleaning and collection of steel ASTs, empty drums and two (2) abandoned tanker trucks and transported off-site with other on-Site scrap metals (i.e., building demolition metals);
- Excavation and disposal of non-hazardous petroleum-impacted soil/fill;
- Excavation of PCB-impacted soil/fill;
- Extraction and storage of approximately 20,000 gallons of impacted water removed from the excavation for solidification and final disposal at a commercial landfill; and
- A soil cover system across the site.

### 500 South Union Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former dry cleaning facility in Spencerport, New York. The investigation included a hydrogeologic assessment, including exterior and interior soil borings, test pits and monitoring well installation, development and sampling, soil vapor testing and hydrogeologic assessment to design the in-situ groundwater treatment program. Remedial Action included:

- Installation of an active subslab depressurization system within the existing building to prevent migration of vapors into the building air;
- In-situ injection of treatment agent at 71 injection points located across the Site to enhance natural biodegradation of cVOCs in groundwater;
- Limited excavation and off-Site disposal of surface soil/fill exceeding commercial use soil cleanup objectives; and
- Construction and maintenance of a soil cover system consisting of the existing building, pavement (asphalt), sidewalks, and soil cover in all other areas at a minimum of one foot thick over the demarcation layer, to prevent human exposure to remaining contaminated soil/fill remaining at the Site;

The site is currently used as a multi-tenant commercial facility.

### Scott Rotary Seals Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as subslab vapor/indoor air testing. Remedial Action included:

- Limited excavation and off-Site disposal of shallow grossly contaminated soil to a depth of approximately 6-feet below final grade within the northwest area of the Site, including the building footprint and utility corridors;
- Installation of a soil vapor extraction system to treat grossly contaminated soil in the deeper vadose zone soil/fill from approximately 6-fbgs to the top of the groundwater surface;
- Construction and maintenance of a soil cover system consisting of buildings, pavement (asphalt and concrete), sidewalks, and soil cover in all other areas at a minimum of one foot thick over the demarcation layer, to prevent human exposure to remaining contaminated soil/fill remaining at the Site;
- Installation of an active sub-slab depressurization system within the newly constructed on-Site building to prevent migration of vapors into the buildings; and
- Installation of a LNAPL removal system within certain on-Site wells, utilizing absorbent socks.
- The site was redeveloped as a light industrial and commercial facility.

### Olean Redevelopment Parcel 2 Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The comprehensive investigation, which was completed over three separate sites (Olean Redevelopment Parcels 1,2 and 3) totaling approximate 60-acres, included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling.

As part of the investigation, bench-scale studies were completed to assess treatment of grossly contaminated petroleum soil (GCPS) impacted soil and lead-impacted soil. Soil/fill batches were treated by mixing to simulate landfarming; stabilized with lime, Portland cement, and fly ash (all amendments added at 2% and 5% by weight); and chemically oxidized with hydrogen peroxide (1% and 3% by weight).

Based on the results of the bench-scale treatability studies, four pilot-scale treatability studies were performed: in-situ SVE; ex-situ landfarming; force vented biopiles (FVBP); and solidification/stabilization. As part of these pilot-scale treatability studies, biofiltration was assessed as component of treatment of the extracted air from the in-situ SVE pilot study and for the FVBP pilot study.

**Remedial Action included:**

- Approximately 2,715-tons of arsenic contaminated soil/fill, 143-tons of mercury contaminated soil/fill and 638-tons of grossly contaminated petroleum soil (GCPS) was excavated, loaded, and transported off-Site to a commercial landfill;
- Approximately 34,313 linear feet of subsurface metallic product piping (steel, cast iron, lead and copper) was exposed, tapped, evacuated of contents, removed, cleaned and recycled or disposed. An additional 156 linear feet of wood pipe was also exposed, tapped, evacuated of contents, removed, cleaned and disposed off-site. Piping which extended beyond the property boundary was capped and/or grouted at the apparent property line. Approximately 240 cubic yards of GCPS was excavated during piping removal activities and treated on the on-site force-vented biopiles FVBPs and reused as backfill below the cover system;
- Approximately 24, 55-gallon drums were generated from the removal of the abandoned subsurface piping. The contents of the piping included LNAPL, residual pipe scale, and product sludge. The 24 drums (15 non-hazardous and 9 hazardous) were disposed at a commercial landfill. In addition to the drums, approximately 3.5 tons of tank contents that were placed into roll-off containers and solidified with Portland cement due to liquid content were disposed at a commercial landfill. Water extracted from excavations during piping removal was pumped into holding tanks, treated with bag filters and granular activated carbon (GAC) on-site, pumped into a secondary on-Site temporary holding tank, sampled, and discharged to the municipal sanitary sewer with approval under an Industrial Pretreatment Program permit. Approximately 4 drums of wash water generated during holding tank cleaning were disposed at a commercial landfill;
- Design, installation, and operation of a SVE system to address GCPS in the deeper soil/fill from approximately 2 to 15 fbgs. The SVE system included the installation of 13 SVE wells, associated conveyance piping, and placement of three trailer-mounted SVE blowers. Emissions from the SVE system were controlled using biofilters, which allowed the naturally occurring microbes

to bioremediate the air stream and control the nuisance odors from the SVE systems.

- Light non-aqueous phase liquid (NAPL) recovery was completed utilizing hydrocarbon absorbent socks at one well and a product pump at one well. LNAPL thicknesses at these locations have been measured to vary from 0 to 6.5 ft. Recovered product was transferred to properly labeled and sealed 55-gallon drums at the Site for future off-Site disposal.
- A site cover system was constructed to allow for commercial use of the Site. The cover system consists of a minimum of one foot of soil. A portion of the Site is covered with an asphalt road that serves as part of the cover system The soil cover was placed over a demarcation layer, consisting of orange plastic mesh, and was hydroseeded and fertilized. On-Site drainage ditches were lined with rip-rap.

**Olean Redevelopment Parcel 3 Site**

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The comprehensive investigation, which was completed over three separate sites (Olean Redevelopment Parcels 1,2 and 3) totaling approximate 60-acres, included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling.

As part of the investigation, bench-scale studies were completed to assess treatment of grossly contaminated petroleum soil (GCPS) impacted soil and lead-impacted soil. Soil/fill batches were treated by mixing to simulate landfarming; stabilized with lime, Portland cement, and fly ash (all amendments added at 2% and 5% by weight); and chemically oxidized with hydrogen peroxide (1% and 3% by weight).

Based on the results of the bench-scale treatability studies, four pilot-scale treatability studies were performed: in-situ SVE; ex-situ landfarming; force vented biopiles (FVBP); and solidification/stabilization. As part of these pilot-scale treatability studies, biofiltration was assessed as component of treatment of the extracted air from the in-situ SVE pilot study and for the FVBP pilot study.

Remedial Action included:

- Approximately 425-tons of arsenic contaminated soil/fill, 235-tons of GCPS was excavated, loaded, and transported off-Site to a commercial landfill;
- Approximately 7,592-tons of lead contaminated soil/fill was stabilized in-place utilizing Portland cement to treat the soil and render it non-hazardous;
- Approximately 50,667 linear feet of subsurface metallic product piping (steel, cast iron, lead and copper) was exposed, tapped, evacuated of contents, removed, cleaned, and recycled or disposed. An additional 232 linear feet of wood pipe was also exposed, tapped, evacuated of contents, removed, cleaned, and disposed off-site. Piping which extended beyond the property boundary was capped and/or grouted at the apparent property line. Approximately 2,552 cubic yards of GCPS was excavated during piping removal activities and treated on the on-site FVBPs and reused as backfill below the cover system;
- Approximately 33, 55-gallon drums were generated from the removal of the abandoned subsurface piping. The contents of the piping included LNAPL, residual pipe scale, and product sludge. The 33 drums (21 non-hazardous and 12 hazardous) were disposed at a commercial landfill. In addition to the drums, approximately 4.9 tons of tank contents that were placed into roll-off containers and solidified with Portland cement due to liquid content were disposed at a commercial landfill. Water extracted from excavations during piping removal was pumped into holding tanks, treated with bag filters and granular activated carbon (GAC) on-site, pumped into a secondary on-Site temporary holding tank, sampled, and discharged to the municipal sanitary sewer with approval under an Industrial Pretreatment Program permit. Approximately 6 drums of wash water generated during holding tank cleaning were disposed at a commercial landfill;
- Installation and operation of a SVE system to address GCPS in the deeper soil/fill from approximately 2 to 15 fbgs. The SVE system included the installation of 58 SVE wells, associated conveyance piping, and placement of three trailer-mounted SVE blowers. Emissions from the SVE system were controlled using biofilters, which allowed the naturally occurring microbes to bioremediate the air stream and control the nuisance odors from the SVE systems.
- LNAPL recovery was completed utilizing hydrocarbon absorbent socks;
- A site cover system was constructed to allow for commercial use of the Site. The soil cover was placed over a demarcation layer, consisting of orange plastic mesh, and was hydroseeded and fertilized. On-Site drainage ditches were lined with rip-rap.

The site was redeveloped as a commercial solar power generating facility.

**Olean Redevelopment Parcel 1 Site**

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The comprehensive investigation, which was completed over three separate sites (Olean Redevelopment Parcels 1,2 and 3) totaling approximate 60-acres, included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling.

As part of the investigation, bench-scale studies were completed to assess treatment of grossly contaminated petroleum soil (GCPS) impacted soil and lead-impacted soil. Soil/fill batches were treated by mixing to simulate landfarming; stabilized with lime, Portland cement,

and fly ash (all amendments added at 2% and 5% by weight); and chemically oxidized with hydrogen peroxide (1% and 3% by weight).

Based on the results of the bench-scale treatability studies, four pilot-scale treatability studies were performed: in-situ SVE; ex-situ landfarming; force vented biopiles (FVBP); and solidification/stabilization. As part of these pilot-scale treatability studies, biofiltration was assessed as component of treatment of the extracted air from the in-situ SVE pilot study and for the FVBP pilot study.

- Approximately 1,652 tons of arsenic contaminated soil/fill, 110 tons of mercury contaminated soil/fill, approximately 357 tons of PCB contaminated soil/fill, and approximately 5,722 tons of PAH (SVOC)-contaminated was excavated, loaded, and transported off-site to a commercial landfill;
- Removal of an ammonia tank, approximately 500-gallon stainless steel vertical UST with no piping, and associated PCB- and ammonia-impacted soil;
- Approximately 49,976 linear feet of subsurface metallic product piping was exposed, tapped, evacuated of contents, removed, cleaned, and recycled. An additional approximate 578 tons of GCPS contaminated soil/fill was excavated, loaded, and transported off-site to a commercial landfill;
- Approximately 48, 55-gallon drums were generated during the remedial work, 42 of which were generated from the removal of the abandoned subsurface piping. The contents of the piping included LNAPL, residual pipe scale, and product sludge. Water extracted from excavations during piping removal was pumped into holding tanks, treated with bag filters and granular activated carbon (GAC) on-site, pumped into a secondary on-site temporary holding tank, sampled, and discharged to the municipal sanitary sewer;
- Installation and operation of a SVE system to address GCPS in the soil/fill from approximately 2 to 15 fbgs. The SVE system included the installation of seven SVE wells, associated conveyance piping, and placement of an SVE blower. Emissions from the SVE system were controlled using a biofilter to bioremediate the air stream and control the nuisance odors from the SVE system;
- LNAPL recovery was completed using hydrocarbon absorbent socks and/or manual bailing at six wells and a product skimmer at one well. LNAPL thicknesses at these locations has been measured to vary from 0.3 to 5.05 ft. Recovered product was transferred to properly labeled and sealed 55-gallon drums at the Site for off-site disposal; and
- Construction and maintenance of a site cover system.

A portion of the site was redeveloped as a hotel.

### 251 Homer Street Redevelopment Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major petroleum storage facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. Remedial Action included:

- Removal and recycling of approximately 10,644 linear feet of piping (approx. 97 tons) ranging in diameter from 2-inch to 12-inch. Removal and disposal of 51, 55-gallon drums containing oil, sludge, and scale from within the piping. Extraction, treatment, and discharge of approximately 21,000 gallons of water from within the pipes and perched water encountered during trench excavation under a temporary discharge permit issued by the municipal Wastewater Treatment Plant (WWTP);
- Excavation and off-site disposal of 49,670 tons of grossly contaminated soil (GCS) followed by backfill with clean imported soil. The on-site drainage ditch was converted to a closed 30-inch subsurface drainage pipe as discussed with NYSDEC;
- Excavation and off-site disposal of approximately 2,106 tons of arsenic-impacted soil/fill followed by backfill with clean imported soil;
- Extraction, treatment using granular activated carbon (GAC), and discharge of approximately 250,000 gallons of water encountered during excavation activities under a temporary discharge permit issued by the municipal WWTP;
- Temporary re-routing of Two Mile Creek, followed by excavation of approximately 4,000 tons on-site and 973 tons off-site of Two Mile Creek bed and bank material followed by off-site disposal, and backfilling. The creek bed and banks were restored with stone (creek bottom), and clay and clean soil (creek banks), including biodegradable erosion control blanket, riparian shrubs and hydro-seeding of creek banks;
- Construction and maintenance of a cover system consisting of a minimum 12 inches of clean soil or gravel to prevent human exposure to remaining contaminated soil/fill remaining at the site.

The site was redeveloped as a commercial solar power generating facility.

### 300 Ohio Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum storage and sales facility in Buffalo, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as sub-slab vapor/indoor air testing. Remedial Action included:

- Excavation and off-site disposal of the underground storage tank (UST) system. A total of sixteen (16) USTs and related piping and appurtenances were uncovered and removed, cleaned of residual contents and transported off-site for recycling as scrap;

- Excavation and off-site disposal of approximately 18,650 tons of grossly contaminated petroleum soil, approximately 220 tons of soil/fill exceeding 500 ppm total PAHs, and approximately 425 tons of soil/fill exceeding Commercial Use SCOs for arsenic and lead;
- Approximately 500 cubic yards (cy) of recyclable concrete and stone generated from the removal of buildings and sign footers/foundations, was crushed on-Site and used for backfill and subsurface grading beneath the cover system; and
- Construction and maintenance of a cover system consisting a minimum of 12 inches of approved soil/stone material above a demarcation fabric to prevent human exposure to contaminated soil/fill remaining at the site.

A portion of the site was redeveloped as a brewery and restaurant.

### 229 Homer Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major petroleum storage facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as a soil vapor intrusion assessment. Remedial Action included:

- Approximately 5,815 tons of grossly contaminated soil GCS-impacted soil/fill was excavated and transported off-site for disposal at a commercial landfill;
- Approximately 1,946 linear feet of subsurface metallic product piping was exposed, tapped, evacuated of contents, removed, cleaned and recycled. Piping which extended beyond the property boundary was capped and/or grouted at the property line.
- Approximately 19 tons of piping was recycled as scrap metal. Cleaning of the pipes generated 4 drums of pipe scale, oil, and water, which was transported off-site for incineration.
- Design, installation, and operation of an air sparge/soil vapor extraction (AS/SVE) system to address GCS in the deeper soil/fill from approximately 5 to 15 fbgs and in the upper 5 ft of the water table (i.e., smear zone). The air sparge portion of the system includes 53 injection wells connected to an air compressor in a climate-controlled trailer via individual 1" polyethylene lines. The SVE system includes 14 extraction wells connected by 2" polyethylene lines to one of two blowers in a separate climate-controlled trailer. Emissions from the SVE system are controlled using a biofilter, which allows naturally occurring microbes to bioremediate the air stream and control the nuisance odors from the AS/SVE system;
- Construction and maintenance of a site cover system.

### Former Trico Plant Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former manufacturing facility in Buffalo, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as subslab vapor/indoor air testing. Remedial Action included:

- Construction and maintenance of a site cover system.
- In-situ on-site treatment of groundwater contaminated with chlorinated volatile organic compounds (cVOCs);
- Removal of six (6) hydraulic lifts and associated infrastructure and impacted soil/fill;
- Pumping and on-site treatment of water present in the building sub-basement prior to sanitary sewer discharge under a temporary discharge permit;
- Cleaning accessible sump and sewer structures with evidence of potential impacts;
- Removing and properly disposing off-site miscellaneous abandoned regulated waste materials; and abating building components for lead, asbestos, oil staining, PCBs, etc. as required during redevelopment. Building surfaces and features planned to remain with evidence of impacts from historic operations will be encapsulated or sealed;
- Installing an active sub-slab depressurization (ASD) system within the existing buildings; and
- Maintaining existing cover system in accordance with 6NYCRR Part 375 and NYSDEC DER-10 guidelines. The cover system includes building foundations and asphalt on former Burton Street.

The site is being redeveloped as a mixed-use commercial and residential complex.

### Jamison Road Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at an active industrial facility in Elma, New York. The Remedial Investigation was completed across the BCP Site and off-site on adjacent parcels to supplement previous environmental data and delineate or identify areas requiring remediation. Field activities included soil boring advancement; test pit excavations; surface and near-surface soil/fill sampling; overburden and bedrock monitoring well installation; groundwater and storm water quality sample collection; soil vapor sample collection; and sub-slab vapor, indoor air, and outdoor air sample collection in six on-site buildings and one off-site building. Hydraulic conductivity testing was also completed in the overburden groundwater zone as well as the bedrock groundwater to assess groundwater transmissivity. Remedial Action included:

- Excavation of 2,430 tons of contaminated soil/fill, which was disposed off-site at a commercial landfill;
- 314 tons of flowable fill proximate to a sewer line was excavated as it was deemed unsuitable due to structural considerations, which was also disposed off-site at commercial landfill;
- Two steel former pipes that ran along the eastern boundary of an on-site building were removed and disposed at a

commercial landfill. Approximately 10-gallons of residual hydraulic oil removed from the pipes was transported and recycled off-site;
- Approximately 13,415 cubic yards (CY) of non-impacted soil was excavated for the construction of new buildings. With NYSDEC approval, 12,250 CY of soil was exported for reuse at another site and the remaining soil was reused on-site;
- During overburden soil removal, approximately 1,100,000 gallons of Chlorinated VOC-impacted groundwater was extracted, treated using granular activated carbon, tested, and discharged;
- A former 15" concrete storm sewer was encountered during foundation excavation for new buildings. Approximately 150 gallons of emulsified oil and water were removed using a vacuum truck, transported to an on-site frac tank and later disposed. A portion of the former sewer was removed, and the remaining portion of the sewer was filled in with concrete;
- Installing an active sub-slab depressurization (ASD) system within two new building and two existing buildings;
- As part of the remedial design, a bench-scale treatability study evaluation of media was conducted. The study included four column reactors filled with four different material combinations to determine which most effectively removed CVOCs from the Site groundwater. A proprietary product comprised of granular carbon and zero-valent iron was selected as the treatment medium;
- Implementation of in-Situ Chemical Reduction (ISCR) in the form of a permeable reactive barrier (PRB) with two approximate 250-feet long slurry wall legs to direct the groundwater toward the PRB. The slurry walls consist of a homogeneous mixture of soil, bentonite, and water, with a maximum hydraulic conductivity of 1x10-6 cm/s. The PRB and slurry wall legs were installed in the northwestern corner of the site to treat groundwater impacted by chlorinated volatile organic compounds;
- Implementation of in-situ phytoremediation using hybrid poplar trees to treat groundwater impacted by 1,4-dioxane. The hybrid poplar trees were planted in two rows in the northwestern corner of the site, upgradient of the PRB; and
- Installation of an in-line air stripper to remove CVOCs from storm water prior to discharge.

The site has been redeveloped with a mixed-use industrial manufacturing facility and related research and development offices.

### 1827 Fillmore Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former gravel pit filled in with miscellaneous soil/fill and construction and demolition debris in Buffalo, New York located adjacent to two public schools. The Remedial Investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. As part of the Remedial Investigation, bench-scale studies were completed to assess treatment characteristically hazardous lead-impacted soil. Soil/fill batches were treated by mixing different amendments, including Portland cement and phosphoric acid, at varying percentages by weight. 5% Portland cement was selected as the soil amendment.

Remedial action included:

- In-situ stabilization of approximately 3,091 cubic yards of characteristic hazardous lead soil/fill using Portland cement in two remedial areas of concern;
- Excavation and off-site disposal of contaminant source areas, including soil exceeding the site-specific action levels (SSALs) of 3,900 ppm of lead and soil containing total semi-volatile organic compounds (SVOCs) exceeding 500 ppm. Approximately 2,200 tons of soil was removed and disposed off-Site, including 160 tons of soil exceeding the hazardous criteria for lead, which was treated in-situ and rendered non-hazardous prior to disposal; and
- Construction and maintenance of a soil cover system consisting of a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer to prevent human exposure to remaining contaminated soil/fill.

The site is planned to be redeveloped with mixed-use commercial and residential buildings.

### 3100 Clinton Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former railyard filled in with miscellaneous soil/fill in West Seneca, New York and located adjacent to a regulated wetland. The Remedial Investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. Remedial Action included:

- Clearing and grubbing of vegetation, shrubs, and trees to allow remedial excavation activities. Approval to complete work activities within designated wetland areas was received from the United States Army Corps of Engineers and NYSDEC prior to starting work in those areas;
- Excavation and off-site disposal of approximately 45,850 tons (approximately 30,600 cubic yards) of PAH- and metals-impacted soil/fill;
- Excavation and off-site transport to an approved location of a total of 761 loads of surplus native soils which were determined to be structurally unsuitable for redevelopment purposes;
- Excavation and off-site disposal of 5.9 tons of treated/weathered wood (former railroad ties);
- Collection, storage, volume measurement, and discharge of 1,005,000 gallons of groundwater and/or rainwater encountered during remedial activities;

- Backfilling of the excavation area with approximately 172,724 tons of backfill including screened backfill and surge stone. Surge stone was required in areas of the site where natural soils were not suitable for geotechnical requirements of the planned building. In those areas, certain native soils were removed and/or bridged with filter fabric and surge stone was installed beneath compacted gravel.

The site was redeveloped with state-of-the-art food processing protein plant.

### 351 Franklin Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The Remedial Investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. Exterior soil vapor sampling and an interior soil vapor intrusion (SVI) assessment was completed within one on-site building. A pre-design investigation included additional groundwater monitoring wells and gauging/monitoring levels of light non-aqueous phase liquid (LNAPL). As part of the remedial design, bench-scale studies will be completed to assess potential treatment options for grossly contaminated material (GCM), including assessment of Portland cement and other potential amendments (e.g., lime-kiln dust), at varying percentages by weight.

Remedial actions to be completed include:

- Excavation and reuse of the top one foot of SVOC- and arsenic-impacted soil under the cover system, and disposal of excess material;
- Excavation of non-GCM-impacted soil/fill that resides over the GCM and staging of the material on-site for reuse as backfill under the cover system;
- Excavation and disposal of approximately 16,000 tons of GCM-impacted soil/fill and completion of in-situ solidification (ISS) as needed to address GCM-impacted soil/fill at the water table, followed by backfill and site grading. After the completion of ISS mixing activities, the solidified soil will be allowed to cure for 28 days. After the mixture has cured, core samples will be collected from the solidified soil and post-treatment tests, including unconfined compressive strength (UCS), permeability testing and free liquid testing, will be completed to ensure that the solidified soil meets ISS performance requirements;
- Solidification of excavated soil, as needed, prior to disposal, based on landfill requirements;
- Removal and transferal of abandoned petroleum piping encountered during GCM excavation activities to a recycling facility and extraction and disposal of piping contents;
- Management of impacted groundwater and stormwater during remedial activities;
- Placement of a cover system across the entire Site;
- Installation of an active sub-slab depressurization (ASD) system in the newly constructed building during construction and completion of SVI sampling;
- Monitoring of groundwater level and LNAPL; and
- Removal of LNAPL via bailing or in-well pumps as needed from monitoring wells over time.

The site is planned for a redevelopment as a mixed use commercial and light industrial building.

# PROFESSIONAL PROFILE

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## EDUCATION

BS, Civil Engineering,
Manhattan College, 1991
ME, Environmental Engineering,
Manhattan College, 1994

## PROFESSIONAL LICENSES

Professional Engineer in New York

# Noelle M. Clarke, PE

## Principal Engineer

### EXPERIENCE SUMMARY

Thirty-five years' experience: Principal Engineer/Senior Engineer at Remedial Engineering, P.C./Roux; Project Engineer at Camp Dresser & McKee.

### TECHNICAL SPECIALTIES

Extensive experience with feasibility studies/alternatives analyses, pilot testing, remedial design, implementation, construction management, and startup evaluations for remediation of soil, groundwater, soil vapor and sediment. Phase I/Phase II Environmental Site Assessments (ESA). Soil vapor intrusion sampling, evaluation and mitigation at numerous sites. Extensive experience at brownfields redevelopment sites, including dozens enrolled in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), former industrial facilities, and public works facilities. Evaluation and design of storm water drainage systems. Evaluation, design, and construction management for new and existing wastewater treatment processes.

### REPRESENTATIVE PROJECTS

- **Principal Engineer for a Brownfield Redevelopment of a Property Adjacent to a Dry Cleaning Solvent Distribution Facility Under the NYSDEC BCP in Brooklyn, New York.** The site was previously a warehouse built on a former freight railyard that serviced the dry cleaning solvent facility with significant soil, groundwater, and vapor contamination with chlorinated VOCs (CVOCs). The site was developed into multifamily housing with first floor retail use and a subgrade parking garage. Pre-remediation and post-remediation Phase I ESAs were prepared by Roux, as well as an extensive remedial investigation (RI). The remedy, as summarized in the RAWP, consisted of soil hot spot removal down to 35 feet below grade, a physical barrier to limit on site groundwater migration, a permeable reactive wall to treat groundwater and mitigate offsite migration, and a sub slab depressurization system (SSDS). Roux, under the direction of Ms. Clarke provided full-time oversight of the remediation and prepared the Final Engineering Report (FER) and Site management Plan (SMP). The Certificate of Completion for the Site was obtained in October 2015, and Roux is currently providing post-remediation O, M&M and reporting services under the SMP.
- **Principal Engineer for a Renovation Project at an Affordable Housing Complex in the East Village, New York, New York.** Roux's client is partnered with NYCHA to renovate the site under the PACT program. The renovations will include envelope repairs; interior renovations to residential units and common areas; and exterior renovations to the landscaped areas, walkways, and common areas. Roux prepared and implemented a New York City Department of Environmental Protection (NYCDEP)-approved Phase II ESA Work Plan. Since the Site is located within 200 feet of subway/rail lines, Roux prepared New York City Transit Authority/Metropolitan Transportation Authority-required drawings for the Site to achieve a determination of no impact for subsurface activity prior to implementation of the investigation. Based on the results of the investigation, a RAP and CHASP were submitted to NYCDEP to detail the environmental procedures to be followed during the planned exterior renovations.
- **Principal Engineer Providing Due Diligence Support for Real Estate Transactions on Multiple Projects in the New York Metropolitan Area.** Projects have included multi-family housing (both affordable and market rate), retail/ commercial, community services and industrial properties. Services have included Phase I and Phase II ESAs.

- **Principal Engineer for a NYSDEC BCP Remediation Project at a Mixed-use Multifamily Housing/Neighborhood Retail Complex with a former On-site Dry Cleaner in Brooklyn, New York.** Significant soil, groundwater, and vapor contamination from CVOCs was present from the former on-site dry cleaner, as well as groundwater contamination from offsite dry cleaners. The remedy, described in the Remedial Investigation Report (RIR)/RAWP prepared by Roux, consisted of hot spot soil removal, in situ groundwater chemical oxidation treatment and SSDS for vapor mitigation in the existing building. The NYSDEC accepted the FER and SMP prepared by Roux and the Site received a Certificate of Completion from NYSDEC in 2016. Roux is currently providing post-remediation operation, maintenance and monitoring (O, M&M) and reporting services under the SMP.
- **Principal Engineer for the Investigation and Remediation of a Former Petroleum Refinery Under the NYSDEC BCP Located in Olean, New York.** The work included site investigation and preparation of an Alternatives Analysis Report (to document analysis of engineering options and remedy recommendation), RAWP and remedial design documents to address the environmental impacts associated with the historical operations. The selected remedy included excavation and on-Site reuse of 13,000 cubic yards of soil, excavation and off-Site disposal of 17,000 tons of soil, in-situ stabilization of 58,000 cubic yards of deep petroleum impacted soil and capping. The remediation work was completed in phases between 2022 and 2024, with an anticipated Certificate of Completion date in 2025.
- **Principal Engineer Environmental Consulting Services at the Baychester Houses and Murphy Houses Affordable Housing Developments in the Bronx, New York.** Roux's client, in partnership with NYCHA, is renovating and operating the developments under NYCHA's PACT program. Roux's work has included preparation of a Phase I ESA for each site, and closure of two underground storage tanks at Baychester Houses and one underground storage tank at Murphy Houses, including reporting related to the Sites' NYSDEC PBS registrations.
- **Principal Engineer for a NYSDEC BCP Remediation and Redevelopment Project of a Former Retail Service Station and Former Auto Dealership Site in Long Island City, New York.** Soil, groundwater, and vapor contamination exists from petroleum-related constituents across the former service station property (the petroleum source area), as well as historic fill across the entire site. The remedy, described in the RAWP prepared by Roux, consists of delineation sampling to define potential hot spots for excavation, installation of support of excavation and excavation of up to 10 feet of soil in the petroleum source area and other hot spots on-site, in-situ soil solidification (i.e., soil mixing) to a maximum depth of 34 feet below land surface in the petroleum source area, a site cover system, a vapor barrier and an active sub-slab depressurization system.
- **Principal Engineer for a Complex Dredging Project for a Major Petroleum Company Under the NYSDEC Spills Program on the Allegheny River, New York.** The goal of the project was to remove 1,000 tons of petroleum impacted sediments from the river. Work included Site investigation, remedial investigation, alternatives evaluation, remedial design, planning and extensive regulatory permitting with multiple federal, state, and local agencies. It also included relocation and monitoring of endangered mussels from the work area. The remediation work was completed in 2021.
- **Principal Engineer for two Adjoining Multifamily NYSDEC BCP Redevelopment sites in Mott Haven, Bronx, New York Along the Harlem River.** Project includes characterization, excavation, and disposal of over 40,000 tons of soil, support for obtaining a SPDES discharge permit for construction water and a site-wide cover system. Project tasks include community air monitoring, shoreline permitting, and construction monitoring while minimizing cost impact by sharing resources between both projects. Certificates of completion were received in 2020 and 2020 and Roux is providing post-remediation monitoring and reporting services.
- **Principal Engineer at a Former Metals Manufacturing Site Under the NYSDEC Voluntary Cleanup Program (VCP) in Staten Island, New York.** Principal Engineer for the alternatives evaluation, remedy selection, regulatory negotiation, preparation of design documents (drawings, specifications, and permit applications) and permitting for all remedial components in support of redevelopment at a former metals manufacturing site. The remedy included dredging and on-site disposal of stream sediments; consolidation and capping of fill material across the site; in-place abandonment of the Site's former sewer system; installation of drainage swales for storm water management; and wetland bank stabilization and mitigation/restoration. Required permits and regulatory approvals for the project included a Joint Permit from the USACE and NYSDEC; a NYSDEC SPDES equivalency permit for discharge of treated water to the Arthur Kill, a New York State Department of State Coastal Management Program (CMP) Federal Consistency Assessment; a New York City Waterfront Revitalization Program Consistency Assessment, a modification of topography authorization from New York City Department of City Planning; and a New York City Department of Environmental Protection permit for temporary discharge to a combined sewer. Also required by the USACE and National Marine Fisheries, was preparation of an Essential Fish Habitat Study, in support of the Joint Permit application. Permitting activities included preparation of the various permit

applications, forms and supporting documentation, as well as follow up meetings and correspondence to finalize the authorizations.

- **Principal Engineer for the Design, Bidding, Contractor Selection, and Remedial Construction Phase at a Former Metals Manufacturing Facility under the NYSDEC VCP in Staten Island, New York.** Responsibilities included finalizing biddable construction documents, issuing to bidders, preparing addenda, and evaluating bids for presentation to the client. Following contractor selection Roux was heavily involved in coordinating with the client, regulators, and contractor for mobilization to the site in late 2006. During the construction Ms. Clarke provided support to the on-site construction manager regarding field changes, design revisions to account for unexpected conditions and contractor questions. The Final Engineering Report summarizing the construction activities was accepted by NYSDEC.
- **Principal-in-Charge of an Investigation And Remediation Project at a Former Petroleum Refinery and Current Distribution Facility in Buffalo, New York.** The site entered the NYSDEC BCP in 2006. Roux completed the BCP application and supported the application process. The work included assessing and remediating the potential environmental impacts associated with historical Site operations. These activities have included preparing multiple work plans and directing the activities of another consultant performing the fieldwork and preparing reports of results for field investigations including soil boring and sampling, well installation and groundwater sampling, aquifer pump testing, and groundwater/separate phase modeling. An in situ chemical oxidation system was designed, installed, and was operated as an IRM to remediate an area of free product and impacted groundwater discharging to the Buffalo River in OU-4.
    - For the same petroleum Site in Buffalo, New York, multiple Alternatives Analysis Reports (to document analysis of engineering options and remedy recommendation), Remedial Action Work Plans and remedial design documents have been prepared to address the environmental impacts associated with the five Operable Units (OU) on the Site. Remedial construction for OU-1 was completed in 2007 and included excavation and disposal of impacted soil. The Final Construction Certification Report for OU-1 was accepted by the NYSDEC. The Alternatives Analysis Report and Remedial Design for OU-4 were submitted and approved by NYSDEC. The remedy for OU-4 included excavation and on-site consolidation of river sediments and site soil, stabilization of 1,400 linear feet of river embankment using tiered slopes, rip rap, and reinforced bioengineering, slurry wall groundwater containment, low permeability capping, a stormwater collection system and constructed wetland treatment for stormwater. Various vegetative measures were incorporated into the design in order to promote vegetative growth and enhance wildlife habitats. The remedial construction was completed in 2013 and 2014, and preparation of the Final Construction Completion Report was completed in 2015. The Alternatives Analysis Reports for OU-2 and OU-3 were submitted to NYSDEC. For OU-2, bench scale studies of stabilization/solidification agents were completed and evaluated for treatment of lead and petroleum impacted soil. In addition, field pilot studies of multiple options to treat petroleum impacted soils were completed and evaluated. Design of a stormwater collection system for portions of OU-2 and OU-3 was completed in 2010, and construction was completed in 2014 under the direction of Ms. Clarke.
    - For the same petroleum terminal in Buffalo, New York, the work also included performing activities related to the operation of the remediation systems at the Site. These activities have included preparing a feasibility study work plan for improving water management systems at the site; preparing a work plan, directing the field work, and preparing an evaluation summary report for startup and testing of a portion of the groundwater extraction system at the Site; and assisting in preparation of plans to upgrade the existing treatment facilities at the Site.
    - For the same petroleum terminal in Buffalo, New York, the work also included preparation of design documents and a completion report for in-place closure of the site's former in-ground oil water separator. In addition, a vapor enhanced extraction pilot study work plan was prepared and implemented at the site for recovery of separate-phase product in one portion of the site located adjacent to the Buffalo River. The results of the VER pilot testing, along with the results of chemical oxidation pilot testing conducted at the site, have been summarized in a Remedial Action Selection report, which recommended implementation of chemical oxidation in this portion of the site. A conceptual plan for implementation of chemical oxidation was submitted with the selection document. The work also included maintaining contact with regulatory agencies regarding the status of activities at the Terminal; preparing compliance monitoring reports for submittal to the regulatory agencies; overall project coordination; and budget management and tracking.
- **Principal Engineer for the Investigation, Design, and Implementation of a Soil Remediation Project at a 4-acre Former Oil Terminal Under the NYSDEC Spills Program in Cold Spring Harbor, New York.** The remedy completed included excavation and offsite disposal of approximately

20,000 tons of petroleum contaminated and/or hazardous lead contaminated soil in accordance with the future use of the site under an Environmental Easement. Additional activities completed by Roux at the site included asbestos remediation followed by building demolition, UST removal, and cesspool remediation. Roux prepared a Final Engineering Report, which was accepted by NYSDEC and resulted in the closure of the spill number for the Site.

- **Principal Engineer for the Investigation, Design, and Implementation of a Soil Remediation Project at a Portion of a Former Oil Terminal in Sag Harbor, New York.** The remedy completed included excavation and offsite disposal of approximately 2,000 tons of petroleum contaminated soil from beneath an active public roadway under the NYSDEC spills program. The remedy included extensive traffic control and coordination with Village of Sag Harbor officials, dewatering, water treatment, temporary water discharge of treated water to Sag Harbor and restoration of the public roadway in accordance with the Village of Sag Harbor Department of Public Works requirements. Roux prepared a Final Engineering Report, which was accepted by NYSDEC and resulted in the closure of the spill number for the Site.
- **Principal Engineer for Brownfield Redevelopment of a Former Retail Service Station Site Under the NYSDEC BCP in Staten Island, New York.** There was soil, groundwater, and vapor contamination from petroleum-related constituents in the vicinity of the former gasoline piping and pump island (the petroleum source area), as well as historic fill across the entire site. The remedy, described in the Remedial Action Work Plan prepared by Roux, consisted of a sealed sheet pile containment wall around the petroleum source area, a Site Cover System across the entire site, comprised of concrete building slab/walkways, asphalt parking areas and limited landscaped areas and a sub-slab depressurization system to prevent vapor intrusion into the retail building. A certificate of completion from NYSDEC was obtained in 2020. Roux provided post-remediation operation, maintenance and monitoring (O, M&M) and reporting services under the SMP from 2020 to 2023.
- **Principal Engineer for the Investigation, Remedial Design, Construction Oversight and Operation and Maintenance of a Bioventing and Soil Vapor Extraction System at the Site of a Diesel UST Failure in Brooklyn, New York.** A free product recovery system was also designed, installed, and operated by Roux. Investigation activities included the use of the sonic drilling technique to advance twelve wells to 85 feet below grade through cobbles and boulders for delineation of separate phase product, soil, and groundwater impacts. Eight wells were converted to combination biovent/SVE wells. Design included specification of SVE and biovent blowers, piping, valves, and an automatic control system. Product only pumps were also designed and installed in three wells. Approximately 2,000 gallons of product were recovered by the two systems and the spill was closed by NYSDEC in 2011.
- **Principal Engineer for the Design and Specification of a Large-scale (750 scfm) Soil Vapor Extraction (SVE) Pilot System with Thermal Oxidation Off-gas Treatment for a Client in Brazil.** Responsibilities included equipment sizing and specification, selection of materials of construction, SVE well and equipment layout, description of general startup procedures and preparation of a pilot test work plan. The pilot test work plan included a description of the pilot test operating procedures to be followed, operating parameters to be monitored and data to be collected and analyzed. The work also included conducting the pilot test activities and generating a report that included plans for expanding the SVE system across the Site. The work also included technical support for evaluating and optimizing system performance.
- **Principal Engineer for the Design of a New Storm Water Collection System for a Metals Manufacturing Site Under the NYSDEC VCP in Staten Island, New York.** The design included evaluation and hydrologic modeling of the system using the USG Soil Conservation Service TR-55 hydrologic analysis model, inlet structure and pipe sizing and layout, outfall design and specification of materials and methods of construction for all system components.
- **Principal-in-Charge of the Operation, Maintenance, Monitoring and Reporting Activities at Multiple Active and Former Petroleum Storage and Distribution Terminals for a Large Petroleum Company, New York.** All sites have open NYSDEC spill numbers. The work includes operation, maintenance, and performance/compliance monitoring services at the sites that currently have active remediation systems installed and monitoring, sampling, and reporting services at sites without systems. The remediation systems include groundwater extraction and treatment, free product recovery, bio-sparging, and soil vapor extraction/air sparging. At these sites, Roux is responsible for: maintaining and troubleshooting the various system components to reduce downtime to the extent possible; repairing and/or replacing equipment as needed; coordinating the upgrading of the electrical systems, as needed, to meet current building code requirements; expanding systems to meet regulatory requirements, as needed; optimizing system performance; collecting performance monitoring samples and data to track the efficiency of the treatment systems; and collecting compliance monitoring data.
- **Principal Engineer for at Multiple Petroleum Terminals in New York State for Groundwater Quality and Surface Water Quality Sampling and Monitoring Well Gauging as Required**

**by the NYSDEC, as well as Quarterly Reporting for all Sites Under the NYSDEC Spills Program, New York.** The work has also included collection of soil quality data at several sites and performance of an electromagnetic survey to support the divestiture and redevelopment of one of these sites. Based on these results, soil removal activities were performed at one of the former terminals in order to obtain regulatory closure of the site. Roux successfully completed the remedial activities to the satisfaction of the regulator and received closure for the client of the open spill number. Regulatory closure of another of these former terminals was obtained based upon the results of ongoing groundwater monitoring and reporting.

- **Project Manager for the Remedial Design at a Superfund Site for the New York State Department of Environmental Conservation in Nanuet, New York.** The work included preparation of a preliminary design report, which evaluated two alternatives for handling hazardous soils and sediments at the site contaminated with volatile organic compounds. Each alternative was evaluated on the basis of technical feasibility, cost and schedule for implementation. Based upon this evaluation, off-site disposal was recommended over on-site treatment. The report presented a site-wide conceptual plan for remediation, including soil/sediment excavation, staging and sampling; stream diversion; excavation dewatering; temporary on-site groundwater treatment; and long-term monitoring. Duties also included managing and tracking all project budgets and serving as the main client contact.
- **Project Manager for Preparation of a Work Plan, Direction the Field Activities and Preparation of a Summary Report for Investigation of the Storm-water Collection System at a Petroleum Terminal in Buffalo, New York.** The objectives of the storm sewer investigation were to: prepare a detailed map of the Site's sewer system; re-establish connections that may have become blocked by debris; investigate the structural integrity of the storm sewers; locate areas of groundwater infiltration and assess infiltration rate and quality; assess wet and dry-weather flow and quality; and identify areas contributing surface water to the collection system, including hydrologic modeling using TR-55. Based on the results of the investigation, several improvements to the sewer system were recommended, including eliminating inlets to the system in areas of the site where no active operations currently take place and rehabilitation and/or installation of new sewers to restore flow by gravity to the treatment system.
- **Project Manager for a storm sewer study at the Former Metals Manufacturing Facility in Staten Island, New York.** Project Manager as part of the Voluntary Cleanup Program for the Site to identify contaminated infiltration sources, provide an accurate site drainage map, and verify contributing areas to each outfall. The investigation included field inspections, surveying, dye testing, and sampling during varying tidal conditions. The storm sewer map prepared was used for future sewer closure and site redevelopment planning.
- **Project Engineer for Design of a 2.6-mgd Groundwater Treatment System at the Fireman's Training Center for Nassau County Department of Public Works on Long Island, New York.** The work included design of air strippers, exhaust stacks, liquid-phase GAC treatment units, and all chemical feed and storage facilities, including unit sizing, selection of materials of construction, equipment layout, and coordination with other disciplines. The work also included the development of the "mass balance" for the facility.
- **Task Leader in Charge of Overseeing A Bioventing Pilot Study Conducted by a Subconsultant, to Treat Contaminated Vadose Zone Soils at the Fireman's Training Center Site in Nassau County, New York.** The work included development of a preliminary design report for the full-scale implementation of bioventing at the site based upon the results of the pilot study.
- **Project Engineer for the Design, Specification, Construction, and Operation of an Air Sparging and Soil Vapor Extraction Pilot at the Terminal of a Large Petrochemical Distributor, Long Island, New York.** The pilot was designed to treat contaminated ground water and vadose zone soils resulting from a one-million-gallon gasoline spill at the site. The work included development of the field sampling program and sampling and evaluation of various parameters to determine the pilot's radius of influence and effectiveness. The work also included performing data analysis and preparation of the pilot study report, which recommended full scale implementation of air sparging at the site. The site-wide implementation of air sparging and expansion of the site's existing vapor extraction system at the same Long Island petrochemical terminal was also part of the work. Responsibilities included design, specification, and layout of all mechanical equipment, vapor extraction, and air sparging wells and new vapor extraction/air sparging piping.
- **Project Engineer for the Design of a 0.50-mgd Groundwater Treatment Facility at a Petrochemical Terminal, Long Island, New York.** Responsibilities included the design, specification, and layout of mechanical equipment, including the air stripping tower, vapor phase granular activated carbon off-gas treatment, centrifugal blowers, ductwork, influent pump, and concrete wet well. Responsible for shop drawing review during the construction phase.
- **Project Manager for an Investigation at a Gasoline Service Station with Soil and Groundwater Contamination.** Responsible for reviewing and evaluating the work of another consultant that performed the soil and groundwater sampling

and conducted remedial activities at the site including investigation summary reports; remedial designs; remediation progress reports; correspondence with regulators; and plans for future work at the Site. The work also included mapping the groundwater flow patterns in the area of the service station and mapping the aerial and vertical extent of the groundwater contamination. Responsible for project coordination and budget management and tracking.

- **Project Manager for the Field Investigation, Feasibility Study, and Remedial Design at NYSDEC Superfund Site as a Standby Contractor to NYSDEC in Spring Valley, New York.** The work included the development of a work plan and site operations plan. The field investigations included Geoprobe soil borings; groundwater monitoring well installation; groundwater sampling; aquifer pump testing; and vapor extraction pilot testing. Work also included conducting the field operations for the vapor extraction pilot and producing a summary report of the field investigation results. The report presented an evaluation of the cost and feasibility of several alternatives for remediation of the site. It recommended reducing the level of effort of the remediation presented in the Record of Decision, based on lower levels of contamination encountered during the investigation. Duties also included project coordination, budget management and tracking, and development of subcontract agreements.
- **Project Engineer for Upgrades to the Spring Creek Auxiliary Water Pollution Control Plant for the City of New York.** The work included the evaluation, design, and specification of a two-stage odor control system, chemical storage and feed facilities and new effluent disinfection system.
- **Project Engineer Responsible for Preparation of Design Documents for the Replacement of the Sodium Hypochlorite Pumps and Piping at the Mamaroneck Wastewater Treatment Plant for Westchester County Department of Environmental Facilities in New York.**
- **Project Engineer for Design of Upgrades to the New Rochelle Wastewater Treatment Facility for Westchester County Department of Environmental Facilities in New York.** Designed upgrades to the main influent pump station, including rehabilitation of the existing influent pumps and replacement of the magnetic drives with new variable frequency drives. Responsibilities also included design of a submersible automatic duplex sump pump system, new primary sludge pumps and piping and new primary and secondary settling tank equipment. The work also included assisting the County during the bidding and contractor selection phase and preparing addenda to the contract documents.
- **Project Manager for the Construction of Upgrades to the Wastewater Treatment Facility in New Rochelle, New York.** Responsibilities included overseeing the shop drawing logging and distribution process; reviewing mechanical equipment shop drawings; addressing contractor questions regarding the contract documents; and coordinating with the resident engineer in the field and the electrical and general contractors.
- **Project Engineer for the Performance Evaluation of the Harriman Wastewater Treatment Plant for the Orange County Department of Environmental Facilities and Services, New York.** Responsibilities included documentation of the existing conditions at the plant and evaluation of the historical and current performance of the plant with respect to its potential for expansion. A summary report was prepared, which included evaluations of the existing plant processes with respect to standard design criteria, typical design practices and receiving water considerations. This summary report served as the basis for the facilities plan, prepared as the next phase of the project.
- **Project Engineer for the Facilities Plan for the Upgrade of the Harriman Wastewater Treatment Plant, New York.** Responsibilities included evaluation of alternatives for expanding the plant's treatment capacity. A report was prepared, which recommended the conversion of the existing oxidation ditches to sequencing batch reactors (SBR) in order to increase the plant's treatment capacity to 6.0 mgd within the limited space available on the site.
- **Project Engineer for the Gates-Chili-Ogden Pump Station and Force Main Design for Monroe County, New York.** The design consisted of a new 36 mgd wet pit/dry pit pump station, influent sewer, and force main. Responsibilities included evaluating influent pumping conditions, and design of the influent sewer, manual influent bar racks and a duplex automatic submersible sump pump system for the station.
- **Project Manager for the Flow Augmentation Needs Study (FANS) for Suffolk County Department of Public Works, New York.** Responsibilities included coordinating and implementing the annual wetland monitoring effort for collection of data to characterize the vegetation communities and surface water and groundwater conditions at four freshwater wetland sites in Suffolk County. Duties also included maintaining a database of all vegetation data collected; developing and refining equations to characterize the groundwater table and wetlands vegetation in all monitoring areas; evaluating potential impacts of sewering on sensitive wetlands; and evaluating the need for any mitigation of these sites as triggered by vegetation changes correlated to groundwater drawdown.

Responsibilities also included coordinating the production of a draft and final annual monitoring report summarizing the findings of the program.

**PRESENTATIONS**

*Sparging Targets Submerged Residual Saturation Contamination*, written with D. Bennett and L. Buchanan. Presented at the 66th New York Water Environment Federation Association Annual Meeting, New York, New York, February 1994.

*Suffolk County Wetlands – Flow Augmentation Needs Study*, written with M. A. Taylor and R. Southard. In Proceedings of the Annual Meeting, Hydrology and Hydrogeology of Urban and Urbanizing Areas. American Institute of Hydrology, April 1996.

# PROFESSIONAL PROFILE

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**EDUCATION**
BS, Geology University of Massachusetts, Amherst, 2006

**PROFESSIONAL LICENSES**
Licensed Site Professional Association (Associate)

## Eric Runstrom

### Senior Geologist I | Project Manager

**EXPERIENCE SUMMARY**
Mr. Runstrom has eighteen years of experience, including Senior Geologist I and Project Manager (2019-Present), Project Geologist (2013-2019), Staff Geologist (2011-2013) at Roux; and Geologist at Sovereign Consulting Inc. (2006-2010).

**TECHNICAL SPECIALTIES**
Mr. Runstrom's technical specialties include designing and implementing environmental remediation projects, conducting environmental site assessments and environmental due diligence. Focus on management of comprehensive site investigations including environmental assessment and risk characterization; evaluation of remedial alternatives; development and implementation of remedial work plans; regulatory reporting and permitting; quality control; and health and safety compliance. Mr. Runstrom has extensive experience managing site assessment, remedial construction and soil excavation projects including management of subcontractors, data collection and waste characterization and management. Mr. Runstrom also has experience with wetland regulations & sensitive resource area permitting for oil and gas industry rights-of-ways in MA, CT, RI, and NJ.

**REPRESENTATIVE PROJECTS**

- **Senior Project Manager, Major Oil Company.** Managed and oversaw remedial action and monitoring work scopes at a former refinery and active petroleum bulk storage facility in accordance with a Remedy Implementation Plan (RIP). The RIP addressed 8 Areas of Concern (AOCs) across the terminal and included soil excavation, use of engineered barriers and site controls, and passive and active LNAPL recovery. Short term response actions were conducted concurrently with ongoing comprehensive remedial actions in response to spills and/or release typically as either Release Abatement Measures (RAM) or Immediate Response Actions (IRA). Responsibilities involved the scheduling and coordination of RIP, RAM, and/or IRA activities with the client, terminal personnel, and subcontractors. Also prepared associated work scopes and budgets and assisted with the overall regulatory strategy for the site.
- **Senior Project Manager, Major Oil Company, Everett, Massachusetts.** Developed and implemented environmental assessment work plans for the assessment and delineation of petroleum hydrocarbons and metals (primarily lead and organic lead) impacted areas for a former refinery and active petroleum bulk storage facility. Managed development of updated site risk characterization and selection of remedial action alternatives to advance site towards permanent solution.
- **Project Manager, Major Oil Company.** Developed and managed a LNAPL investigation at a former refinery and active petroleum bulk storage facility. Work included delineation of 8 different plumes, advancement of over 50 soil borings, installation of over 40 monitoring wells, collection of over 100 soil samples and gauging and sampling of monitoring wells. Evaluated collected data and historical data to develop remedial action plans to address each LNAPL plume and advance site towards permanent solution.
- **Project Manager, Major Oil Company.** Developed and oversaw investigation and rehabilitation of storm water system structures and piping (SWS) for a former refinery and active petroleum bulk storage facility. Included remote video survey of approximately 2,500 feet of SWS to evaluate structural integrity of the stormwater system, identifying where petroleum seeps were infiltrating into the network, and implementing appropriate remedial response measures. Major activities included use of line jetting equipment to clean SWS and excavation activities to facilitate repair and abandonment of SWS, and associated

management and disposal of impacted soils and sediments. Included the oversight of subcontractors performing permit required CSEs with Marine Chemist certs.

- **Project Manager, Major Oil Company, Upstate New York.** Managed and oversaw soil excavation and abandoned subsurface pipeline cleaning and removal activities at 9-acre NYSDEC Brownfields Cleanup Program Site, located on one of the first oil storage and refining centers in the Northeast. Project included the removal and disposal of over 5,000 cubic yards of impacted soil and over 1,500 linear feet of piping. Work included planning and implementation of engineering and trenching protective system designs, development of soil excavation and pipe removal plans, confirmatory endpoint sampling plan, and waste management plan including steps to minimize and control dust, vapors, and odors.
- **Project Manager, Major Oil Company.** Developed and oversaw large scale survey and confirmatory testing of over 8,500 linear feet of suspected asbestos insulated pipelines. Project included planning and implementation of work plans to abate and dispose of approximately 3,000 linear feet of asbestos insulation. Work including several elevated work areas requiring the use of scaffolding and aerial lifts to safely access work areas in accordance with OSHA requirements. Included the management and oversight of subcontractors performing asbestos abatement and confirmatory testing activities, and proper management and disposal of asbestos containing waste.
- **Senior, Project & Staff Geologist, Phase I Environmental Site Assessments.** Conducted, oversaw, and managed multiple Phase I Environmental Site Assessments in accordance with ASTM E1527-13 throughout New England for due diligence of commercial and industrial facilities, and residential buildings. Associated activities included agency contact, database management and interpretation, site inspections, identification of recognized environmental conditions (RECs), and report preparation. Based on Phase I findings, provide recommendations to clients, legal counsel, and lenders on potential liabilities and, and recommendations for additional due diligence.
- **Staff Geologist-Project Manager, Major Oil Company, Pipeline Facilities.** Provided technical support for securing over 100 wetland and various construction and access permits (state, local, federal). Developed risk reduction plans, engineering design for stream & RR crossings. Work scopes included assisting with foreign lines, dent, and corrosion anomalies. Conducted site walks and oversaw wetland delineation activities, corresponded with state, local and federal agencies, and presented at local Conservation Committees to obtain required permits. Permits include CWA Order of Conditions, DOT access, road opening, NHESP VMP & OMP, Water Quality Cert., and US Army Corp.
- **Staff Geologist, Petroleum Product Bulk Storage and Distribution Facility, East Providence, Rhode Island.** Conduct field tasks such as groundwater monitoring and sampling, contractor oversite and management, product recovery system operation & maintenance. Responsible for remedial system sampling and maintenance, surface/groundwater treatment system sampling and repairs, and groundwater monitoring and sampling. Conducted groundwater product recovery & pump maintenance as well as hazardous waste inspections of waste recovery systems/ containers and the storm sewer & remedial system inspections.
- **Staff Geologist, Petroleum Bulk Storage and Distribution Facility, East Providence, Rhode Island.** Oversaw the installation of an Engineered Natural System (ENS) to treat shallow groundwater and surface water in East Providence, Rhode Island. Provided oversight of installation of permeable reactive barrier, subsurface flow constructed treatment wetland, and contingency treatment system. Work was completed to fulfil the requirements of the Rhode Island Department of Environmental Management.
- **Staff Geologist, Shipping Freight Facility Inspections, multiple locations, Massachusetts/Rhode Island/New Hampshire.** Provided stormwater permitting to multiple facilities throughout New England. Coordinated and conducted inspections of facilities. Prepared stormwater pollution prevention plans (SWPPPs) and Stormwater Management Plans (SWMPs) in accordance with Federal and state industrial discharge permits.

**PROFESSIONAL TRAININGS**

OSHA 29 CFR 1910.120 40-Hour Safety Training

OSHA 29 CFR 1910.120 8-Hour Annual Refresher

OSHA Excavation and Trenching Safety Regulations

Confined Space Safety Training

DOT HM-181/126F Certificate

Red Cross Certified, First Aid and CPR

Loss Prevention System Training

# PROFESSIONAL PROFILE

**CONTACT INFORMATION**
Main: (716) 856-0599
Direct: (716) 713-3937
Email: Nsuraci@rouxinc.com
Website: www.rouxinc.com

2558 Hamburg Turnpike
Suite 300
Buffalo, NY 14218


**EDUCATION**
Bachelor of Science,
Environmental Geoscience,
State University of New York
at Buffalo, 2015

## Nicholas Suraci

### Project Scientist

**EXPERIENCE SUMMARY**
Mr. Suraci has Over 9 years professional experience in environmental engineering, science and consulting at numerous contaminated sites throughout the northeast United States as a Project Scientist (Roux Environmental Engineering and Geology, DPC July 2023 to Present) and as an Environmental Scientist (TurnKey Environmental Restoration, LLC January 2016 to July 2023).

**TECHNICAL SPECIALTIES**
Mr. Suraci is an expert in brownfield and hazardous waste site investigation and remediation; petroleum-impacted site remediation; due diligence for environmentally impaired properties; solid waste facility construction management, water treatment and management, and construction quality assurance monitoring and testing. He holds a BS in Environmental Geoscience from the University at Buffalo. Mr. Suraci has completed assessments, investigations and remediation projects on properties with a multitude of historic uses (e.g., petroleum storage refineries and terminals, gas stations, automobile dealerships, rail yards, foundries, dry cleaners, steel manufacturing, metal plating operations, junk yards), media types (surface and subsurface soil, groundwater, waste water, sediments, soil vapor, indoor air, building materials) and contaminants (e.g., volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), heavy metals, per- and polyfluoroalkyl substances (PFAS)). Mr. Suraci has completed a variety of remediation projects, ranging from simple underground storage tank (UST) removals to large-scale soil excavations, in-situ soil stabilization, water treatment system maintenance, and complex groundwater remediation programs, such as biological and/or chemical in-situ groundwater treatment and permeable reactive barriers for VOCs.

**REPRESENTATIVE PROJECTS**
**6804-6812 Main Street, Cherry Creek, New York**
Managed and oversaw underground gasoline storage tank system closure activities completed as part of fuel station upgrades for an existing gasoline station facility with significant soil and groundwater impacted with volatile organic compounds. The remediation approach included:

- Removal of four underground storage tanks, including all associated dispensing units and underground product piping.
- Soil excavation and disposal of approximately 2,060 tons of petroleum-impacted soil.
- Operation and management of a groundwater treatment system including filtration, multiple settling tanks, granular carbon treatment, and municipal sanitary sewer discharge of a total of 210,000 gallons of treated water. The groundwater treatment system was maintained in accordance with NYSDEC as well as local municipality regulations.

**Former Westin Truck Stop 4925 West Henrietta Road, Rochester, New York**
Managed and oversaw underground gasoline storage tank system closure activities completed as part of fuel station upgrades for an existing gasoline station and truck stop facility with significant soil and groundwater impacted with volatile organic compounds. The remediation approach included:

- Removal of five underground storage tanks, including all associated dispensing units and underground product piping.
- Soil excavation and disposal of approximately 3,235 tons of petroleum-impacted soil.
- Operation and management of a groundwater treatment system including filtration, multiple settling tanks, granular carbon treatment, and municipal sanitary sewer discharge of a total of 9,500 gallons of treated water. The groundwater treatment system was maintained in accordance with NYSDEC as well as local municipality regulations.

**2970 West Henrietta Road, Rochester, New York**
Managed and oversaw underground gasoline storage tank system closure activities completed as part of fuel station upgrades for an existing gasoline station and car wash facility with significant soil and groundwater impacted with volatile organic compounds. The remediation approach included:

- Removal of eight underground storage tanks, including all associated dispensing units and underground piping.
- Soil excavation and disposal of approximately 1,143 tons of petroleum-impacted soil.
- Operation and management of a groundwater treatment system including filtration, multiple settling tanks, granular carbon treatment, and municipal sanitary sewer discharge of a total of 25,081 gallons of treated water. The groundwater treatment system was maintained in accordance with NYSDEC as well as local municipality regulations.

**1841 Empire Boulevard, Webster, NY**
Managed, installed, and operated a temporary car wash wastewater pit bypass and treatment system during wastewater pit upgrade activities. The System consisted of a pump and multiple filtration socks. The treated water was discharged directly to the municipal sanitary system.

**500 South Union Street Site**
Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former dry cleaning facility in Spencerport, New York. The investigation included a hydrogeologic assessment, including exterior and interior soil borings, test pits and monitoring well installation, development and sampling, soil vapor testing and hydrogeologic assessment to design the in-situ groundwater treatment program. Remedial Action included:

- Installation of an active subslab depressurization system within the existing building to prevent migration of vapors into the building air.
- In-situ injection of treatment agent at 71 injection points located across the Site to enhance natural biodegradation of cVOCs in groundwater.
- Limited excavation and off-Site disposal of surface soil/fill exceeding commercial use soil cleanup objectives.
- Construction and maintenance of a soil cover system consisting of the existing building, pavement (asphalt), sidewalks, and soil cover in all other areas at a minimum of one foot thick over the demarcation layer, to prevent human exposure to remaining contaminated soil/fill remaining at the Site; The site is currently used as a multi-tenant commercial facility.

**229 Homer Street Site**
Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major petroleum storage facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as a soil vapor intrusion assessment. Remedial Action included:

- Approximately 5,815 tons of grossly contaminated soil GCS-impacted soil/fill was excavated and transported off-site for disposal at a commercial landfill.
- Approximately 1,946 linear feet of subsurface metallic product piping was exposed, tapped, evacuated of contents, removed, cleaned and recycled. Piping which extended beyond the property boundary was capped and/or grouted at the property line.
- Approximately 19 tons of piping was recycled as scrap metal. Cleaning of the pipes generated 4 drums of pipe scale, oil and water, which was transported off-site for incineration.
- Design, installation and operation of an air sparge/soil vapor extraction (AS/SVE) system to address GCS in the deeper soil/fill from approximately 5 to 15 fbgs and in the upper 5 ft of the water table (i.e., smear zone). The air sparge portion of the system includes 53 injection wells connected to an air compressor in a climate-controlled trailer via individual 1" polyethylene lines. The SVE system includes 14 extraction wells connected by 2" polyethylene lines to one of two blowers in a separate climate-controlled trailer. Emissions from the SVE system are controlled using a biofilter, which allows naturally occurring microbes to bioremediate the air stream and control the nuisance odors from the AS/SVE system.
- Construction and maintenance of a site cover system.

# PROFESSIONAL PROFILE

## Alex Wirth

### Technical Director


**CONTACT INFORMATION**
Main: (585) 895-6800
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2850 Clover Street, Suite 3
Pittsford, NY 14534


**EDUCATION**

BS, Earth Science, Geology/Environmental Science, State University of New York College at Buffalo

**PROFESSIONAL TRAININGS**

OSHA 40-hour certified
OSHA 8-hour current
NYSDEC SWPPP Qualified Inspector
DOT Operator Qualification certified
Loss Prevention System certified

**EXPERIENCE SUMMARY**

Mr. Wirth is an experienced, proficient, and analytical engineering professional focused on providing progressive technical and management solutions. He encompasses over twenty-two years of project management experience; excellent knowledge in conceptual engineering, construction, planning, litigation support, settlement negotiations, design and cost estimating; proven interpersonal skills; and a superior record of financial management. He holds a BS in Earth Science and Geology from the State University of New York College at Buffalo. He is currently a Technical Director for Roux (2025-present). His past experience includes Principal/Senior Geologist at Rocterra, LLC (2011-2025), Contract Project Manager/Senior Geologist at Greenstar Environmental Solutions (2011-2025), Project Manager/Senior Geologist at Kleinfelder (2003-2015; 2018-2025 Part Time/Flex).

**TECHNICAL SPECIALTIES**

Mr. Wirth has conducted, managed or overseen investigations and remediations at many sites located across the Northeast and has experience within the Industrial, Pharmaceutical, Oil & Gas, and Brownfields/Real Estate markets. Mr. Wirth's areas of expertise include contaminant investigation and remediation, brownfield redevelopment, litigation technical support, and settlement negotiations.

**REPRESENTATIVE PROJECTS**

- Provided project management, investigation, remedial design, operation and optimization, litigation support, third-party oversight, and monitoring at a pharmaceutical manufacturing facility with a chlorinated solvent plume.
- Provided on-site management for the decommissioning of a landfill facility in New York. Activities included ongoing maintenance and long-term monitoring for PFAS, heavy metals, and PCB litigation support.
- Provided brownfield investigation, remediation, monitoring and responsible party settlement negotiations at multiple sites in New York.
- Provided third-party oversight and litigation support for a major petroleum release site including residential indoor air emergency response measures.
- Provided review and optimization of existing process engineering systems via mechanical and/or technology-based improvements, providing value-added services and engineering design solutions across sites in New York, New Jersey, and Pennsylvania.
- Provided litigation support for critical Environmental Impact Statement (EIS) and State Environmental Quality Review Act (SEQR) evaluations at an environmentally sensitive development site in New York.

# PROFESSIONAL PROFILE

**CONTACT INFORMATION**
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200 Summit Drive, Suite 500
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**EDUCATION**

PhD, Environmental Engineering, University of California, 2001
MS, Environmental Science (concentration in environmental chemistry), Indiana University, 1993
BA, Biochemistry, University of Texas, 1991

## James Hauri, PhD

### Senior Scientist I

**EXPERIENCE SUMMARY**

Dr. Hauri is a broad-based environmental scientist with more than twenty years of experience in environmental science, engineering, and chemistry. His professional experience includes Roux, Senior Scientist I (2022–Present); Assumption University, Associate Professor (tenured), (2007–2012, 2014–2022) and Assistant Professor (2001–2007); Exponent, Senior Scientist (part-time: 2014–2015; full-time: 2012–2014); Harvard University, School of Public Health, Visiting Scientist (part time: 2008–2012); CH2M-Hill, Environmental Consultant (2001); San Francisco Estuary Institute, Intern, (1997–1998); and Southwest Research Institute, Scientist (1993–1994).

**TECHNICAL SPECIALTIES**

Dr. Hauri's multidisciplinary background has included field sampling, environmental analytical chemistry, toxicity testing and data analysis. Much of his work has explored the nexus between the chemistry and ecotoxicity of environmental contaminants.

Dr. Hauri's areas of expertise include:

- Heavy metal speciation and toxicology;
- Environmental data analysis and validation;
- Analysis of ecotoxicology data; and
- Aquatic chemistry and contamination.

**REPRESENTATIVE PROJECTS**

**Chemistry and Toxicology**

- **Deep Water Horizon Oil Spill.** Evaluated the appropriateness of new methods to solubilize oil used with toxicity tests during the DWH spill. Compared the composition and concentration changes in polycyclic aromatic hydrocarbons (PAHs) associated with the new preparatory methods with field collected samples in order to determine if the toxicity tests performed were relevant to the actual toxicity expected to be seen in the field.
- **Alameda Corridor Transportation Authority (ACTA).** Provided technical expertise to gain a unique temporary discharge waiver for a multi-billion-dollar construction project in California. ACTA gained a waiver to discharge dewatering effluent during construction into the LA-Long Beach Harbor. The waiver regulated the effluent based on bioavailable (labile) metal concentration rather than total or dissolved concentrations, and then the project ensured non-detect labile metal concentration via the addition of EDTA.

**REPRESENTATIVE EXPERT RETENTIONS/APPEARANCES**

**Analytical Environmental Chemistry**

- Knurr, B. and J. Hauri (2021) Connecting Bomb Calorimetry to Environmental Issues: Two Bomb Calorimetry Experiments. Presented at the Fall ACS National Meeting, August 22-26. Atlanta, GA.
- Hauri, J. and B. Niece. (2018) Fingerprinting White Wines with Excitation-Emission Matrix Fluorescence. Poster presented at the Fall ACS National Meeting, August 19-23. Boston, MA.
- Hauri, J. (2017) Variation to the Excitation-Emission Matrix Fluorescence Characterization of Allochthonous Dissolved Organic Carbon due to pH changes. Poster presented 38th Annual Society of Environmental Toxicology and Chemistry National Meeting, 12 - 16 November, Minneapolis, MN.

- J. Hauri and K. Wirzbicki. (2011) Excitation-Emission Matrix Fluorescence Characterization of Dissolved Organic Carbon Leached from Leaves from Various Tree Species. Poster presented at the Society of Environmental Toxicology and Chemistry National Meeting, 13 - 17 November, Boston, MA.
- Miller, M. and J.F. Hauri. (2005) Development of an HPLC/UV Method for the Detection of Ibuprofen in River Water. Poster presented at the National Conference on Undergraduate Research, April 21-23, Lexington, VA.
- Parnass, K. and J.F. Hauri. (2004) Development of an HPLC/UV Method for the Measurement of Environmentally Relevant Concentrations of Ibuprofen. Poster presented at the North Atlantic Regional Chapter of the Society of Environmental Toxicology and Chemistry Meeting, June 9-11, Portsmouth, RI.

### Chemistry and Toxicology

- S. Kane Driscoll, J. Hauri, K. Kulacki, A. M. Morrison, M. McArdle, A. Schierz, K. Yozzo, and M. Edwards. (2016) The Influence of Mixing Energy on the Concentration and Composition of Oil in Laboratory Toxicity Tests. Poster presented 37th Annual Society of Environmental Toxicology and Chemistry National Meeting, 6 - 10 November, Orlando, FL.
- Yozzo, K. S. Kane Driscoll, J. Hauri, M. McArdle, and A.M. Morrison. (2016) Review of Current Literature of Cardiotoxicity of Oil to Early Life Stages of Fish and the Use in Injury Assessments. Presentation at 37th Annual Society of Environmental Toxicology and Chemistry National Meeting, 6 - 10 November, Orlando, FL.
- Kane Driscoll, S., R. Wells Whittlesey, J. Hauri, K. Kulacki, A. Schierz, T.L. Morse, A.M. Morrison, and K. Yozzo. (2016) The Influence of Mixing energy on the Concentration, Composition, Toxicity, and Relevance of the Laboratory Toxicity Tests. Poster presented at the Gulf of Mexico Oil Spill and Ecosystem Science Conference. 1-4 February, Tampa Bay, Fl.
- Frazier, K., K. Cushing, and J. Hauri (2010) A visual documentation of acute toxicity in zooplankton. Poster presented at the North Atlantic Regional Chapter of the Society of Environmental Toxicology and Chemistry Meeting, June 2-4, Narragansett, RI.
- Hauri, J.F. and A.J. Horne. (2002) Copper toxicity reduction via EDTA addition: a real-world application. Presentation at the Society of Environmental Toxicology and Chemistry National Meeting, 16 - 20 November, Salt Lake City, UT.
- Hauri, J.F. and A.J. Horne. (2002) Copper toxicity reduction via EDTA addition: a real-world application. Poster presented at the American Chemical Society National Meeting, 18-22 August, Boston, MA.
- Hauri, J.F., K.D. Zoh, A. Steding, and A.J. Horne. (1999) Trinitrotoluene toxicity reduction to Ceriodaphnia dubia by humic acid complexation. Poster presented at the 19th NALMS Annual Meeting, 1-4 December, Reno, Nevada.
- Hauri, J.F., and A.J. Horne. (1997) Toxicity and chemistry of copper in urban runoff from San Francisco Bay creeks. Presented before the CALMS Annual Meeting, November, California.
- Hauri, J.F., and A.J. Horne. (1997) Influence of food on bioavailability of copper in the 7-day Ceriodaphnia dubia bioassay. Poster presented at the 18th SETAC Annual Meeting, 16-27 November, San Francisco, California.
- Hauri, J.F., and A.J. Horne. (1997) Toxicity and chemistry of copper in urban runoff from San Francisco Bay creeks. Presented before the 17th NALMS Annual Meeting, 2-6 December, Houston, Texas

### Misc. Environmental Chemistry

- Drumm, E., and J. Hauri (2020) Analysis of Existing Water Quality Datasets of Lake Quinsigamond, Massachusetts. Poster accepted at North Atlantic Regional Chapter of the Society of Environmental Toxicology and Chemistry Meeting, April 13-14, Avery Point, CT. Accepted, but conference was cancelled.
- Hauri, J. (2007) Adapting research for laboratory experiments in undergraduate environmental chemistry courses. Presented at the 234th ACS National Meeting, August 19-23, Boston, MA.
- Kulevich, S. J. Van Doren, and J. Hauri. (2006) Green arsenic remediation. Presented at the 231st ACS National Meeting, March 26-30, Atlanta, GA.
- Hauri, J. and B. Niece. (2005) Removal of Ibuprofen through a Wastewater Treatment Plant. Poster presented Society of Environmental Toxicology and Chemistry National Meeting, 14 - 17 November, Baltimore, MD.
- Hauri, J.F., P. Frank, and A.J. Horne. (1999) Acid mine drainage in rural and urban environments. Presented before the 19th NALMS Annual Meeting, 1-4 December, Reno, Nevada.

## PROFESSIONAL AFFILIATIONS

American Chemistry Society (ACS)

Society of Environmental Toxicology and Chemistry (SETAC)

NAC SETAC – board of directors 2005-2008, VP 2008-2009, Pres 2009-2010

## PUBLICATIONS

### Analytical Environmental Chemistry

Knurr, B. and J.F. Hauri. (2020) An Alternative to Recycling: Measurement of Combustion Enthalpies of Plastics via Bomb Calorimetry. Journal of Chemical Education. V.97, pp 1465-1469.

Niece, B. and J.F. Hauri. (2013) Determination of Mercury in Fish: A Low-Cost Implementation of Cold-Vapor Atomic Absorbance for the Undergraduate Environmental Chemistry Laboratory. Journal of Chemical Education. V.90 (14), pp 487–489.

Hauri, J. and B. Niece. (2011) Leaching of silver from silver-impregnated food containers. Journal of Chemical Education. V.88 (10), pp 1407–1409.

### Chemistry and Toxicology

Hauri, J.F. and A.J. Horne. (2006) Copper toxicity reduction via EDTA addition: a real-world application. Water Environment Research. v. 78, pp. 2508-2513.

Hauri, J.F. and A.J. Horne. (2004) Reduction in Labile Copper in the 7 Day Ceriodaphnia dubia Toxicity Test due to the interaction with zooplankton food. Chemosphere. v. 56, pp. 717-723.

### Misc. Environmental Chemistry

Hauri, J.F., C. Daughton, and R. Klaper. (2016) The Challenge: Establishing Policy in an Uncertain World: What can be done to address emerging environmental contaminants having indeterminate or subtle ecological or human impacts? Environmental Toxicology and Chemistry. V.35(2), pp. 266-270.

Hauri, J.F. and L.A. Schaider. (2009) Remediation of Acid Mine Drainage with Sulfate Reducing Bacteria. Journal of Chemical Education. v. 86 (2), pp. 216-218. Other Publications

Lincoln, R., C. Amarasiriwardena, J. Shine, A. Ettinger, C. Paciorek, J. Hauri, R. Wright, J. Spengler (2011) Meconium as a biomarker for prenatal metals exposure: Methodological considerations and variations in serial samples over time (Diss. Chapter). Biomarkers of Metals Exposure in Two High-Risk Communities. School of Public Health, Harvard University.

Hauri, J.F. (1998) Scoping study of air deposition monitoring information relevant to water quality of San Francisco Bay, Final Report. Bay Area Stormwater Management Agencies Association.

Hauri, J.F., and Alex J. Horne. (1997) Bioavailability and toxicity of heavy metals in urban runoff in simulated natural conditions. University of California Water Resources Center.

# Citizen Participation Plan

NEW YORK STATE | Department of Environmental Conservation

**Brownfield Cleanup Program**

**Citizen Participation Plan**
**for**
**Portion of Former Vacuum Oil Refinery**

**Properties located at 13, 31, 49 (Formally part of 13), 69, 75, and Portions of 1 Cottage Street; 100 Riverview Place; Portions of 102 Violetta Street; Portions of 1320 S. Plymouth Avenue, and Portions of 10 Flint Street (Formerly Part of 1320 S. Plymouth Avenue) in Rochester, New York; City of Rochester; Monroe County, New York**

**March 2025**

# Site No. C828190

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**Note:** The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **City of Rochester and 10 Flint Street LLC ("Applicants")**
Site Name: **Portion of Former Vacuum Oil Refinery ("Site")**
Site Address: **Properties located at 13, 31, 49 (formally part of 13), 69, 75, and portions of 1 Cottage Street; 100 Riverview place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) in Rochester, New York**
Site County: **Monroe County**
Site Number: **C828190**

## 1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: http://www.dec.ny.gov/chemical/8450.html .

## 2. Citizen Participation Activities

*Why NYSDEC Involves the Public and Why It Is Important*

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment.
- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process.
- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process.
- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community.
- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

*Project Contacts*

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

*Locations of Reports and Information*

The locations of the reports and information related to the site's investigation and cleanup program also are identified in **Appendix A**. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

*Site Contact List*

**Appendix B** contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.

The site contact list includes, at a minimum:

- chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- residents, owners, and occupants of the site and properties adjacent to the site;
- the public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

**Note:** The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html.

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

*CP Activities*

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP

activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.
- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

*Technical Assistance Grant*

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, it has been determined that the site does not pose a significant threat.

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

| Citizen Participation Activities | Timing of CP Activity(ies) |
|---|---|
| **Application Process:** | |
| • Prepare site contact list<br>• Establish document repository(ies) | At time of preparation of application to participate in the BCP. |
| • Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period<br>• Publish above ENB content in local newspaper<br>• Mail above ENB content to site contact list<br>• Conduct 30-day public comment period | When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time. |
| **After Execution of Brownfield Site Cleanup Agreement (BCA):** | |
| • Prepare Citizen Participation (CP) Plan | Before start of Remedial Investigation<br>**Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA. |
| **Before NYSDEC Approves Remedial Investigation (RI) Work Plan:** | |
| • Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan<br>• Conduct 30-day public comment period | Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined, and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet. |
| **After Applicant Completes Remedial Investigation:** | |
| • Distribute fact sheet to site contact list that describes RI results | Before NYSDEC approves RI Report |
| **Before NYSDEC Approves Remedial Work Plan (RWP):** | |
| • Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period<br>• Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager)<br>• Conduct 45-day public comment period | Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period. |
| **Before Applicant Starts Cleanup Action:** | |
| • Distribute fact sheet to site contact list that describes upcoming cleanup action | Before the start of cleanup action. |
| **After Applicant Completes Cleanup Action:** | |
| • Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report<br>• Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC) | At the time, the cleanup action has been completed.<br>**Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC. |

**3. Major Issues of Public Concern**

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

**4. Site Information**

Appendix C contains a map identifying the location of the site.

*Site Description*

- **Location:** Properties located at 13, 31, 49 (formally part of 13), 69, 75, and portions of 1 Cottage Street; 100 Riverview Place; portions of 102 Violetta Street; portions of 1320 S. Plymouth Avenue, and portions of 10 Flint Street (formerly part of 1320 S. Plymouth Avenue) in Rochester, New York (the "Site");
- **Setting:** Vacant Commercial Land – Use Code 330 (10 Flint Street, 13 Cottage Street, 100 Riverview Place, and 102 Violetta Street); Vacant Residential Land – Use Code 311 (1, 31, 69, and 75 Cottage Street); Park Land – Use Code 590 (49 Cottage Street and 1320 S. Plymouth Avenue)
- **Zoning:** R1 - Low Density Residential
- **Site size:** Approximately 15.4 acres
- **Adjacent properties:** - Mix of residential, commercial, and light industrial properties. Portions of adjacent properties are vacant. The Genesee River is present to the east of the site. The Flint Street Right-of-Way is also present along the northern boundary of the site.

*History of Site Use, Investigation, and Cleanup*

Site

Most of the site, about 15.4 acres, was either part of the former Vacuum Oil Company refinery or was part of the associated support operations such as railroads. At one time, the refinery and railroads covered about 30 to 40 acres (estimates vary) and operated from about 1866 to 1930. Three properties (31, 69, and 75 Cottage Street) are next to the former refinery, but were not part of it. Over time, the Vacuum Oil Company became ExxonMobil Corporation. The site is currently vacant and includes wooded, grass-covered, and paved trail areas. The refinery distilled crude petroleum to produce different petroleum products. Site operations included a barrel preparation and storage area, a canal, and railroads. Most of the structures were demolished in place when the refinery closed. Some remnants of former structures and other scattered debris remain. This includes, former railroad bed foundation walls, former building slabs and foundation walls, concrete rubble, scattered bricks, fire hydrants, crushed metal drums/tanks, metal piping, tires, vehicle parts, ash/black foundry sand. There have been no industrial or commercial operations at the site since the refinery closed.

In 1989, a tar-like substance was encountered on property south of the site. NYSDEC excavated and properly disposed of the tar off-site. In 1990, the City of Rochester prepared a report that describes property and traces the history of the Vacuum Oil Company. In 2001, NYSDEC completed an investigation of a 24-acre portion of the former Vacuum Oil facility south of Flint St. In 2005 and 2009 ExxonMobil performed work that expanded on the NYSDEC investigation and in 2012 an additional site assessment report was prepared for the City of Rochester. Based on these results, the Portion of Former Vacuum Oil Refinery site entered the Brownfield Cleanup Program in April 2015. Remedial Investigation Activities were conducted at the BCP site between 2015 and 2018, and a Remedial Investigation Report was prepared for the City of Rochester in 2019.

The results of these investigations indicate the presence of various contaminants in soil and/or groundwater including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. SVOCs and metals (primarily arsenic), are the primary compounds found in soils at concentrations above use-specific soil cleanup objectives. The SVOCs and metals are present from the surface to depths up to 12 feet below grade and are present throughout the site. Soils with nuisance odors, staining, and visible sheens

associated with petroleum-related compounds are also present, especially in the northern part of the site. Volatile organic compounds (VOCs), SVOCs, and metals are found in groundwater at concentrations above groundwater standards. Groundwater impacts are generally limited to the northern part of the site.

The site is also part of the much larger City Vacuum Oil - South Genesee River Corridor Brownfield Opportunity Area (BOA).1 The BOA program provides resources to plan, design, and begin implementing targeted investment projects which support and enhance on-going revitalization efforts in the study area. The Vacuum Oil BOA project is a community-based planning effort that seeks to integrate ideas generated from residents, business owners, and other stakeholders into the actual development of plan recommendations. Involvement and participation by the public is critical to ensuring the planning processes are successful and the final plans achieve the community's vision. The BOA Master Plans to date include mixed use development, waterfront and open space improvements, flex space and incubator/workforce training, and commercial and housing redevelopment. The City submitted and was awarded funding in 2015 to proceed with implementation of the final step in the BOA program, which will include refinements to the Master Plan based on findings from additional BOA studies. While the BOA program is run by the NYS Department of State and the BCP is run by the NYS Department of Environmental Conservation, the two programs work together to help revitalize communities.

5 Flint Street and 15 Flint Street (Adjoining off Site Parcels)

Separate BCP projects are being performed for the 5 Flint Street and 15 Flint Street parcels (NYSDEC Site Numbers C828162B and C828162C, respectively). These two properties were also part of the Vacuum Oil refinery and cover about 7 acres. Further information regarding the 5 & 15 Flint Street BCP projects can be found at the Phillis Wheatley Community Library.

## 5. Investigation and Cleanup Process

*Application*

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a **Volunteer**. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the site will be used for restricted purposes. To achieve this goal, the Applicant will conduct cleanup activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

*Interim Remedial Measures*

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

*Selected Remedy*

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then

1 Additional information on this BOA can be found online: https://www.cityofrochester.gov/VacuumOilBOA/

would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

**or**

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

*Cleanup Action*

If the Record of Decision for the site calls for cleanup action, the project then moves to designing and performing the actions to address the site contamination. When cleanup actions have been completed, NYSDEC will approve or prepare a Final Engineering Report that describes the cleanup actions undertaken and certifies that cleanup requirements have been achieved or will be achieved.

*Certificate of Completion*

Upon approval of the Final Engineering Report, NYSDEC may issue a Certificate of Completion (COC). The COC would recognize the findings of the Final Engineering Report and note that the cleanup program achieved a cleanup level consistent with specific categories of use for the site. The recipient of the COC would be entitled to limited liability as long as it complied with the terms of the COC, and other conditions.

A COC may be modified or revoked if, for example, the recipient does not comply with the terms of the COC, or if the recipient commits fraud regarding its certification that it has met cleanup levels.

*Site Management*

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by NYSDEC, or by the responsible party under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed. During the site management phase, NYSDEC may also take steps to reclassify the site or delist the site from the Registry.

**Appendix A -**
**Project Contacts and Locations of Reports and Information**

**Project Contacts**
For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

**New York State Department of Environmental Conservation (NYSDEC):**

Ms. Charlotte Theobald
Project Manager
NYSDEC Region 8
Division of Environmental Remediation
6274 East Avon-Lima Rd.,
Avon, NY 14414-9519
(585) 226-5354
charlotte.theobald@dec.ny.gov

Ms. Linda Vera
Regional Citizen Participation Specialist
NYSDEC Region 8
6274 East Avon-Lima Rd.,
Avon, NY 14414-9519
(585) 226-5324
Linda.vera@dec.ny.gov

**New York State Department of Health (NYSDOH):**

Ms. Bridgette K. Boyd
Public Health Specialist III
Bureau of Env. Exposure Investigation
NYSDOH
Empire State Plaza,
Corning Tower, Room 1787
Albany, New York 12237
BEEI@health.ny.gov
(518) 402-7859

**Locations of Reports and Information**

The facilities identified below are being used to provide the public with convenient access to important project documents:

Phillis Wheatley Library
33 Dr. Samuel McCree Way
Rochester, NY
Attn: Lori Frankunas
Branch Manager/Teen Services/Media Librarian
Phone: 585-428-8213
Hours: Mon. and Wed., 11:00 AM – 7:00 PM
Tue. and Thur., 11:00 AM – 6:00 PM
Fri., 11:00 AM – 5:00 PM Sat., 11:00 AM – 2:00 PM Sun., Closed.

NYSDEC Region 8
6274 East Avon-Lima Rd.,
Avon, NY 14414-9519
Attn: Charlotte Theobald
Phone: (585) 226-5353
Hours: unknown hour of operations (call for appointment)

**Appendix B - Site Contact List**

Monroe County, City of Rochester Contacts

| | |
|---|---|
| Adam J. Bello (Monroe County: County Executive)<br>110 County Office Building<br>39 W. Main St.<br>Rochester, NY 14614 | William Santos (Monroe County: Planning Board Chairman<br>City Place 50 West Main Street<br>Suite 1150<br>Rochester, New York 14614 |
| Mayor Malik D. Evans (CEO City of Rochester)<br>City Hall, Room 307A<br>30 Church St.<br>Rochester NY 14614 | Marc Grasso (Rochester, NY: Planning Board Chairman)<br>P.O. Box 65<br>15 Tobacco Road<br>Accord, NY 12404 |

Residents, owners, and occupants of the property and adjacent properties.

| **Property Owner/Property Occupant** | **Postal Address** | **Property Address** |
|---|---|---|
| Crego, Kevin | 1661 West Av #398615<br>Miami Beach, FL 33239 | 41 Serenity Cir<br>Rochester, NY 14608 |
| Larracuente, Maria A, & Navarro, Jose M | 33 Serenity Cir<br>Rochester, NY 14608 | 33 Serenity Cir<br>Rochester, NY 14608 |
| Gibbs, Celeste | 25 Serenity Cir<br>Rochester, NY 14608 | 25 Serenity Cir<br>Rochester, NY 14608 |
| Westfall, Portia L | 97 Cottage St<br>Rochester, NY 14608 | 97 Cottage St<br>Rochester, NY 14608 |
| State Of New York | A E Smith Office Bldg<br>Albany, NY 12236 | 93 Cottage St<br>Rochester, NY 14608 |
| Arieno, Carol | 89 Cottage St<br>Rochester, NY 14608 | 89 Cottage St<br>Rochester, NY 14608 |
| Dunham, Evon M | 590 Lake Shore Dr<br>Hilton, NY 14468 | 85 Cottage St<br>Rochester, NY 14608 |
| Coker Martin & Rosetta | 0079 Cottage St<br>Rochester, NY 14608 | 79 Cottage St<br>Rochester, NY 14608 |
| Jordan Property Ventures LLC | 46 Cheriton Rd<br>Quincy, MA 02170 | 73 Cottage St<br>Rochester, NY 14608 |
| Knoll, David C & Skinner David M | 969 S Plymouth Av<br>Rochester, NY 14608 | 67 Cottage St<br>Rochester, NY 14608 |
| Craddock, Willie Foe & Elizabeth Ann | 197 Elmdorf Av<br>Rochester, NY 14619 | 63 Cottage St<br>Rochester, NY 14608 |
| Tsadkan, Neggussie G | 205 Parkwood Av<br>Rochester, NY 14620 | 59 Cottage St<br>Rochester, NY 14608 |
| Hunt, Errol E | 45 Cottage St<br>Rochester, NY 14608 | 55 Cottage St<br>Rochester, NY 14608 |
| Hunt, Errol E | 45 Cottage St<br>Rochester, NY 14608 | 45 Cottage St<br>Rochester, NY 14608 |
| Richardson, Grosvenor | 63 Delemere Blvd<br>Fairport, NY 14450 | 37-39 Cottage St<br>Rochester, NY 14608 |
| Farrance, Brian | 99 Delray Rd<br>Rochester, NY 14610 | 33 Cottage St<br>Rochester, NY 14608 |
| Rowland, Nora D | 29 Cottage St<br>Rochester, NY 14608 | 29 Cottage St<br>Rochester, NY 14608 |

| | | |
|---|---|---|
| High Peaks Property Holdings LLC | 16 Briggs Av Apt A<br>Fairport, NY 14450 | 23 Cottage St<br>Rochester, NY 14608 |
| Singh Baljit | 17 Cottage St<br>Rochester, NY 14608 | 17 Cottage St<br>Rochester, NY 14608 |
| Johnson Donye J Bradford L/U Joe | 51 Charwood Cir<br>Rochester, NY 14609 | 9 Cottage St<br>Rochester, NY 14608 |
| Goodwin Susan | 3 Cottage St<br>Rochester, NY 14608 | 3 Cottage St<br>Rochester, NY 14608 |

Local news media from which the community typically obtains information.

| | |
|---|---|
| Rochester Democrat and Chronicle<br>245 East Main Street; Midtown Plaza,<br>Rochester, New York 14604 | |

The public water supplier which services the area in which the property is located.

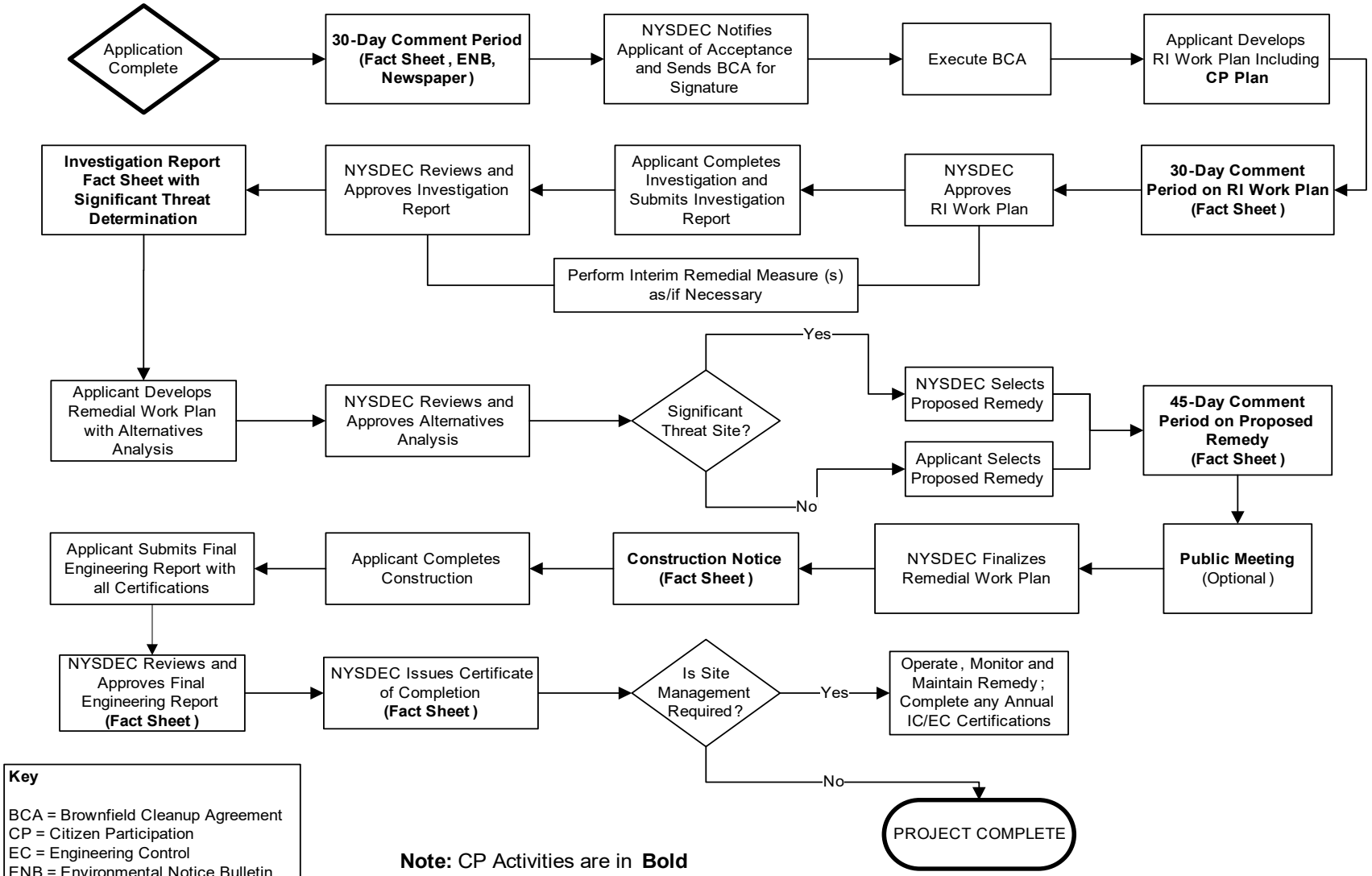
| | |
|---|---|
| Geoffrey W. Gugel, Director (City of Rochester Bureau of Water)<br>Bureau of Water<br>10 Felix Street<br>Rochester, NY 14608 | |

**Please note that the names, addresses, and email addresses of adjacent property owners and residents on the contact list should not be placed in versions of this document available to the public. Instead, they should be maintained confidentially in the NYSDEC project manager's files.}**

**Appendix C - Site Location Map**

**{Instruction to preparer: Insert a map locating the site under the above heading. Alternately, replace this page with such a map. Be sure to label the page/map as Appendix C - Site Location Map and number the page consecutively with the others.}**

# Appendix D– Brownfield Cleanup Program Process




**Key**

BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation

**Note:** CP Activities are in **Bold**

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

**Division of Environmental Remediation**

**Remedial Programs**
**Scoping Sheet for Major Issues of Public Concern**

**Instructions**

This Scoping Sheet assesses major issues of public concern; impacts of the site and its remedial program on the community; community interest in the site; information the public needs; and information needed from the public.

The information generated helps to plan and conduct required citizen participation (CP) activities, and to choose and conduct additional CP activities, if appropriate. The scoping sheet can be revisited and updated as appropriate during the site's remedial process to more effectively implement the site's CP program.

**Note: Use the information as an aid to prepare and update the Major Issues of Public Concern section of the site CP Plan.**

**General Instructions**

- When to prepare: During preparation of the CP Plan for the site. It can be revisited and updated anytime during the site remedial process.
- Fill in site name and other information as appropriate.
- The Scoping Sheet may be prepared by DEC or a remedial party but must be reviewed and approved by the DER site project manager or his/her designee.

**Instructions for Numbered Parts**

Consider the bulleted issues and questions below and any others that may be unique or appropriate to the site and the community to help complete the five Parts of this Scoping Sheet. Identify the issue stakeholders in Parts 1 through 3 and adjust the site's contact list accordingly.

**Part 1. List Major Issues of Public Concern and Information the Community Wants.**

- Is our health being impacted? (e.g., Are there problems with our drinking water or air? Are you going to test our water, yards, sumps, basements? Have health studies been done?)
- There are odors in the neighborhood. Do they come from the site and are they hazardous?
- Are there restrictions on what we may do (e.g., Can our children play outside? Can we garden? Must we avoid certain areas? Can we recreate (fish, hunt, hike, etc. on/around the site?)
- How and when were the site's contamination problems created?
- What contaminants are of concern and why? How will you look for contamination and find out where it is going? What is the schedule for doing that?
- The site is affecting our property values!
- How can we get more information (e.g., who are the project contacts?)
- How will we be kept informed and involved during the site remedial process?
- Who has been contacted in the community about site remedial activities?
- What has been done to this point? What happens next and when?
- The site is going to be cleaned up for restricted use. What does that mean? We don't want redevelopment on a "dirty" site.

**Part 2. List Important Information Needed From the Community, if Applicable.**

- Can the community supplement knowledge about past/current uses of the site?
- Does the community have knowledge that the site may be significantly impacting nearby people, properties, natural resources, etc.?

- Are activities currently taking place at the site or at nearby properties that may need to be restricted?
- Who may be interested or affected by the site that has not yet been identified?
- Are there unique community characteristics that could affect how information is exchanged?
- Does the community and/or individuals have any concerns they want monitored?
- Does the community have information about other sources in the area for the contamination?

**Part 3. List Major Issues and Information That Need to be Communicated <u>to</u> the Community.**

- Specific site investigation or remediation activities currently underway, or that will begin in the near future.
- The process and general schedule to investigate, remediate and, if applicable, redevelop the site.
- Current understanding about the site contamination and effects, if any, on public health and the environment.
- Site impacts on the community and any restrictions on the public's use of the site and/or nearby properties.
- Planned CP activities, their schedule, and how they relate to the site's remedial process.
- Ways for the community to obtain/provide information (document repositories, contacts, etc.).

**Part 4. Community Characteristics**

**a. - e.** Obtain information from local officials, property owners and residents, site reports, site visits, "windshield surveys," other staff, etc.

**f.** Has the affected community experienced other **significant** present or past environmental problems unrelated to this site? Such experiences could significantly affect public concerns and perspectives about the site; how the community will relate to project staff; the image and credibility of project staff within the community; and the ways in which project staff communicate with the community.

**g.** In its remedial programs, DER seeks to integrate, and be consistent with, environmental justice principles set forth in *DEC Commissioner Policy 29 on Environmental Justice* and *DER 23 – Citizen Participation Handbook for Remedial Programs*. Is the site and/or affected community wholly or partly in an Environmental Justice (EJ) Area? Use the Search feature on DEC's public web site for "environmental justice". DEC's EJ pages define an EJ area, and link to county maps to help determine if the site and/or community are in an EJ area.

**h.** Consider factors such as:

- Is English the primary language of the affected community? If not, provisions should be considered regarding public outreach activities such as fact sheets, meetings, door-to-door visits and other activities to ensure their effectiveness.
- The age demographics of the community. For example, is there a significant number of senior citizens in the community? It may be difficult for some to attend public meetings and use document repositories. This may suggest adopting more direct interaction with the community with activities such as door-to-door visits, additional fact sheets, visits to community and church centers, nursing homes, etc.
- How do people travel about the community? Would most people drive to a public meeting or document repository? Is there adequate public transportation?

**Part 5. Affected/Interested Public.**

Individuals and organizations who need or want information and input can change during the site's remedial process. This need is influenced by real, potential, or perceived impacts of the site or the remedial process. Some people may want information and input throughout the remedial process. Others may participate only during specific remedial stages or may only be interested in particular issues.

It is important to revisit this question when reviewing this scoping sheet. Knowing who is interested in the site – and the issues that are important to them – will help to select and conduct appropriate outreach

activities, and to identify their timing and the information to be exchanged.

Check all affected/interested parties that apply to the site. **Note: Adjust the site's contact list appropriately.** The following are some ways to identify affected/interested parties:

- Tax maps of adjacent property owners
- Attendees at public meetings
- Telephone discussions
- Letters and e-mails to DER, the remedial party, and other agencies
- Political jurisdictions and boundaries
- Media coverage
- Current/proposed uses of site and/or nearby properties (recreational, commercial, industrial)
- Discussions with community organizations: grass roots organizations, local environmental groups, environmental justice groups, churches, and neighborhood advisory groups

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

**Division of Environmental Remediation**

**Remedial Programs**
**Scoping Sheet for Major Issues of Public Concern** (see instructions)

**Site Name:** Click here to enter text.

**Site Number:** Click here to enter text.

**Site Address and County:** Click here to enter text.

**Remedial Party(ies):** Click here to enter text.

**Note: For Parts 1. – 3. the individuals, groups, organizations, businesses and units of government identified should be added to the site contact list as appropriate.**

**Part 1.** List major issues of public concern and information the community wants. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and information needs. **Use this information as an aid to prepare or update the Major Issues of Public Concern section of the site Citizen Participation Plan.**
Click here to enter text.

How were these issues and/or information needs identified?
Click here to enter text.

**Part 2.** List important information needed **from** the community, if applicable. Identify individuals, groups, organizations, businesses and/or units of government related to the information needed.
Click here to enter text.

How were these information needs identified?
Click here to enter text.

**Part 3.** List major issues and information that need to be communicated **to** the community. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and/or information.
Click here to enter text.

How were these issues and/or information needs identified?
Click here to enter text.

**Part 4.** Identify the following characteristics of the affected/interested community. This knowledge will help to identify and understand issues and information important to the community, and ways to effectively develop and implement the site citizen participation plan (mark all that apply):

**a.** Land use/zoning at and around site:
☐ **Residential** ☐ **Agricultural** ☐ **Recreational** ☐ **Commercial** ☐ **Industrial**

**b.** Residential type around site:
☐ **Urban** ☐ **Suburban** ☐ **Rural**

**c.** Population density around site:
☐ **High** ☐ **Medium** ☐ **Low**

**d.** Water supply of nearby residences:

☐ **Public** ☐ **Private Wells** ☐ **Mixed**

**e.** Is part or all of the water supply of the affected/interested community currently impacted by the site?
☐ **Yes** ☐ **No**

Provide details if appropriate:
Click here to enter text.

**f.** Other environmental issues significantly impacted/impacting the affected community?
☐ **Yes** ☐ **No**

Provide details if appropriate:
Click here to enter text.

**g.** Is the site and/or the affected/interested community wholly or partly in an Environmental Justice Area?
☐ **Yes** ☐ **No**

**h.** Special considerations:
☐ **Language** ☐ **Age** ☐ **Transportation** ☐ **Other**

Explain any marked categories in **h:**
Click here to enter text.

**Part 5.** The site contact list must include, at a minimum, the individuals, groups, and organizations identified in Part 2. of the Citizen Participation Plan under 'Site Contact List'. Are *other* individuals, groups, organizations, and units of government affected by, or interested in, the site, or its remedial program? (Mark and identify all that apply, then adjust the site contact list as appropriate.)

☐ **Non-Adjacent Residents/Property Owners:** Click here to enter text.

☐ **Local Officials:** Click here to enter text.

☐ **Media:** Click here to enter text.

☐ **Business/Commercial Interests:** Click here to enter text.

☐ **Labor Group(s)/Employees:** Click here to enter text.

☐ **Indian Nation:** Click here to enter text.

☐ **Citizens/Community Group(s):** Click here to enter text.

☐ **Environmental Justice Group(s):** Click here to enter text.

☐ **Environmental Group(s):** Click here to enter text.

☐ **Civic Group(s):** Click here to enter text.

☐ **Recreational Group(s):** Click here to enter text.

☐ **Other(s):** Click here to enter text.

**Prepared/Updated By:** Click here to enter text. **Date:** Click here to enter text.

**Reviewed Approved By:** Click here to enter text. **Date:** Click here to enter text.

# APPENDIX L

Required Permits

CK # 62844
WL Exp. 9/21/26

# SPECIALTY SHORT TERM DISCHARGE PERMIT

County of Monroe Pure Waters District No. 8575 ST- Permit No: ST-474

Fee: $130.00 Effective Date: _____ Expiration Date: April 30, 2026

FirmName Roux Environmental Engineering & Geology, D.P.C

Address 2850 Clover Street

Pittsford, New York 14534

Type of Business or Service Environmental Consulting

I. The above-named applicant is permitted to discharge wastes into the Monroe County Pure Waters Sewer system or Tributary thereto as applied for by an application dated _____ and verified by the applicant except the Director of Pure Waters requires the following terms and conditions to govern the permitted discharge:

A. _____

B. _____

C. _____

II. The applicant further agrees to:

1. Accept and abide by all provisions of the Sewer Use Law of Monroe County and of all pertinent rules or regulations now in force or shall be adopted in the future.
2. Notify the Director of Pure Waters in writing of any revision to the plant sewer system or any change in industrial wastes discharge to the public sewers as listed in the application. The latter encompasses either (1) an increase or decrease in average daily volume or strength of wastes listed in the application or (2) new wastes that were not listed in the application.
3. Furnish the Director of Pure Waters upon request any additional information related to the installation or use of sewer or drain for which this permit is sought.
4. Operate and maintain any waste pretreatment facilities, as may be required as a condition of the acceptance into the public sewer of the industrial wastes involved, in an efficient manner at all times, and at no expense to the County.
5. Cooperate with the Director of Pure Waters or his representatives in their inspecting, sampling, and study of wastes, or the facilities provided for pretreatment.
6. Notify the Director of Pure Waters immediately of any accident, negligence, breakdown of pretreatment equipment, or other occurrence that occasions discharge to the public sewers of any wastes or process waters not covered by this permit.

Applicant's Name (please print) Michael Lesakowski Phone 716-856-0599

Applicant's Signature _____ Date 10/6/25

Applicant's Title Vice President

Emergency Contact John Deth Phone 716-863-0333

Approved by: _____ Issued this 16 day of OCT 20 25

Michael J. Garland, P.E.
Director of Environmental Services-Pure Waters

# COUNTY OF MONROE
# SEWER USE PERMIT ENCLOSURE

Roux Environmental Engineering and Geology, D.P.C
2850 Clover Street
Pittsford, NY 14534

PERMIT NUMBER: ST-474
DISTRICT NUMBER: 8575

SITE LOCATION: 10 Flint Street
Rochester, NY 14608

TYPE OF BUSINESS: Site Soil and Groundwater Remediation
SAMPLE POINT: Treatment System Discharge

---

## REQUIRED MONITORING

SELF MONITORING FREQUENCY:

1. **Analytical Performance testing** of treatment system with Monroe County approval prior to discharge.
2. **Analytical testing once per day** for two consecutive days after start up and discharge commences (24 hour turnaround).
3. **Analytical testing one week after initial three-day commissioning.**
4. **Sample Monthly after these initial samples for the duration of the permitted discharge.**

SAMPLING PROTOCOL: Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CFR Part 136 and amendments thereto. In the absence of 40 CFR Part 136 testing methodology, a New York State Department of Health approved method is acceptable. A representative grab sample collected from the above noted sample point shall be analyzed for the following:

1. **Volatile Organic Compounds** *
2. **Semivolatile Organic Compounds** *
3. **Metals**

| | Sewer Use Limit |
|---|---|
| Arsenic | 0.5 mg/L |
| Barium | 2.0 mg/L |
| Lead | 1.0 mg/L |
| Mercury | 0.05 mg/L |

* ACTION LEVEL: The summation of all analytes within these groups with laboratory detections at or above 10 ug/L shall not exceed 2.13 mg/L.

SPECIAL CONDITIONS:

1. **Sample results must be reviewed and approved by Monroe County prior to discharge.**
2. **Treatment system is to be inspected and approved by Monroe County prior to discharge.**
3. **Treatment equipment must be maintained to ensure proper filtration of the wastewater.**
4. **Discharge rate not exceed 25 gpm unless approved by Monroe County.**
5. **Discharge point to be inspected and approved by Monroe County prior to discharge.**
6. **Total volume of water discharged shall be reported to Monroe County for billing purposes.**

# CITY OF ROCHESTER, NEW YORK
DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 10 Flint St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**DATE:** 2/24/2025

**PERMIT NUMBER:**
B-25-1249

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 10 FLINT ST)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | |

**Construction Type:**
**Truss Type:**
**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**
**Please call your inspector below to schedule an inspection.**
Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work
**Construction Inspections:** None
**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi Jane MH Forbes 428-7892(O) 314-1719(M)
**Authorized By:**
To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the worksite and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1249 **Issued Date:** 2/24/2025
**Address:** 10 Flint St Rochester NY 14608

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 10 FLINT ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK

DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 1 Cottage St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**DATE:** 2/24/2025

**PERMIT NUMBER:** B-25-1250

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 1 COTTAGE ST)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**

**Truss Type:**

**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**

**Please call your inspector below to schedule an inspection.**

Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work

**Construction Inspections:** None

**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi Jane MH Forbes 428-7892 (o) 314-1719 (m)

**Authorized By:**

To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1250 **Issued Date:** 2/24/2025
**Address:** 1 Cottage St Rochester NY 14608

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 1 COTTAGE ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK

DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 13 Cottage St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**DATE:** 2/24/2025

**PERMIT NUMBER:** B-25-1251

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 13 COTTAGE ST)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**

**Truss Type:**

**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**

**Please call your inspector below to schedule an inspection.**

Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work

**Construction Inspections:** None

**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANE MH FORBES 428-7892(O) 314-1719(M)

**Authorized By:**

To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1251 **Issued Date:** 2/24/2025
**Address:** 13 Cottage St Rochester NY 14608

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 13 COTTAGE ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK
DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 31 Cottage St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc. |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc. |

**DATE:** 2/24/2025

**PERMIT NUMBER:** B-25-1252

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 31 COTTAGE ST)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**
**Truss Type:**
**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**
**Please call your inspector below to schedule an inspection.**
Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work
**Construction Inspections:** None
**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANE MH FORBES 428-7892(O) 314-1719 (M)
**Authorized By:**
To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1252 **Issued Date:** 2/24/2025
**Address:** 31 Cottage St Rochester NY 14608

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 31 COTTAGE ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK

DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 49 Cottage St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc. |

**DATE:** 2/24/2025

**PERMIT NUMBER:** B-25-1253

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**

SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 49 COTTAGE ST)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | |

**Construction Type:**

**Truss Type:**

**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**

**EXCLUDE electrical & plumbing work**

**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**

**Please call your inspector below to schedule an inspection.**

Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work

**Construction Inspections:** None

**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANE MH FORBES 428-7892 (O) 314-1719 (M)

**Authorized By:**

To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1253 **Issued Date:** 2/24/2025
**Address:** 49 Cottage St Rochester NY 14608

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 49 COTTAGE ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK

DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 69 Cottage St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**DATE:** 2/24/2025

**PERMIT NUMBER:** B-25-1254

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 69 COTTAGE ST)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**

**Truss Type:**

**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**

**Please call your inspector below to schedule an inspection.**

Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work

**Construction Inspections:** None

**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANE MH FORBES 428-7892 (O) 314-1719 (M)

**Authorized By:**

To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 30-2(a) of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1254 **Issued Date:** 2/24/2025
**Address:** 69 Cottage St Rochester NY 14608

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 69 COTTAGE ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK
DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 75 Cottage St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc. |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**DATE:** 2/24/2025

**PERMIT NUMBER:**
B-25-1255

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 75 COTTAGE ST)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**
**Truss Type:**
**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**
**Please call your inspector below to schedule an inspection.**
Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work
**Construction Inspections:** None
**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANE MH FORBES 428-7892(O) 314-1719(M)
**Authorized By:**
To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1255 **Issued Date:** 2/24/2025
**Address:** 75 Cottage St Rochester NY 14608

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 75 COTTAGE ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK
DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 100 Riverview PL Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**DATE:** 2/24/2025

**PERMIT NUMBER:**
B-25-1256

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 100 RIVERVIEW PL)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**
**Truss Type:**
**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**
**Please call your inspector below to schedule an inspection.**
Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work
**Construction Inspections:** None
**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANE M. FORBES 428-7892(o) 314-1719(m)
**Authorized By:** J. Shine
To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1256
**Address:** 100 Riverview PL Rochester NY 14608

**Issued Date:** 2/24/2025

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 100 RIVERVIEW PL) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK
DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 102 Violetta St Rochester NY 14608 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 102 VIOLETTA ST)

**DATE:** 2/24/2025

**PERMIT NUMBER:**
B-25-1257

**CERTIFICATE OF OCCUPANCY:**

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**
**Truss Type:**
**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**
**Please call your inspector below to schedule an inspection.**
Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work
**Construction Inspections:** None
**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANEMH FORBES 428-7892(O) 314-1719(M)
**Authorized By:**
To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1257
**Address:** 102 Violetta St Rochester NY 14608

**Issued Date:** 2/24/2025

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 102 VIOLETTA ST) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

# CITY OF ROCHESTER, NEW YORK
DEPARTMENT OF NEIGHBORHOOD AND BUSINESS DEVELOPMENT

# BUILDING PERMIT

| | |
|---|---|
| **WORK LOCATION:** | 1320 S Plymouth AVE Rochester NY 14611 |
| **OWNER NAME:** | City of Rochester |
| **CONTRACTOR NAME:** | Roux Associates Inc |
| **ARCHITECT NAME:** | |
| **ENGINEER NAME:** | |
| **APPLICANT NAME:** | Roux Associates Inc |

**DATE:** 2/24/2025

**PERMIT NUMBER:**
B-25-1258

**CERTIFICATE OF OCCUPANCY:**

**PERMIT DESCRIPTION:**
SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 1320 S PLYMOUTH AVE)

**APPROVALS:**

| | |
|---|---|
| **Spc Pmt:** | |
| **CZC:** | Z-25-0373 |
| **C of A:** | |
| **Var:** | |
| **Site pl:** | |
| **Zon Dist:** | R-1 Low Density Residential |
| **Pres:** | |
| **Landmark:** | |
| **LWRP:** | False |
| **Property Flags:** | NYSDEC, |

**Construction Type:**
**Truss Type:**
**# of Stories:** 0

| Tenant Space Desc | Occupancy Type | Occupancy Desc | Posting Occupancy |
|---|---|---|---|
| | | | |

**COST ESTIMATE:**
**EXCLUDE electrical & plumbing work**
**INCLUDE heating, air conditioning, etc.**

**$ 0.0**

**PERMIT FEES:**

| | |
|---|---|
| | |
| **TOTAL** | $0.00 |

**REQUIRED INSPECTIONS (48 HOUR NOTICE REQUIRED)**
**Please call your inspector below to schedule an inspection.**
Do not proceed beyond these points until all required inspections have been performed.

**Preliminary Inspections:** Site Work
**Construction Inspections:** None
**Final Inspections:** Site Final

**Inspector:** Crystal Gizzi JANE MH FORBS 428-7892(O) 314-1719(M)
**Authorized By:**
To schedule an inspection, please call 428-6520.

The permit issued will expire if the authorized work has not commenced within 90 days after issuance, or if work is not completed by 2/24/2026.

A permit issued does not relieve the owner, contractor, architect, engineer, or owner's agent from complying with any of the provisions of the Code of the City of Rochester and the New York State Uniform Fire Prevention and Building Codes whether stated, implied, or omitted in the permit documents. Failure to comply with the conditions of the permit approval will subject the owner and/or agent to penalties as prescribed by Law.

This placard must be displayed at the work site and remain visible for the duration of the project.
Pursuant to section 39-209 of the Code of the City of Rochester, approved plans must be available on site for inspection during the course of construction.

# PERMIT CONDITIONS

**Permit Number:** B-25-1258 **Issued Date:** 2/24/2025
**Address:** 1320 S Plymouth AVE Rochester NY 14611

| Standard Condition Text | Additional Condition Text |
|---|---|
| | SITE PREPARATION - FOR A NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) BROWNFIELD CLEANUP PROGRAM(BCP) APPLICATION (BCP SITE NO. C828162B) -PURSUING CLEANUP & REDEVELOPMENT OF THE SITE INVOLVING LAND DISTURBANCE & SITE PREPARATION WITHIN A FLOODPLAIN, INCLUDING STRIPPING THAT AFFECTS MORE THAN 10,000 SQUARE FEET OF GROUND SURFACE WITHIN PARCEL. PLANNED BCP ACTIVITIES INCLUDE STRIPPING THE SITE OF VEGETATIVE COVER, EXCAVATING AND IN-SITU SOLIDIFICATION (ISS) OF CONTAMINATED SOILS, BACKFILLING EXCAVATION AREAS, AND PLACING AN ADDITIONAL TWO-FOOT COVER AT THE SITE (AKA 1320 S PLYMOUTH AVE) |
| A permit issued does not relieve the owner nor any others responsible for the permit from compliance with the city of Rochester building code (chapter 39 of the code of the city of Rochester), the New York state uniform fire prevention and building code & its referenced standards, nor any other applicable laws, whether stated, implied or omitted in all documents approved with the issued permit. Code sections referenced in these conditions may be seen at ....http://codes.iccsafe.org/new%20york%20state.html#all....which provides access to all NYS and icc codes. | |
| All work shall be in accordance with the documents approved by this permit. Any changes to the approved permit documents shall be submitted to this office for approval before execution in the field. This permit & all approved documents shall be available to the inspector on site at all times until the permit has been officially closed. | |
| Permitted work shall remain accessible & exposed until inspected & accepted by the assigned inspector or agency enforcing the code. The permit holder shall notify the inspector or agency when work is ready for inspection. Permit holder shall place permit placard in a conspicuous location and shall call for inspections where noted on placard. | |
| If a permit is issued in error because of incorrect, inaccurate or incomplete information, or if the work for which the permit was issued violates the code, the permit shall be revoked or suspended until the permit holder demonstrates that all work completed & all work proposed complies with the applicable provisions of the code. | |
| All work shall be in accordance with approved plans. Submit all design revisions after the issuance of this permit to this office for approval. | |
| All construction debris shall be removed from site and disposed of in an appropriate manner. | |
| The permittee acknowledges that recognized environmental concerns have been identified on site and that it will remedy or mitigate all recognized environmental concerns, and any new environmental concerns identified during the course of the project, | |

# PERMIT CONDITIONS

| | |
|---|---|
| in a manner consistent with the planned future use and manner of construction. | |
| The permittee is responsible for obtaining any approvals from the New York state department of environmental conservation and Monroe County department of health, as necessary to address environmental conditions on the project site in order to ensure safe occupancy and use of the planned facility. | |
| The permittee shall comply with all local, state and federal environmental requirements. | |
| All erosion control measures shall be installed prior to starting work and must be maintained until work is complete. | |

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

**Division of Environmental Permits, Region 8**
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-5400 | F: (585) 226-2830
www.dec.ny.gov

## IMPORTANT NOTICE TO ALL PERMITTEES

The permit you requested is enclosed. **Please read it carefully and note the conditions that are included in it**. The permit is valid for only those activities expressly authorized therein. Work beyond the scope of the permit and the approved project plans may be considered a violation of the law and be subject to appropriate enforcement action. Granting of this permit does not relieve the permittee of the responsibility of obtaining any other permission, consent, or approval from any other Federal, State or local government which may be required.

For many projects involving work in and around streams, lakes and wetlands the US Army Corps of Engineers (ACOE) may have regulatory authority in addition to this Department. If you have not already done so, you should contact their Buffalo District Regulatory Branch office at 716-879-4330 to obtain any required federal authorizations prior to commencing work.

Please note the expiration date of the permit. If you need additional time to complete your project, you must submit your request for permit renewal, in writing, prior to expiration of the permit (minimum of 30 days) and submitted to the Regional Permit Administrator at the above address. Provide an explanation of why additional time is needed and how much additional time you are requesting. Please refer to the general conditions listed in the permit for specific instructions. The DEC permit number & Program ID number noted on page 1 under “Permit Authorization” of the permit are important and should be retained for your records. These numbers should be referenced on all correspondence related to the permit, and on any future applications for permits associated with this facility/project area.

You must post the included Permit Notice Sign at the work site with appropriate weather protection and maintain a copy of this permit at project site or facility. Per Condition #2, you must also submit a Notice of Intent to Commence Work (attached) prior to starting work and similar notification must also be made upon completion of project as noted in the permit conditions.

If you have any questions on the extent of the work authorized or your obligations under the permit, please feel free to contact me at 585-226-5396 or robert.call@dec.ny.gov.

Sincerely,

Robert B. Call
cn=Robert B. Call, o=Environmental Permits, ou=NYSDEC, email=robert.call@dec.ny.gov, c=US
2023.08.02 08:06:30 -04'00'

Robert B. Call
Deputy Regional Permit Administrator

# PERMIT
## Under the Environmental Conservation Law (ECL)

## Permittee and Facility Information

**Permit Issued To:**
CITY OF ROCHESTER

30 CHURCH ST

ROCHESTER, NY 14614
(585) 428-7474

**Facility:**
ROCHESTER - C VACUUM OIL & IRM REMEDIATION
ALONG GENESEE RIVER W BANK BTWN|S SIDE OF SERENITY CIR & N TO FORD ST
ROCHESTER, NY

**Facility Application Contact:**
RITA KOZAK
BERGMANN PC
280 E BROAD ST STE 200
ROCHESTER, NY 14604
(567) 318-1547

**Facility Location:** in ROCHESTER in MONROE COUNTY
**Facility Principal Reference Point:** NYTM-E: 286.817 NYTM-N: 4779.093
Latitude: 43°08'04.4" Longitude: 77°37'16.1"

**Authorized Activity:**
Permit for the the removal of contaminated soils from an approximately 15 acre area at the site of the former Vacuum Oil Company in the City of Rochester. Work will include the excavation of 0.31 acres of wetland soils and the placement of clean fill within 0.44 acres of federal wetlands to prepare the site for reuse. All work will be done per the plans referenced in Natural Resources Condition #1 of this permit.

## Permit Authorizations

**Water Quality Certification - Under Section 401 - Clean Water Act**
Permit ID 8-2614-00969/00001
New Permit Effective Date: 8/2/2023 Expiration Date: 12/31/2026

## NYSDEC Approval

**By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.**

Permit Administrator: ROBERT B CALL, Deputy Regional Permit Administrator
Address: NYSDEC Region 8 Headquarters
6274 E Avon-Lima Rd
Avon, NY 14414

Authorized Signature: Robert B Call Robert B. Call cn=Robert B. Call, o=Environmental Permits, ou=NYSDEC, email=robert.call@dec.ny.gov, c=US 2023.08.02 08:06:15 -04'00' Date 8/2/2023

## Distribution List

RITA KOZAK
City of Rochester
US ARMY CORPS OF ENGINEERS - BUFFALO DISTRICT
DER

## Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

## Permit Attachments

Site Plan
Notice of Intent to Commence Work
Permit Sign

## NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Bergmann on April 12, 2023 (Attachment A) and the application materials provided to the Department on December 22, 2022.

2. **Notice of Intent to Commence Work** The permittee shall submit a Notice of Intent to Commence Work to Bureau of Ecosystem Health at least 48 hours in advance of the time of commencement and shall also notify them promptly in writing of the completion of work.

3. **Install Erosion Controls** Before any soil is disturbed on the subject site, the permittee shall install erosion and sedimentation controls which are adequate to prevent erosion and sedimentation off-site. Such controls shall be maintained until the unpaved portions of subject site, if any, are stabilized by a self-sustaining cover of vegetation that is adequate to prevent erosion and sedimentation on and off such site. Before such controls are removed, the permittee shall remove all sediment that has accumulated at such controls.

4. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

5. **State May Require Site Restoration** If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

6. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

7. **Post Permit Sign** The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

8. **Invasive Species (Non-native Vegetation)** To prevent the unintentional introduction or spread of invasive species, the permittee must ensure that all construction equipment be cleaned of mud, seeds, vegetation and other debris before entering any approved construction areas within the state regulated freshwater wetland or its 100 foot adjacent area.

9. **Work Within Area Depicted on Plans** All construction activity, including operation of machinery, excavation, filling, grading, clearing of vegetation, disposal of waste, street paving and stockpiling of material must take place within the project site as depicted on the project plans referenced by this permit. Construction activity is prohibited within areas to be left in a natural condition or areas not designated by the subject permit.

10. **Minimize Adverse Impacts to Wetlands, Wildlife, Water** All work must be performed in a manner which minimizes adverse impacts to wetlands, wildlife, water quality and natural resources.

11. **Seed, Mulch Disturbed Areas** If seeding is impracticable due to the time of year, a temporary mulch shall be applied within 5 days and final seeding shall be performed at the earliest opportunity when weather conditions favor germination and growth; but not more than six months after project completion and no later than the permit expiration date.

12. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

13. **Prior Approval of Changes** If the Permittee desires to make any changes in construction techniques, species to be planted, the site plan, any mitigation plan, scheduling or staging of construction, or any other aspect of this project, the Permittee shall submit a written request to the Regional Permit Administrator to make such proposed changes and shall not make such changes unless authorized in writing by the Department.

## WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. **Water Quality Certification** The authorized project, as conditioned pursuant to the Certificate, complies with Section 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act, as amended and as implemented by the limitations, standards, and criteria of state statutory and regulatory requirements set forth in 6 NYCRR Section 608.9(a). The authorized project, as conditioned, will also comply with applicable New York State water quality standards, including but not limited to effluent limitations, best usages and thermal discharge criteria, as applicable, as set forth in 6 NYCRR Parts 701, 702, 703, and 704.

## GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. **Facility Inspection by The Department** The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. **Relationship of this Permit to Other Department Orders and Determinations** Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. **Applications For Permit Renewals, Modifications or Transfers** The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC Region 8 Headquarters
6274 E Avon-Lima Rd
Avon, NY14414

4. **Submission of Renewal Application** The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Water Quality Certification.

5. **Permit Modifications, Suspensions and Revocations by the Department** The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. **Permit Transfer** Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

## NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

**Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification**
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

**Item B: Permittee's Contractors to Comply with Permit**
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

**Item C: Permittee Responsible for Obtaining Other Required Permits**
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

**Item D: No Right to Trespass or Interfere with Riparian Rights**
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

# Vacuum Oil Brownfield Opportunity Area

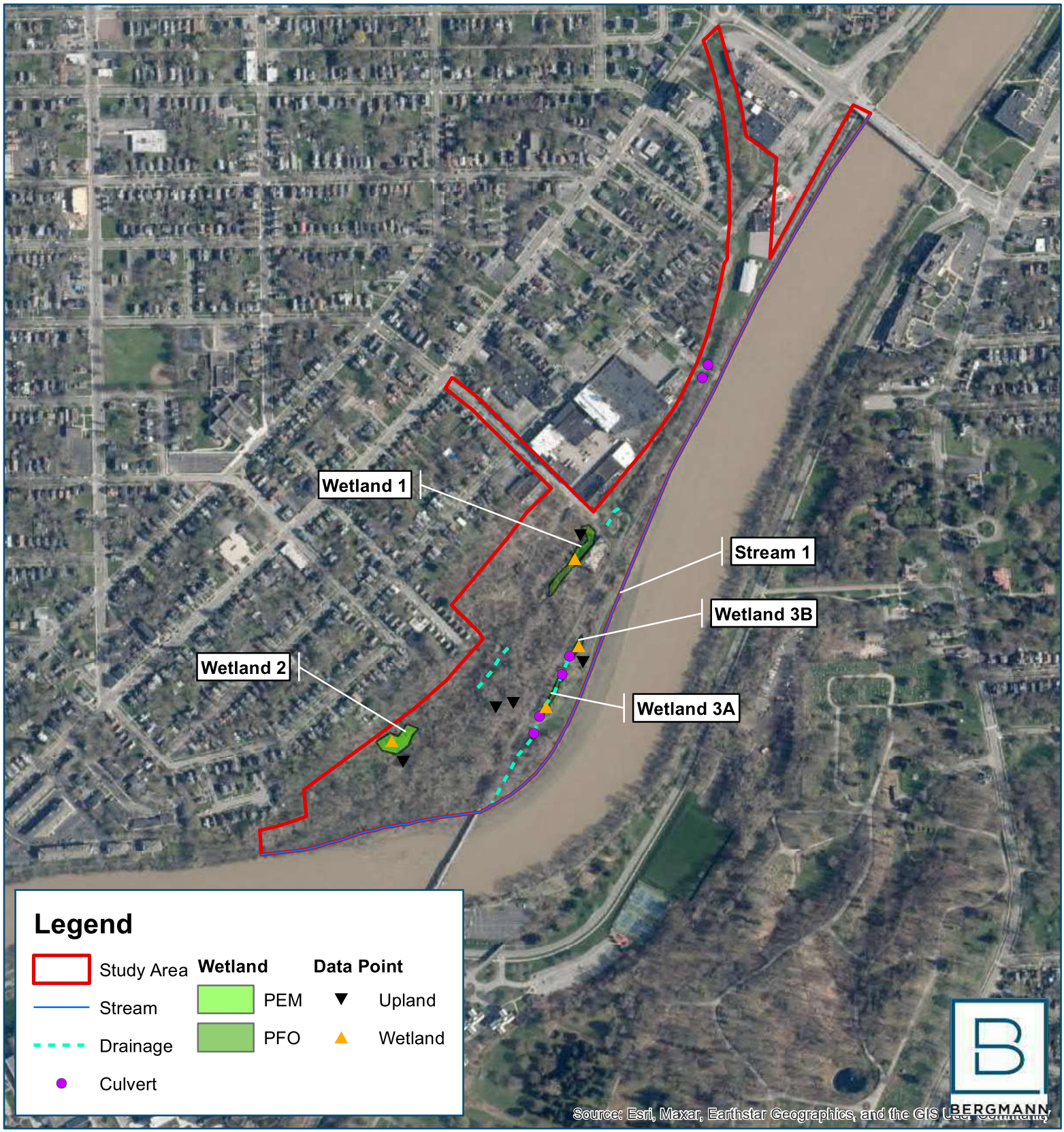
**DELINEATED RESOURCES MAP**

Fig. 7

600 Feet

N

City of Rochester, Monroe County, New York



## 401 Water Quality Certification Conditions
## Water Quality Requirements and Explanations

The conditions included in this certification are necessary to ensure that the project will meet applicable New York State water quality requirements. In accordance with, the applicable water quality requirements and explanations for each condition, wherever included in this Section 401 Water Quality certification, are provided in the table below. Where used in the table, ECL refers to New York State Environmental Conservation Law and 6 NYCRR refers to Title 6 of the Codes, Rules and Regulations of the State of New York. rather

| Condition Title | Water Quality Requirements | Explanation |
|---|---|---|
| Conformance with Plans | 6 NYCRR 608.9, Discharges Prohibited without certification. | This condition is necessary to identify what discharges are authorized by the certification. Any discharge not identified on the referenced plans is prohibited. |
| Precautions Against Contamination of Waters | 6 NYCRR 703.2, Narrative Water Quality Standards related to turbidity, suspended solids, toxic substances, color, and other deleterious substances. | This condition is necessary to ensure that the permittee undertakes whatever additional measures are necessary, and not otherwise specified in the conditions of this permit, to prevent the contravention of water quality standards during the implementation of the project. |
| Install Erosion Controls | 6 NYCRR 703.2 – as above | This condition is necessary to ensure that upland erosion is minimized and contained during project construction, preventing contravention of the water quality standards. |
| Invasive Species | 6 NYCRR 703.2 – as above | This condition is necessary to ensure that the project impacts are minimized to avoid the introduction of harmful invasives which could cause turbidity issues with after restoration. |
| Work within Area Depicted on Plans | 6 NYCRR 608.9 – as above | This condition is necessary to identify what discharges are authorized by the certification. Any discharge not identified on the referenced plans is prohibited. |
| Minimize Adverse Impacts to Wetlands, Wildlife, Water | 6 NYCRR 703.2 – as above | This condition is necessary to ensure that the permittee undertakes whatever additional measures are necessary to assure upland erosion is minimized after construction is completed, preventing a contravention of the water quality standards. |
| Seed and Mulch Streambanks and Work Areas | 6 NYCRR 703.2 – as above | This condition is necessary to ensure that upland erosion is minimized after construction is completed, preventing a contravention of the water quality standards. |

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

**Divsion of Environmental Permits, Region 8**
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-5400 I F: (585) 226-2830
www.dec.ny.gov

## NOTICE OF INTENT TO COMMENCE WORK

Date: _____

NYS Department of Environmental Conservation
Bureau of Ecosystem Health
6274 East Avon-Lima Road
Avon, NY 14414

Re: DEC Permit No. **8-2614-00969/00001**

In accordance with Condition # 2 of the referenced permit, I hereby serve notice to commence work on or about _____, 20___. Notice of project completion will be submitted within one week after termination of all work.

This is also to certify that, having read in entirety the permit, I am fully aware of and understand the general, supplemental and special conditions, and agree to comply in all respects to those requirements. I further understand that prior to undertaking any modification to the authorized project, I must seek and receive the written approval of the Regional Permit Administrator.

_____
Signature of Permittee

_____
Signature of Contractor (if any)

_____
Contractor's Address

_____
Contractor's Telephone Number

_____
Signature of Landowner(s)

**WARNING**

The Permittee and the contractor (if any) are required to follow all permit conditions. Violation of permit conditions may lead to legal action, including the imposition of substantial monetary fines and corrective work.

Attention Permittee and/or Contractor: Please fold as noted on the back and return.

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

(Fold # 2)

Place
Stamp
Here

NYS Department of Environmental
Conservation Attn: Bureau of Ecosystem Health
6274 E Avon-Lima Rd
Avon, NY 14414

(Fold # 1 – Staple Here)

95-20-1 (8/87)—9d

# New York State
# Department of Environmental Conservation

# NOTICE

The Department of Environmental Conservation (DEC) has issued permit(s) pursuant to the Environmental Conservation Law for work being conducted at this site. For further information regarding the nature and extent of work approved and any Departmental conditions on it, contact the Regional Permit Administrator listed below. Please refer to the permit number shown when contacting the DEC.

Regional Permit Administrator

Permit Number 8-2614-00969/00001

Expiration Date 12/31/2026

Robert B. Call, Deputy RPA

Phone 585-226-5396

NOTE: This notice is **NOT** a permit

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April 16, 2024

Mr. Harold Keppner
Chief, Monitoring & Enforcement Section
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199

RE: Wetland Mitigation Credits Reserved in the Lower Genessee Service Area
Ducks Unlimited New York In-Lieu Fee Program

Ducks Unlimited, Inc. (DU) is the authorized sponsor of the Ducks Unlimited – New York In-lieu Fee program (DU-NY-ILF). DU signed an In-Lieu Fee agreement, effective September 28, 2012, with the US Army Corps of Engineers, Buffalo & New York District, to operate the program.

PERMITTEE: City of Rochester
PERMIT NUMBER(S):
DA permit number: LRB-2010-01497
Date Issued: November 2, 2023
NYS Department of Environmental Conservation: 8-2614-00969/00001 Date Issued: 08/2/2023
PROJECT LOCATION (town): Rochester
AUTHORIZED IMPACT ACREAGE: .44 AC
AUTHORIZED IMPACT RESOURCE TYPE(S): PFO
Number of Credits Purchased: 0.44
Service Area of Purchased Credits: Lower Genesee Service Area

The credits purchased through this sale are ADVANCED CREDITS.

This letter confirms receipt of $49,287.92 for the above authorized project.

By making this payment, City of Rochester permanently transfers responsibility for the mitigation liability to Ducks Unlimited, Inc., the ILF sponsor. By accepting the ILF payment, DU is responsible for use of these funds to provide compensatory mitigation for the above-described impacts.

DU signature: DocuSigned by: Karen Waldrop D86079ACEB7A4CB... EH

Permittee signature: Patrick Beath Corporation Counsel City of Rochester

CC: Jane Forbes, Permittee
Patrick Beath, Esq., Corporation Counsel, Permittee
Joseph M. Rowley, USACE
Peter Krakowiak, USACE
Amy L. Gitchell, USACE

**DEPARTMENT OF THE ARMY**
U.S. ARMY CORPS OF ENGINEERS BUFFALO DISTRICT
478 **MAIN STREET**
**BUFFALO, NY 14202-3278**

November 3, 2023

Regulatory Branch

SUBJECT: Transmittal Department of the Army No. LRB-2010-01497, Nationwide Permit No. as Published in the Federal Register, Volume 86, No. 8 on Jan. 13, 2021 and No. 245 on Dec. 27, 2021, New York State Department of Environmental Conservation No. 8-2614-00969

Jane Forbes
City of Rochester DEQ
30 Church Street Room 300B
Rochester, NY 14614

Dear Ms. Forbes:

This pertains to the application submitted on behalf of the City of Rochester by Collier Engineering and Design for a Department of the Army permit for the removal of contaminated soils from an approximately 15 acre area at the former Vacuum Oil Company in the City of Rochester. Work will include the excavation of 0.31 acres of wetland soils and the placement of clean fill within 0.44 acres of federal wetlands for remediation. The project is located South side of Serenity Circle and North to Ford Street adjacent to the bank of the Genesee River.

I have evaluated the impacts associated with your proposal, and have concluded that they are authorized by the enclosed Nationwide Permit (NWP) provided that the attached conditions are satisfied.

Verification of the applicability of this NWP is valid until March 14, 2026 unless the NWP is modified, suspended, revoked, or the activity complies with any subsequent permit modification. Please note in accordance with 33 CFR part 330.6(b), that if you commence or are under contract to commence an activity in reliance of the permit prior to the date this NWP expires, is suspended or revoked, or is modified such that the activity no longer complies with the terms and conditions, you have twelve months from the date of permit modification, expiration, or revocation to complete the activity under the present terms and conditions of the permit, unless the permit has been subject to the provisions of discretionary authority.

It is your responsibility to remain informed of changes to the NWP program. A public notice announcing any changes will be issued when they occur and will be available for viewing at our website: http://www.lrb.usace.army.mil/Missions/Regulatory.aspx. Finally, note that if your activity is not undertaken within the defined period or the project specifications have changed, you must immediately notify this office to determine the need for further approval or reverification.

Your initiation of work as authorized by the enclosed NWP acknowledges your acceptance of the general and special conditions contained therein. This affirmation is limited to the

Regulatory Branch

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attached NWP and associated WQC, and does not obviate the need to obtain any other project specific Federal, state, or local authorization. Specifically, you may need to obtain Article 15 (Protection of Water), Article 24 (Freshwater Wetland), and/or Article 34 (Coastal Erosion Management) authorization from the New York State DEC.

In addition to the general conditions attached to the NWP, your attention is directed to the following Special Conditions which are also appended at the end of the NWP:

1. The Section 401 Water Quality Certification issued for this project by the State of New York, attached to this permit as Appendix A, is hereby part of this Department of the Army permit pursuant to Section 401(d) of the Clean Water Act. Noncompliance with any limitations or requirements stated in the certification may be a basis for suspension, revocation, or modification of this permit.

2. A determination was performed under the 2023 Interim Framework Guidance for the federally-endangered Northern long-eared bat (Myotis septentrionalis), and all tree (woody stems > 3 inches Diameter at Breast Height) clearing associated with the authorized work must be completed by March 31, 2024. If the tree clearing associated with the authorized work cannot be performed by March 31, 2024, you are required to coordinate in writing with this office and shall not initiate tree clearing until receiving written notification from this office that Section 7 of the Endangered Species Act for the bat has been completed.

3. As compensatory mitigation for the permanent and unavoidable loss of 0.44 acres of Federal jurisdictional wetlands, the permittee must purchase 0.44 wetland credits from the Ducks Unlimited In-Lieu Fee Mitigation Program Lower Genesee River Service Area. Prior to commencing the work associated with this permit authorization, the permittee must supply this office with a copy of the signed Credit Sale Letter verifying acceptance of full payment by the Ducks Unlimited In-Lieu Fee Mitigation Program for the appropriate credits. The documentation must be sent to the attention of (Joseph Rowley at joseph.m.rowley@usace.army.mil).

I have evaluated your submitted wetland delineation map and have determined that the wetland and water boundaries shown on the map accurately represent on-site conditions. Please note that this is a Preliminary Jurisdictional Determination (JD) and does not officially confer or decline DA jurisdiction on any of the on-site waters. This letter verifies the location of waters on the site only. Further, this delineation/determination has been conducted only to identify the limits of waters that may be subject to Corps Clean Water Act or Rivers and Harbors Act jurisdiction. This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are United States Department of Agriculture (USDA) program participants, or anticipate participation in USDA

Regulatory Branch

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programs, you should request a certified wetland determination from the local office of the Natural Resource Conservation Service prior to starting work.

In accordance with Regulatory Guidance Letter 05-02, "Preliminary JDs are not definitive determinations of the presence or absence of areas within regulatory jurisdiction and do not have expirations dates." However, wetlands and waters are dynamic systems whose boundaries change over time. For this reason, I strongly recommend that, if the proposed work is not completed within five years of the date of this letter, the boundaries of waters of the United States be re-evaluated by a qualified wetland biologist. This will ensure that any changes are appropriately identified and you do not inadvertently incur a violation of Federal law while constructing your project or working on your project site.

Pursuant to Regulatory Guidance Letter 16-01, any permit application made in reliance on this preliminary JD will be evaluated as though all wetlands or waters on the site are regulated by the Corps. If you require a definitive response regarding DA jurisdiction for any or all of the waters identified on the submitted drawings, you may request an approved JD from this office.

I have enclosed the Preliminary JD Form with this letter. The form and attached table identifies the extent of waters on the site and specific terms and conditions of the Preliminary JD. Please sign and return a copy of this form to my attention. If you do not respond within 15 days, we will presume concurrence and no additional follow up is necessary prior to finalizing an action.

Questions pertaining to this matter should be directed to me at (716) 879-4279 by writing to the following address: U.S. Army Corps of Engineers Regulatory Branch 478 Main Street, Buffalo, New York 14202 or by e-mail at: Joseph.M.Rowley@usace.army.mil.

Sincerely,

Joseph Rowley

Joseph Rowley
Physical Scientist

Enclosures
cc: Rita Kozak Colliers Engineering & Design

COMPLETION FORM / COMPLIANCE CERTIFICATION

Each permittee who receives a Nationwide Permit (NWP) verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any compensatory mitigation.

APPLICANT:
City of Rochester DEQ
30 Church Street Room 300B
Rochester, NY 14614

POINT OF CONTACT:
Rita Kozak
Colliers Engineering Design
280 East Broad St, Suite 200
Rochester, NY 14604

File No.: LRB-2010-01497
File Closed: November 2, 2023
NWP No.: 38

**Upon completion of the activity authorized by this permit and any required compensatory mitigation sign this certification and return it to the address listed below within 30 days of project completion.**

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, revocation, and/or assessment of administrative penalties.

The permittee shall certify the completion of the authorized work and mitigation:

a. The authorized work was done in accordance with the NWP authorization, including any general, regional, or activity specific conditions.

b. The implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, this certification must include the documentation required by 33 CFR 332.3(1)(3) to confirm that the permittee secured the appropriate number and resource type of credits.

_____ _____
City of Rochester DEQ Date

Permittee Telephone Number: _____

Project location: located South side of Serenity Circle and North to Ford Street adjacent to the bank of the Genesee River, City of Rochester, Monroe County, NY

Project Description: excavation of 0.31 acres of wetland soils and the placement of clean fill within 0.44 acres of federal wetlands for remediation

Authorized Impacts (Waters of the U.S. Impacted by Project): 0.44 ACRES

Waterway and/or Project Setting: Federal wetlands

Return completed form to: **LRB.Regulatory.PermitCompliance@usace.army.mil** (Preferred)
**Or Mail to: Mr. David Leput**
**Regulatory Branch**
**U.S. Army Corps of Engineers**
**478 Main St**
**Buffalo, NY 14202**

**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL**

| Applicant: City of Rochester DEQ | File Number: LRB-2010-01497 | Date: November 2, 2023 |
|---|---|---|

| Attached is: | | See Section below |
|---|---|---|
| | INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission) | A |
| | PROFFERED PERMIT (Standard Permit or Letter of permission) | B |
| | PERMIT DENIAL WITHOUT PREJUDICE | C |
| | PERMIT DENIAL WITH PREJUDICE | D |
| | APPROVED JURISDICTIONAL DETERMINATION | E |
| X | PRELIMINARY JURISDICTIONAL DETERMINATION | F |

**SECTION I**

The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/appeals/ or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C. PERMIT DENIAL WITHOUT PREJUDICE: Not appealable

You received a permit denial without prejudice because a required Federal, state, and/or local authorization and/or certification has been denied for activities which also require a Department of the Army permit before final action has been taken on the Army permit application. The permit denial without prejudice is not appealable. There is no prejudice to the right of the applicant to reinstate processing of the Army permit application if subsequent approval is received from the appropriate Federal, state, and/or local agency on a previously denied authorization and/or certification.

D: PERMIT DENIAL WITH PREJUDICE: You may appeal the permit denial

You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information for reconsideration

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.
- RECONSIDERATION: You may request that the district engineer reconsider the approved JD by submitting new information or data to the district engineer within 60 days of the date of this notice. The district will determine whether the information submitted qualifies as new information or data that justifies reconsideration of the approved JD. A reconsideration request does not initiate the appeal process. You may submit a request for appeal to the division engineer to preserve your appeal rights while the district is determining whether the submitted information qualifies for a reconsideration.

F: PRELIMINARY JURISDICTIONAL DETERMINATION: Not appealable

You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also, you may provide new information for further consideration by the Corps to reevaluate the JD.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision you may contact:

Joseph Rowley
U.S. Army Corps of Engineers
478 Main St
Buffalo, NY 14202
Joseph.M.Rowley@usace.army.mil
716-879-4279

If you have questions regarding the appeal process, or to submit your request for appeal, you may contact:

Katherine McCafferty
Regulatory Appeals Officer
US Army Corps of Engineers
Great Lakes and Ohio River Division
550 Main Street, Room 10780
Cincinnati, Ohio 45202-3222
Phone: 513-684-2699 Fax: 513-684-2460
e-mail: katherine.a.mccafferty@usace.army.mil

**SECTION II – REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. Use additional pages as necessary. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15-day notice of any site investigation and will have the opportunity to participate in all site investigations.

| | |
|---|---|
| Signature of appellant or agent. | Date: |
| Email address of appellant and/or agent: | Telephone number: |