
BROWNFIELD CLEANUP PROGRAM

SITE MANAGEMENT PLAN

FORMER TRICO PLANT
NYSDEC SITE NUMBER: C915281
BUFFALO, NEW YORK

December 2019

4398.0001B000

Prepared for:
847 Main Street, LLC
and
791 Washington Street, LLC

Prepared By:
Roux Environmental Engineering & Geology, DPC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

Revisions to Final Approved Site Management Plan:

| Revision # | Submitted Date | Summary of Revision | DEC Approval Date |
|------------|----------------|-------------------------------|-------------------|
| 1 | March 2025 | Address Redevelopment Changes | |
| | | | |
| | | | |
| | | | |

**SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BCP Site No. C915281**

Certification Statement

I Thomas H. Forbes, P.E. certify that I am currently a NYS registered professional engineer as in defined in 6 NYCRR Part 375 and that this Site Management 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).

Thomas Forbes P.E.

3-25-25 Date



**SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BCP Site No. C915281
Table of Contents**

LIST OF ACRONYMS

ES EXECUTIVE SUMMARY

| | | |
|------------|---|-----------|
| 1.0 | INTRODUCTION..... | 1 |
| 1.1 | General..... | 1 |
| 1.2 | Revisions..... | 2 |
| 1.3 | Notifications..... | 2 |
| 2.0 | SUMMARY OF PREVIOUS INVESTIGATION & REMEDIAL ACTIONS | 5 |
| 2.1 | Site Location and Description..... | 5 |
| 2.2 | Physical Setting..... | 5 |
| 2.2.1 | Land Use | 5 |
| 2.2.2 | Geology | 6 |
| 2.2.3 | Hydrogeology | 6 |
| 2.3 | Investigation and Remedial History..... | 7 |
| 2.4 | Remedial Action Objectives | 14 |
| 2.4.1 | Soil..... | 14 |
| 2.4.2 | Groundwater..... | 14 |
| 2.4.3 | Soil Vapor..... | 14 |
| 2.5 | Remaining Contamination | 14 |
| 2.5.1 | Soil..... | 14 |
| 2.5.2 | Groundwater..... | 15 |
| 2.5.3 | Soil Vapor..... | 16 |
| 2.5.4 | Building Materials | 17 |
| 3.0 | INSTITUTIONAL & ENGINEERING CONTROL PLAN..... | 19 |
| 3.1 | General..... | 19 |
| 3.2 | Institutional Controls | 19 |
| 3.3 | Engineering Controls | 21 |
| 3.3.1 | Cover System..... | 21 |
| 3.3.2 | Criteria for Completion of Remediation/Termination of Remedial Systems..... | 21 |
| 3.3.2.1 | Cover System | 22 |
| 3.3.2.2 | Monitoring Wells associated with Monitored Natural Attenuation..... | 22 |
| 3.4 | Building Control - Indoor Parking Ventilations Systems..... | 22 |
| 4.0 | MONITORING AND SAMPLING PLAN..... | 24 |
| 4.1 | General..... | 24 |
| 4.1.1 | Future Building Material Demolition | 24 |
| 4.2 | Site-Wide Inspection..... | 25 |
| 4.3 | Post-Remediation Media Monitoring and Sampling | 26 |
| 4.3.1 | Groundwater Sampling..... | 27 |
| 4.3.2 | Monitoring and Sampling Protocol..... | 28 |
| 5.0 | OPERATION & MAINTENANCE PLAN | 29 |
| 5.1 | General..... | 29 |

**SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BCP Site No. C915281
Table of Contents**

| | | |
|------------|---|-----------|
| 6.0 | PERIODIC ASSESSMENTS/EVALUATIONS | 30 |
| 6.1 | Climate Change Vulnerability Assessment | 30 |
| 6.2 | Green Remediation Evaluation | 31 |
| 6.2.1 | Timing of Green Remediation Evaluations..... | 33 |
| 6.2.2 | Remedial Systems..... | 33 |
| 6.2.3 | Building Operations..... | 33 |
| 6.2.4 | Frequency of System Checks, Sampling and Other Periodic Activities..... | 33 |
| 6.2.5 | Metrics and Reporting..... | 34 |
| 6.3 | Remedial System Optimization | 35 |
| 7.0 | REPORTING REQUIREMENTS..... | 36 |
| 7.1 | Site Management Reports | 36 |
| 7.2 | Periodic Review Report | 38 |
| 7.2.1 | Certification of Institutional and Engineering Controls..... | 40 |
| 7.3 | Corrective Measures Work Plan | 41 |
| 7.4 | Remedial Site Optimization Report..... | 41 |
| 8.0 | REFERENCES | 43 |

**SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BCP Site No. C915281**

Table of Contents

LIST OF TABLES

| | |
|---------|--|
| Table 1 | Notifications |
| Table 2 | Monitoring Well Construction Details & Groundwater Elevations |
| Table 3 | Summary of Remaining Soil/Fill Sample Exceedances |
| Table 4 | Summary of Groundwater Analytical Results |
| Table 5 | Summary of SVI Sample Results Compared to the NYSDOH SVI Guidance Matrices |
| Table 6 | Post Remediation Sampling Requirements & Schedule |
| Table 7 | Schedule of Interim Monitoring /Inspection Reporting |
| Table 8 | Summary of Import Criteria |

LIST OF FIGURES

| | |
|-----------|---|
| Figure 1 | Site Location and Vicinity Map |
| Figure 2 | Site Plan Aerial |
| Figure 3 | Tax Map & Institutional Control Boundary |
| Figure 4 | Geologic Cross Section |
| Figure 5 | Groundwater Isopotential Map |
| Figure 6 | Unrestricted SCO Exceedance Locations |
| Figure 7 | Groundwater Amendment Injection Locations |
| Figure 8 | Groundwater Monitoring Locations and cVOC Results |
| Figure 9 | Area of Soil Vapor Intrusion Concern |
| Figure 10 | Building Materials Requiring Management |
| Figure 11 | Cover System |

**SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BCP Site No. C915281**

Table of Contents

APPENDICES

| | |
|------------|--|
| Appendix A | List of Site Contacts |
| Appendix B | Excavation Work Plan |
| Appendix C | Responsibilities of Owner and Remedial Party |
| Appendix D | Environmental Easement |
| Appendix E | Monitoring Well Boring and Construction Logs |
| Appendix F | Field Operating Procedures (Provided Electronically) |
| Appendix G | Quality Assurance Project Plan |
| Appendix H | Health and Safety Plan (Provided Electronically) |
| Appendix I | Site Management Forms |
| Appendix J | Ventilation System Information |
| Appendix K | Remedial Systems Optimization Table of Contents |
| Appendix L | Climate Screening & Environmental Footprint Analysis |

**SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BCP Site No. C915281**

List of Acronyms

| | |
|--------|---|
| AS | Air Sparging |
| ASD | Active Sub-Slab Depressurization |
| ASP | Analytical Services Protocol |
| BCA | Brownfield Cleanup Agreement |
| BCP | Brownfield Cleanup Program |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CAMP | Community Air Monitoring Plan |
| C/D | Construction and Demolition |
| CFR | Code of Federal Regulation |
| CLP | Contract Laboratory Program |
| COC | Certificate of Completion |
| CO2 | Carbon Dioxide |
| CP | Commissioner Policy |
| DER | Division of Environmental Remediation |
| EC | Engineering Control |
| ECL | Environmental Conservation Law |
| ELAP | Environmental Laboratory Approval Program |
| ERP | Environmental Restoration Program |
| EWP | Excavation Work Plan |
| FOP | Field Operating Procedure |
| GHG | Green House Gas |
| GWE&T | Groundwater Extraction and Treatment |
| HASP | Health and Safety Plan |
| IC | Institutional Control |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| NYCRR | New York Codes, Rules, and Regulations |
| O&M | Operations and Maintenance |
| OM&M | Operation, Maintenance and Monitoring |
| OSHA | Occupational Safety and Health Administration |
| OU | Operable Unit |
| PID | Photoionization Detector |
| PRP | Potentially Responsible Party |
| PRR | Periodic Review Report |
| QA/QC | Quality Assurance/Quality Control |
| QAPP | Quality Assurance Project Plan |
| RAO | Remedial Action Objective |
| RAWP | Remedial Action Work Plan |
| RCRA | Resource Conservation and Recovery Act |

**SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BCP Site No. C915281**

List of Acronyms

| | |
|-------|---|
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RP | Remedial Party |
| RSO | Remedial System Optimization |
| SAC | State Assistance Contract |
| SCG | Standards, Criteria, and Guidelines |
| SCO | Soil Cleanup Objective |
| SMP | Soil Management Plan |
| SOP | Standard Operating Procedures |
| SOW | Statement of Work |
| SPDES | State Pollutant Discharge Elimination System |
| SSD | Sub-slab Depressurization |
| SVE | Soil Vapor Extraction |
| SVI | Soil Vapor Intrusion |
| SVMS | Soil Vapor Mitigation System |
| TAL | Target Analyte List |
| TCL | Target Compound List |
| TCLP | Toxicity Characteristic Leachate Procedure |
| USEPA | United States Environmental Protection Agency |
| UST | Underground Storage Tank |
| VCA | Voluntary Cleanup Agreement |
| VCP | Voluntary Cleanup Program |

EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: C915281 Former Trico Plant
628 Ellicott Street (formerly 791 Washington Street),
Buffalo, New York

| | |
|-------------------------|---|
| Institutional Controls: | 1. The property may be used for restricted-residential; commercial, industrial use; |
| | 2. All ECs must be operated and maintained as specified in this SMP; |
| | 3. All ECs must be inspected at a frequency and in a manner defined in the SMP; |
| | 4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department; |
| | 5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP; |
| | 6. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP; |
| | 7. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP; |
| | 8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP; |
| | 9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP; |
| | 10. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement; |
| | 11. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 3, and any potential impacts that are identified must be monitored or mitigated; |
| | 12. Vegetable gardens and farming on the site are prohibited; |

Site Identification: C915281 Former Trico Plant
628 Ellicott Street (formerly 791 Washington Street),
Buffalo, New York

| | | |
|---|---|---|
| | 13. An evaluation shall be performed to determine the need 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. | |
| Engineering Controls: | 1. Cover System | |
| Inspections: | | Frequency |
| 1. Cover inspection | | Annually |
| Monitoring: | | |
| 1. Groundwater Monitoring Wells RIMW-2, -4, and -7R | | Annually |
| Maintenance: | | |
| 1. Cover System | | As needed |
| Reporting: | | Laboratory data provided electronically and report with the annual PRR. |
| 1. Groundwater Data | | Annually |

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Former Trico Plant located in Buffalo, New York (hereinafter referred to as the “Site”). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP) Site No. C915281 which is administered by New York State Department of Environmental Conservation (NYSDEC).

847 Main Street, LLC entered into a Brownfield Cleanup Agreement (BCA) on October 24, 2013 with the NYSDEC to remediate the Site. A BCA amendment was submitted on February 16, 2016 to add 791 Washington Street, LLC to the BCA. A second BCA amendment was submitted on July 3, 2019 to notify the NYSDEC that 791 Washington Street, LLC acquired the Site from the Buffalo Brownfield Restoration Corporation on May 31, 2019. A figure showing the Site location and boundaries of this Site is provided in Figure 2. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement provided in Appendix D.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as “remaining contamination.” Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Erie County Clerk, requires compliance with this SMP and all ECs and ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor’s successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 (Ref. 1) and the BCA (Index No. C915281-10-13; Site No. C915281) for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix A of this SMP.

This SMP revision was prepared by Roux Environmental Engineering and Geology, DPC, on behalf of 847 Main Street, LLC and 791 Washington Street, LLC, in accordance with the requirements of the NYSDEC's DER-10 "Technical Guidance for Site Investigation and Remediation" (Ref. 2), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.

2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above- mentioned 60-day advance notice is also required.
4. Notice within 48-hours of any damage or defect to the foundation, structures, or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
5. Notice within 48 hours of any non-routine maintenance activities.
6. Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

8. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.
9. Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 below includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix A.

Table 1: Notifications*

| Name | Contact Information | Required Notification ** |
|---|--|---------------------------------|
| Region 9 Project Manager Megan Kuczka | 716-851-7220 megan.kuczka@dec.ny.gov | All Notifications |
| Region 9 Engineer Andrea Caprio, P.E. | 716-851-7220 andrea.caprio@dec.ny.gov | All Notifications |
| NYSDEC Site Control Kelly Lewandowski, P.E. | 518-402-9543 kelly.lewandowski@dec.ny.gov | Notifications 1 and 8 |
| NYSDOH Bureau of Environmental Exposure Investigation Stephen Lawrence | 518-402-0450 stephen.lawrence@health.ny.gov | Notifications 4, 6, and 7 |
| | | |

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATION & REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in Buffalo, Erie County, New York and is identified as Section 111.31 Block 1 and Lot 1.11 on the Erie County Tax Map (see Figure 3). The Site is an approximately 2.11-acre area and is bounded by the Buffalo Niagara Medical Campus Innovation Center (640 Ellicott Street) to the north, Goodell Street to the south, Ellicott Street to the east, and Washington Street to the west (see Figure 2 – Site Layout Map and Figure 3 – Tax Map). The boundaries of the Site are more fully described in Appendix D – Environmental Easement. The owner(s) of the Site parcel(s) at the time of issuance of this SMP revision is/are:

791 Washington Street, LLC, 4 Centre Drive, Orchard Park, New York 14127

A Change of Use was submitted to NYSDEC on November 16, 2023, and acknowledgement received from NYSDEC on November 20, 2023, regarding the change in Site address from 791 Washington Street to 628 Ellicott Street.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of a complex of five former industrial buildings totaling approximately 497,660 square feet with a building footprint of approximately 84,000 square feet and former Burton Street to the north. The Site is zoned N-1C (Downtown Mixed-Use Core) which is defined as mixed-use, mid-rise developments at edges of downtown. The Site has been redeveloped for use primarily as residential apartments with some commercial space.

The properties adjoining the Site and, in the neighborhood, surrounding the Site primarily include industrial, commercial, and residential properties. The properties immediately north, south and east of the Site include commercial and residential properties and the properties to the west of the Site include commercial properties.

2.2.2 Geology

The Site is located within the Erie-Ontario lake plain physiographic province, which is typified by little topographic relief and gentle slope toward Lake Erie, except in the immediate vicinity of major drainage ways. The surficial geology of the Lake Erie Plain consists of a thin glacial till (if present), glaciolacustrine deposits, recent alluvium, and the soils derived from these deposits.

The majority of the Site is covered by building footprint with the exception of former Burton Street to the north and the new at grade Ellicott Street entrance area referred to as the Courtyard. Underlying the building is a thin veneer (2 to 3 inches) of fill material consisting of black fine to coarse sand with ash. The underlying native soils generally consisting of a varying thickness and alternating layers of reddish-brown sandy lean clays and sandy silts to depths of 40 feet below investigation starting grade.

Under the former Burton Street roadway, the fill material consisting of asphalt and concrete subbase was approximately 3 feet thick overlying native reddish-brown sandy lean clays and sandy silts.

A geologic cross section is shown in Figure 4. Site specific boring logs are provided in Appendix E.

2.2.3 Hydrogeology

The Site is located in the Erie-Niagara River Basin. In the Erie-Niagara Basin, the major areas of groundwater are within coarser overburden deposits, and limestone and shale bedrock. Regional groundwater may flow south towards the Buffalo River and/or west towards Lake Erie.

Groundwater measurements collected during the RI on June 2016 from the ten (10) on-site monitoring wells indicate a southerly groundwater flow direction. The hydraulic gradient was calculated to range from 0.02 to 0.03 feet/foot.

Groundwater depths were measured to be approximately 12 feet below ground surface (fbgs) at RIMW-2 (located on the western portion of the Site at a grade similar to Washington Street) to 1 fbgs at RIMW-4 (located in the lower basement area approximately 9 to 10 feet below surrounding street grade).

A groundwater contour map is shown in Figure 5. Monitoring well and groundwater elevation data is provided in Table 2. Groundwater monitoring well construction logs are provided in Appendix E.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

TurnKey Environmental Restoration, LLC. Limited Subsurface Investigation Report, Former Trico Plant, 791 Washington Street, Buffalo, New York. July 2013 (Ref. 3).

TurnKey completed a Limited Subsurface Investigation at the Site in 2013. Eleven (11) soil borings were completed within the building footprint. The findings of the previous investigation are as follows:

- Oil staining was noted in numerous areas of the basement and first floor of the building.
- Open buckets/containers of oil were noted in multiple areas of the basement.
- Six in-ground lifts were noted in the western loading dock area of the building and oil-staining was noted surrounding the lifts. Apparent oil was observed within the void space exposed between two layers of the first-floor concrete foundation in the soil boring identified as SB-1, proximate to the in-ground lifts. These lifts will require removal prior to site redevelopment.
- The sub-basement was filled with water at the time of the investigation; historic reports identified approximately 144,000 gallons water are present in the sub-basement of the complex.
- Elevated concentrations of polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and metals have been detected in sub-slab soil samples collected from beneath the building first floor and basement foundations.

Benchmark Environmental Engineering and Science, PLLC. Remedial Investigation/Alternatives Analysis Report, Former Trico Plant, 791 Washington Street, Buffalo, New York, BCP Site Number C915281. January 2017 (Ref. 4).

Benchmark-TurnKey completed a Remedial Investigation to more fully characterize the Site in accordance with the BCP requirements. The RI included soil vapor intrusion sampling (indoor, outdoor and sub-slab air), interior utility observations, the completion of soil borings, and installation of monitoring wells/piezometers to assess soil and groundwater at the Site. The findings of the RI are as follows.

Geology/Hydrogeology

- In general, the geology at the Site underlying the concrete building slabs is native soil consisting of a varying thickness of reddish-brown sandy lean clays and sandy silts to depths of around 40 feet below investigation grade. In some locations underlying the concrete building slab, a thin veneer (2 to 3 inches) of fill material was present consisting of black fine to coarse sand with ash overlying the native soil.
- The depth to groundwater at the Site ranged from 1.65 feet below grade (fbg in the lowest portion of the basement in the southern of the building) to 11.75 fbg and indicated a southerly groundwater flow direction.

Summary of Analytical Results

- Based on the RI soil/fill data, no volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs) were detected above the Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs). There were chlorinated VOCs (cVOCs) detections beneath the concrete slab in the former truck repair area that slightly exceeded their respective Part 375 Protection of Groundwater Soil Cleanup Objectives (PGWSCOs). Two sample locations from the Limited Subsurface Investigation (SB-10 and SB-11) had slightly elevated SVOCs above RRSCOs. No polychlorinated biphenyls (PCBs), pesticides, or herbicides were detected above MDLs during the RI; however, the Limited Subsurface Investigation sample location SB-8 had a PCB concentration slightly above its RRSCO. Arsenic was the only metal analyte detected during the RI slightly above its respective RRSCO and at only one location, RISB-13. Arsenic, mercury, and barium were the only metal

analytes detected slightly above their respective RRSCOs during the Limited Subsurface Investigation (SB-1, -2, -7 and -8).

- Based on the groundwater data, SVOCs, metals, PCBs, pesticides, or herbicides are not considered to be a concern in Site groundwater. Two SVOCs were detected at one location at concentrations above their respective GWQS; however, these detections are relatively low and not considered significant. Certain metals were detected slightly above GWQS; however, the metals were primarily limited to naturally occurring minerals with the exception of iron, which is a common analyte found in groundwater in urban settings; and magnesium and sodium are common to road salt used on the streets surrounding the Site. Furthermore, municipally supplied potable water is available, and on-site groundwater is not used for potable or other purposes.

cVOCs were detected at four locations in the central portion of the Site and may contribute to SVI. Concentrations of total chlorinated-VOCs (cVOCs) in groundwater at RIMW-4, RIMW-7 and RIMW-9 do not exceed 500 ug/L at any one particular location. The Site and surrounding area are serviced by a municipal drinking water system.

- VOCs were not detected above their respective groundwater quality standards (Ref. 5, GWQS) in the two off-site (36 to 40 feet deep) wells installed at NYSDEC's request. Deep and/or off-site groundwater does not appear to be a concern.
- Based on the New York State Department of Health (NYSDOH) Soil Vapor Intrusion (SVI) Guidance decision matrices (Ref. 6) the building will require mitigation due to elevated cVOC concentrations in sub-slab and indoor air samples. [As discussed in Section 3.4, the basement indoor parking ventilation systems, a building control, address this concern.]
- The results of the basement surface water sampling indicate that low levels of metals and pesticides are present in the water. No VOCs, PCBs, or herbicides were detected above method detection limits (MDLs).
- Given the nature and extent of contamination present underneath the building, in an urban setting, with a long history of commercial/industrial use, it is not

reasonably practicable to remediate the property to pre-release (Unrestricted Use) or Track 2 Restricted-Residential Use conditions.

Alternative Analysis

Based on the Alternatives Analysis completed, a Track 4 RRSCO cleanup will achieve the Sites remedial action objectives (RAOs) and is the selected remedy. Additional components of the remedial measures to achieve the selected remedy include:

- Treating on-site groundwater in-situ.
- Removing hydraulic lift infrastructure and any associated impacted soil/fill followed by collecting post-excavation confirmatory samples in accordance with DER-10.
- Managing impacted water during remedial activities and hydraulic lift removal.
- Pumping sub-basement water with on-site treatment, if required by Buffalo Sewer Authority (BSA), prior to discharging to sanitary sewer.
- Cleaning accessible utility and/or sewer services 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 addressed (e.g., encapsulated or sealed) consistent with a Restricted Residential Use scenario.
- Installing an active sub-slab depressurization (ASD) system within the existing buildings. [As discussed in Section 3.4, the basement indoor parking ventilation systems, a building control address this concern.]
- 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. Building foundations removed for future development must be replaced by six inches of concrete or asphalt (including sub-base material), or a minimum of two feet of clean soil/gravel meeting the import criteria for restricted-residential use sites, in accordance with Appendix 5 of DER-10.

- Implementing the Site Management Plan (SMP), which will include:
 - Engineering Controls (ECs) consisting of the existing building foundations and asphalt on former Burton Street to eliminate potential exposure pathways to contaminants and building ASD system for SVI control.
 - Institutional Controls (IC) to restrict groundwater use on-site and limit Site uses to restricted-residential use.
 - Operation and Maintenance Plan for the ASD System.
 - Excavation Work Plan to assure that future intrusive activities and soil/fill handling at the Site is completed in a safe and environmentally responsible manner.
 - Site Monitoring Plan that includes provisions for a Site-wide inspection program to assure that the EC/ICs have not been altered and remain effective.
 - Environmental Easement filed with Erie County.

Benchmark Environmental Engineering and Science, PLLC. Remedial Action Work Plan, Former Trico Plant, BCP Site Number C915281, Buffalo, New York. July 2017 (Ref. 7).

Benchmark Environmental Engineering and Science, PLLC (Benchmark), in association with TurnKey Environmental Restoration, LLC (TurnKey), referred to herein as Benchmark-TurnKey, prepared this Remedial Action Work Plan (RAWP) on behalf of 847 Main Street, LLC, 791 Washington Street, LLC, and their construction manager, The Krog Group, LLC, referred to herein as Krog. The RAWP provided the scope of work and procedures for completion of planned remedial activities on the Site consistent with the NYSDEC-approved RI/AA Report and NYSDEC-issued Decision Document (DD). The selected remedy is a Restricted-Residential Track 4 approach (i.e., restricted use with site-specific soil cleanup objectives) incorporating the following major remedial elements:

- Removal of hydraulic lifts, associated infrastructure and associated impacted soil/fill.

- In-Situ direct injection of biological amendments to address areas of the Site impacted with chlorinated VOCs in groundwater.
- Installation of an active sub-slab depressurization (ASD) system within the existing building (Active Sub-slab Depressurization System Work Plan will be submitted under separate cover). [As discussed in Section 3.4, the basement indoor parking ventilation systems, a building control, address this concern.]
- Cleaning accessible utility and/or sewer services with evidence of potential impacts.
- Sub-basement water treatment and discharge.
- Removing and properly disposing off-site miscellaneous abandoned regulated waste materials; and abating building components for lead, asbestos, oil staining, and PCBs as required during redevelopment.
- Maintenance and replacement of site cover system within areas of the building footprint that will undergo demolition/redevelopment.
- Development of a Site Management Plan (SMP) for post-certificate of completion (COC) operation, maintenance and monitoring.

Benchmark Environmental Engineering and Science, PLLC. Remedial Action Work Plan Addendum for Areas Formerly Containing Oil-Filled Electrical Equipment & Loading Dock Areas, Former Trico Plant, 791 Washington Street, Buffalo, New York, BCP Site Number C915281. December 2019 (Ref. 8).

PCB sampling of a former interior loading area and accessible areas of the building basement that formerly contained oil-filled electrical equipment (referred to as electrical equipment areas, or EEAs) indicated the presence of PCBs at concentrations above 1 mg/kg in the concrete of these areas which require remedial action. The sampling of the loading dock area and EEAs were completed in accordance with NYSDEC-approved work plans: Loading Dock Concrete & Soil Sampling Work Plan and Concrete-Slab Sampling Work Plan for Areas Formerly Containing Oil-Filled Electrical Equipment (Ref. 9 and 10), respectively. The locations where PCBs were detected above 1 mg/kg represented a limited area of the existing concrete Site cover system (approximately 8,000 square feet, less than 10% of cover system).

Loading Dock Area Remedial Action

Because the initial PCB concentrations detected in the loading dock were greater than 50 mg/kg, the remedial actions completed in the former loading area were subject to

the Toxic Substance Control Act (TSCA). The concrete floor and underlying impacted soils with concentrations greater than 1 mg/kg were addressed using a performance-based disposal approach pursuant to 40 CFR 761.61(b). This involved the removal and off-site disposal of concrete and underlying soil with PCB concentrations exceeding 1 mg/kg at a chemical waste landfill approved under 40 CFR 761.75 (i.e., approved Subtitle C landfill permitted to accept PCB remediation waste). The TSCA-approved landfill used for this project was US Ecology in Belliveau, Michigan. Approximately 378 tons of concrete and soil were taken to US Ecology landfill for disposal as TSCA-regulated remediation waste.

The concrete and soil removed from the former loading dock area was replaced with a crushed stone sub-base and a new 6-inch concrete slab.

Electrical Equipment Areas Remedial Action

The concrete associated with EEAs 2, 3, 4, and 5 required remedial action which was removal and off-site disposal. The results of the soil samples collected from the EEAs were less than 1 mg/kg PCBs and did not required remedial action.

The concrete associated with EEA 3 was transported to US Ecology landfill in Bellevue, Michigan due to the PCB concentrations of the oil in the former electrical equipment present in that area (greater than 50 mg/kg).

The concrete associated with EEAs 2, 4, and 5 were disposed of as non-TSCA regulated concrete in a Subtitle D Sanitary landfill (Modern Disposal in Model City, New York) as the impacts to the concrete were related to non-TSCA electrical equipment. Approximately 113 tons of concrete were taken to Modern Landfill in Model City, New York for disposal as non-TSCA waste.

The concrete removed from EEA2 was replaced with a new sub-base and a new 6-inch concrete slab. The concrete removed from EEA3, EEA4, and EEA5 were replaced with an orange demarcation layer and 2-feet of 2-inch crusher run stone.

The remedial actions implemented at the Site were documented in Final Engineering Report (Ref. 11) dated December 2019.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated July 2017 are as follows:

2.4.1 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation exposure to contaminants volatilizing from contaminants from soil.

2.4.2 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.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

2.4.3 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 a Site.

2.5 Remaining Contamination

2.5.1 Soil

The previous investigations completed at the Site have identified subsurface contamination at the Site which exceeds its respective Unrestricted Use SCOs. No surface soil contamination existing as the entire footprint of the Site is covered with hardscape.

The contaminant classes detected above their respective Unrestricted Use SCO include:

VOCs, specifically chlorinated-VOCs, were detected beneath the concrete basement slab in the former truck repair area in the central western portion of the building.

SVOCs, specifically polycyclic aromatic hydrocarbons (PAHs), were detected beneath the concrete slab in the south basement area of the building.

Metals were present beneath the basement floor at multiple locations below the basement concrete slab. Barium was detected at one location (SB-8, 1 to 1.5 ft) above its respective Restricted Residential Soil Cleanup Objective (RRSCO), mercury was detected at one location (SB-7, 1 to 1.5 ft) above its RRSCO, and arsenic was detected at two locations (SB-2, 1 to 2 ft, and RI SB-13, 1 to 3 ft) slightly above its respective RRSCO.

PCBs were detected in the at a few locations (former hydraulic lift area (SB-1 and SB-2), former interior loading dock area (C2 and F2), former truck repair area (SB-7) and former plastic molding and machine shop area (SB-8)) beneath the concrete slab in those areas of the building.

Table 3 and Figure 6 summarize the results of all soil samples collected that exceed the Unrestricted Use SCO and the Restricted Residential Use SCO at the Site after completion of remedial action.

2.5.2 Groundwater

The previous investigations completed at the Site have identified groundwater contamination at the Site which exceeds groundwater quality standards (GWQS). The contaminant class of concern is VOCs, specifically cVOCs, which were detected in the central portion of the Site and are likely the cause of SVI as discussed in Section 2.5.3.

The detected concentration of cVOCs in the groundwater are less than 0.5 milligrams per liter (mg/L) or 500 ug/L total cVOCs in each well. The concentrations of cVOCs detected above their respective GWQS are located at RIMW-2, -4, -7 and -9 from west to east and are hydraulically cross-gradient of each other as it pertains to groundwater flow direction (north to south). Groundwater samples results indicate the presence of parent compounds PCE and/or TCE and their daughter products, including cis-DCE, trans-DCE and VC, which indicates on-going degradation and natural attenuation of cVOCs in groundwater.

As discussed in Section 2.3, groundwater amendments were injected into the groundwater at the Site to address the cVOCs present in May/June 2019. Approximately 16,000 pound of 3-D Microemulsion (3DMe), 6,400 pounds of Chemical Reducing Solution (CRS) and 96 liters of Bio-Dechlor Inoculum Plus (BDI) were mixed and injected at 90 locations throughout the contaminated groundwater area as shown on Figure 7. Groundwater monitoring is underway as discussed in Section 4.3.

Two (2) SVOCs were detected at one (1) location (RIMW-9) at estimated concentrations above their respective GWQS; however, these detections are relatively low and not considered significant.

Minor metal analyte contaminants are present in the groundwater. The analytes detected above their respective GWQS, with the exception of cobalt, iron, magnesium and sodium detected in the dissolved samples, were from total metals analysis in unfiltered samples with high turbidity. The results are likely biased high due to sediment present within those groundwater samples. Iron is a common analyte found in groundwater in urban settings; and magnesium and sodium are common to road salt used on the streets surrounding the Site. Dissolved cobalt was detected in RIMW-3 and RIMW-8 at concentrations slightly above its GWQS.

Table 4 is a summary of the groundwater samples collected from the Site through July 2024.

2.5.3 Soil Vapor

Due to the presence of cVOCs in the groundwater at the Site a soil vapor intrusion (SVI) investigation was completed at the Site. The SVI investigation consisted of the collection of indoor air (two samples), outdoor ambient air (one sample) and sub-slab vapor samples (six samples). The NYSDOH SVI Guidance matrices require the use of the indoor air and sub-slab vapor sample results in conjunction to determine the resultant outcome. The following indoor samples were used in conjunction the following sub-slab air samples when reviewing the decision matrix.

- IA -1 was used in conjunction with SSV-1, SSV-2, SSV-3, and SSV-7
- IA-2 was used in conjunction with SSV-4, SSV-5, and SSV-6.

Based on the NYSDOH SVI Guidance decision matrices the building will require mitigation due to elevated trichloroethene (TCE), cis-1,2-dichloroethene, and 1,1-dichloroethene concentrations in sub-slab and indoor air samples.

Table 5 is a summary of the SVI sample results compared to the NYSDOH decision matrices and Figure 9 identifies the location of the SVI samples collected and the portion of the building to be mitigated by the active sub-slab depressurization (ASD) system to be installed. The Boiler Room was backfilled with C&D debris during redevelopment to a basement floor grade and covered with concrete. The area under loading dock/garage area along Washington Street was walled off. These areas are inaccessible. As discussed in Section 3.3.2, NYSDEC/NYSDOH approved a Request for SMP Variance for the ASD System (SMP Variance, Ref. 16) which was approved March 21, 2024. The SMP Variance allowed the exhaust fans associated with the basement indoor parking area ventilation system to be used to mitigate the SVI concern in lieu of installing an ASD system.

2.5.4 Building Materials

Suspended Concrete Floor

PCBs were detected in a concrete floor on the 1st floor of the building in the southwestern portion of the Site (see Figure 10). The concrete floor is a suspended concrete slab above the basement in this area of the building. This portion of the Site is to be used as an interior parking area. To address the PCBs in the suspended concrete slab the entire suspended concrete slab area was removed and taken to US Ecology landfill in Bellevue, Michigan for disposal as TSCA waste. Approximately 590 tons of concrete was removed and disposed of as TSCA waste in 2019, and an additional 610 tons was removed and disposed of in January through March 2023 as TSCA waste with NYSDEC approval. These activities were documented in the December 2019 FER and May 2023 Periodic Review Report (Ref. 12), respectively.

Clay Tile Wall

PCBs were detected on a small area of wall (approximately 30 feet in length) located along the western perimeter wall of the former loading dock area (see Figure 10). The PCBs were detected in sample of the clay tile material used to finish the interior portion of the wall at 50.1 mg/kg. Other building material samples collected from other wall finish materials

(concrete and red brick) around the perimeter of the former loading dock and future interior parking areas did not exceed 1 mg/kg PCBs. The portion of the former loading dock area in the vicinity of the impacted wall will be used as utility rooms associated with the building water service and fire pumps for the sprinkler system (low-occupancy use).

Additional PCB sampling, as approved by NYSDEC and NYSDOH, was completed along the subject clay tile wall area to determine the area to be addressed and removed and disposed as TSCA waste. The work was completed in accordance with the NYSDEC-approved Work Plan for Removal of Interior PCB-Impacted Wall (Ref. 13). Post-removal confirmation samples were collected and provided to the NYSDEC. Removal continued until the PCB concentrations were less than 1 mg/kg. The removed wall material was staged in a cardboard tote on a wooded pallet until transport off-site. In May 2023, approximately 4.9 tons of wall material (clay tile and brick) were removed and disposed as TSCA waste to achieve a 1 mg/kg criteria. The work was documented in the May 2024 PRR (Ref. 14).

Future Demolition Work

PCB sample analysis will be completed in the future on historic building materials generated from the Site prior to reuse or recycling, as further discussed in Section 4.1.1.

3.0 INSTITUTIONAL & ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix B) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to restricted-residential, commercial and industrial uses only, as allowed City of Buffalo zoning (Green Code, Ref. 15). Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 3. These ICs are:

- The property may be used for: restricted residential; commercial, industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 3, and any potential impacts that are identified must be monitored or mitigated; and
- Vegetable gardens and farming on the Site are prohibited;
- An evaluation shall be performed to determine the need 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.

3.3 Engineering Controls

3.3.1 Cover System

Exposure to remaining contamination at the Site is prevented by a cover system placed over the Site. This cover system is comprised of a minimum of 6-inches existing asphalt pavement and subbase (northeastern exterior portion of the Site along former Burton Street), concrete-covered sidewalks, and concrete building slabs. The interior building slabs vary in thickness from 4-inches to 9-inches in thickness. Areas formerly with 2-foot of stone cover after concrete removal as part of remedial activities in 2019 (i.e., former Boiler Room and former electrical equipment areas) were replaced with concrete slabs. Figure 11 depicts the post-redevelopment cover system.

The Excavation Work Plan (EWP) provided in Appendix B outlines the procedures required to be implemented in the event the cover system is breached, penetrated, or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the Site and provided in Appendix H. Any breach of the site's cover system must be overseen by a Professional Engineer (PE) who is licensed and registered in New York State or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

3.3.2.1 Cover System

The cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.2.2 Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period, or achieve the Groundwater RAOs for Environmental Protection as outlined in Section 2.4.2. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

3.4 Building Control - Indoor Parking Ventilations Systems

A SMP Variance (Ref. 16) was prepared and submitted to NYSDEC/NYSDOH on March 13, 2024, which requested the use of the basement ventilation systems from the indoor parking areas to be used to address the SVI concern at the Site prior to building occupancy. NYSDEC/NYSDOH issued a letter on March 21, 2024 indicating that the SMP Variance was acceptable, “*as long as the lowest floors of the building remain parking (not occupied), are continuously ventilated, and remaining contamination onsite continues to decrease. If any of these conditions change, a soil vapor intrusion assessment will be required.*”.

The ventilation system within the parking areas of the building consists of seven (7) Make Up Air Units (4 for basement area, 2 for Street Level parking area, and 1 for Second-Floor parking area), which bring tempered outdoor air into the parking areas, and 12 Exhaust Fans associated with the parking areas.

Two (2) exhaust fans associated with the ventilation systems in the basement (EF-4 and EF-7) operate continuously and place the basement parking area under negative pressure relative to the occupied spaces on the floors above. Additionally, an exhaust fan (EF-12) operates continuously on the second-floor parking area.

The parking area floors were also sealed with Neogard TrafficTuff coating to provide a surface seal of the concrete slab areas.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of Site management for the Site are included in the Quality Assurance Project Plan provided in Appendix G.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCO's for soil; and
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.1.1 Future Building Material Demolition

Any porous historic building materials, such as concrete slabs, concrete block, brick, clay tile, etc. generated from demolition work (e.g.; removal of floors, walls or ceilings), during current or future renovation of the building will be tested for PCBs prior to on-site reuse

and/or off-site recycling. Sampling will be completed in accordance with composite sample requirements for volume quantities outlined in DER-10 Table 5.4(e)10. The analytical results will be provided to NYSDEC with the type of building materials that were sampled, the quantity of materials to be generated, and the proposed location of the on-site reuse and/or off-site recycling location. Building materials with PCB concentrations less than 10 mg/kg can be reused on-site under the cover system with NYSDEC approval. Porous building materials with PCB concentrations less than 1 mg/kg can be taken off-site for recycling. Building materials that cannot be reused nor meet the off-site recycling criteria will be characterized for proper landfill disposal.

4.2 Site-Wide Inspection

Site-wide inspections will be performed annually. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix I – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site records are up to date.

Inspections of all remedial components installed at the Site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP

schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public. The remedial party will submit follow-up status reports to the NYSDEC within 45 days of the event on actions taken to respond to any emergency event requiring ongoing responsive action, describing and documenting actions taken to restore the effectiveness of the ECs.

4.3 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the select groundwater monitoring wells on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in Table 6 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 6 – Post Remediation Sampling Requirements and Schedule

| Sampling Location | Analytical Parameters | | Schedule |
|-------------------|------------------------|--|----------|
| | VOCs (EPA Method 8260) | Additional Groundwater Quality Parameters * | |
| RIMW-2 | X | As needed to monitor the effectiveness of the groundwater amendment injections | Annually |
| RIMW-4 | X | | |
| RIMW-7R | X | | |

* = Additional groundwater quality parameters include dissolved iron, manganese, sulfate, nitrate-nitrite, and dissolved gases (methane, ethane, and ethene).

Detailed sample collection and analytical procedures and protocols are provided in Appendix F – Field Operating Procedures and Appendix G – Quality Assurance Project Plan.

4.3.1 Groundwater Sampling

Groundwater monitoring was performed semi-annually for two years post-COC (2020 and 2021) and annually thereafter (2022 on) to monitor the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The initial network of monitoring wells installed monitored upgradient, on-site, and downgradient groundwater conditions at the Site. As groundwater conditions have improved post-injections, or locations did not have groundwater exceedances for multiple sampling events, a number of the monitoring wells have been decommissioned with NYSDEC-approval as follows:

RIMW-1, RIMW-3, RIMW-5, RIMW-6 and RIMW-8 were approved on June 25, 2024.
RIMW-7, RIMW-9, and RIMW10 were approved on October 19, 2022.

RIMW-11 and RIMW-12 were approved on November 8, 2022.

Currently, three (3) monitoring wells MW-2, MW-4 and MW-7R are required to be monitored annually (see Figure 8).

Table 2 summarizes the wells identification number, location, depths, diameter and screened intervals of the wells monitoring well construction logs are included in Appendix E of this document.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.3.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix I - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Operating Procedures provided as Appendix F of this document.

5.0 OPERATION & MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the Building Control component being used to protect against soil vapor intrusion at the Site. A SMP Variance was prepared and submitted to NYSDEC/NYSDOH on March 13, 2024, which requested the use of the basement ventilation systems from the indoor parking areas to be used to address the SVI concern at the Site prior to building occupancy. NYSDEC/NYSDOH issued a letter on March 21, 2024, indicating that the SMP Variance was acceptable, *“as long as the lowest floors of the building remain parking (not occupied), are continuously ventilated, and remaining contamination onsite continues to decrease. If any of these conditions change, a soil vapor intrusion assessment will be required.”*.

The basement parking areas are outfitted with a ventilation system. Two (2) exhaust fans (EF-4 and EF-7) associated with the ventilation system in the basement operate continuously and place the basement parking area under negative pressure relative to the occupied spaces on the floors above. This building control for the Site was installed post-COC (during redevelopment construction activities) and prior to building occupancy. Additionally, EF-12, in the 2nd floor parking area also operates continuously. Appendix J contains information on the ventilation system.

If the exhaust fans EF-4 and EF-7 are not in operation a licensed HVAC contractor should be contacted to assess and repair the exhaust fans, as needed.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given Site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a current vulnerability assessment that evaluates the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding. This section also identifies vulnerability assessment updates that will be conducted for the site in Periodic Review Reports.

A discussion of potential vulnerabilities assessed for this SMP and to be assessed during periodic reviews are included below:

1. Flood Plain: The Site is located approximately 1.6 miles east of the Niagara River and is not located within a flood plain or low-lying/low-groundwater recharge area, per the NYSDEC Environmental Resource Mapper.
2. Sea Level Rise: The Site is not vulnerable to sea level rise, per the National Oceanic and Atmospheric Administration (NOAA) Sea Level Rise Viewer.
3. Extreme Heat/Cold: Observed Average temperatures in Erie County, New York are expected to rise between 3.5- and 8-degrees Fahrenheit in the next 70 years (2090) based on projections provided by The Climate Explorer.
4. Total Precipitation: Average precipitation is expected to increase between 1 and 3 inches in the next 70 years (2090) based on projections provided by The Climate Explorer.
 - a. Site Drainage and Storm Water Management: Stormwater is directed toward existing stormwater system located under Washington Street, Ellicott Street, and Burton Street via existing manholes/inlets and/or new stormwater drainage pipes.

- b. Erosion: The entire site is covered by hardscape (concrete and asphalt). Therefore, erosion at the Site is not a concern.
- 5. Severe Weather Conditions: Climate change is increasing temperatures and precipitation in the Western New York Region. These changes will likely result in an increased frequency of high severity storms. Types of storms and resulting environmental events along with their potential impacts on the Site are discussed below.
 - a. Blizzard/Lake Effect Snow: Increased intensity of winter storms in Buffalo, New York may lead to increased snowfall, heavy winds, and extreme cold temperatures. Heavy snowfall and driving bans could stall corrective measures/inspection activities if responsible parties are unable to reach the Site.
 - b. Drought: Drought conditions are generally not a concern in Buffalo, New York.
 - c. Wildfires: The risk of wildfires is low in the immediate area.
 - d. Landslides: The Site is located in a flat-lying urban area, therefore there is no risk due to landslides, per the USGS Landslide Hazards Map.
- 6. Spill/Contaminant Release: There are no areas of the Site or remedial systems that utilize chemicals that may provide a concern to the Site if a spill were to occur. Therefore, spill/contaminant release due to human error or storm-related damage caused by flooding, erosion, high winds, and/or loss of power, is not a concern at the Site.

Site inaccessibility due to blizzard/lake effect snow conditions has been identified as a potential site vulnerability. No other vulnerabilities have been identified for SMP activities. This climate vulnerability assessment will be reviewed annually and will be updated in the event that any changes are made to the remedy.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this SMP. This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during site management, and as reported in the Periodic Review Report (PRR).

An Environmental Footprint Analysis was completed using the USEPA's Spreadsheets for Environmental Footprint Analysis (SEFA), a NYSDEC-approved footprint analysis calculator (see Appendix L). Fuel usage and emissions and waste disposal were estimated for the remedy for a one-year period. Remedy components analyzed included annual groundwater monitoring and inspection.

Best management practices will be (BMPs) implemented at the site to reduce the environmental footprint as further discussed below:

Emissions: Vehicle emissions and energy use will be minimized by reducing site visits to the extent practicable, however at least 2 site visits will be required to complete annual groundwater monitoring and inspections.

Energy Usage: No energy usage is required for implementation of the remedy.

Waste Generation: The remedy will result in minimal waste production. Groundwater monitoring will result in accumulation of contaminated purge water, which will be containerized and stored on-site. An estimated 20 gallons (likely less) of purge water will be characterized as needed and appropriately disposed of each year. No other waste will be generated as part of the remedy.

Land and/or Ecosystems: Prior to redevelopment, the Site was vacant, contaminated land developed with the existing building. The building was in poor condition and contaminated. Therefore, the Site provided little to no positive impact to the community and did not support any habitats or natural/cultural resources. The Site has been redeveloped as residential apartments with supporting commercial use, which significantly improves its impact to the community.

Water Usage: No water usage is required for implementation of the remedy.

In addition to implementation of BMPs, the following actions were considered to make the remedy greener and more sustainable:

- Cleaner and more energy-efficient equipment will be utilized during OM&M activities to the extent practicable.
- Green remediation principles will be applied to any future work plans and/or remedial actions including but not limited to cover system modifications.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the Project Manager feels appropriate, (e.g. during significant maintenance events or in conjunction with storm recovery activities).

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities after approval from the DER project manager. Reporting of these modifications will be presented in the PRR.

6.2.2 Remedial Systems

Remedial systems will be operated properly considering the current Site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate.

There are no remedial systems operating at the Site.

6.2.3 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

There are no buildings operating remedial systems at the Site.

6.2.4 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a

laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

The following activities have been considered:

- Reduced sampling frequencies: Sampling will be conducted at the frequency described in this SMP.
- Reduced site visits: Site visits will be conducted at the frequency described in this SMP.
- Coordination/consolidation of activities: Activities will be consolidated so as to reduce the frequency of site visits to the extent possible while still completing all requirements specified in this SMP.

Use of mass transit/carpooling for site visits: Mass transit is limited in the City of Buffalo. Carpooling will be utilized when possible.

6.2.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix I – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits. A set of metrics has been developed and will be evaluated over time to ensure that green remediation actions are achieving the desired results.

Metrics specific to the Site include the following:

- Fuel usage for personal vehicles (transportation to/from the Site to complete groundwater sampling and annual inspections)
- Waste generation and disposal (purge water during groundwater sampling)
- Fuel usage for waste transportation vehicles (transporting waste purge water from the Site to disposal location)

Metrics will be reported annually in the PRR. Any additional metrics identified throughout site management will also be reported and the SEFA will be revised.

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a Site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principles are to be considered when performing the RSO.

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance, and monitoring events will be recorded on the appropriate site management forms provided in Appendix I. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375 a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 7 and summarized in the Periodic Review Report.

Table 7: Schedule of Interim Monitoring/Inspection Report

| Task/Report | Reporting Frequency* |
|-------------------------------|---|
| Groundwater Monitoring Report | Laboratory data provided electronically (annually after sampling) and report with the annual PRR. |
| Periodic Review Report | Annually, or as otherwise determined by the Department |

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);

- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and

- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link <http://www.dec.ny.gov/chemical/62440.html>.

7.2 Periodic Review Report

Periodic Review Report (PRR) submittals began in 2021, sixteen (16) months after the Certificate of Completion was issued and have been submitted annually to the NYSDEC project manager. However, another frequency may be required by the NYSDEC project manager. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix D - Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment, and certification of all ECs/ICs required by the remedy for the Site.
- Results of the required annual site inspections and severe condition inspections, if applicable.
- Description of any change of use, import of materials, or excavation that occurred during the certifying period.
- All applicable site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds

analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.

- Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
 - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
 - O&M data summary tables;
 - A current plume map for sites with remaining groundwater contamination; and
 - A groundwater elevation contour map for each gauging event.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: <http://www.dec.ny.gov/chemical/62440.html>.
- A Site evaluation, which includes the following:
 - The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP), ROD, or Decision Document;
 - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
 - An update to the climate change vulnerability assessment if site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities.
 - A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a site's environmental impacts and

recommendations to improve the remedy's environmental footprint. The PRR will include the completed Summary of Green Remediation Metrics form provided in Appendix L.

- An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD, or Decision Document; and
- The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

“For each institutional or engineering control identified for the site, I certify that all of the following statements are true:

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*

- *The information presented in this report is accurate and complete.*
- *No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and*
- *I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/ Remedial Party or Owner’s/ Remedial Party’s Designated Site Representative] for this site.”*

In addition, every five years the following certification will be added:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located, and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

7.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3, upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in Appendix K. The RSO report will document the research/

investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and NYSDOH project manager.

8.0 REFERENCES

1. NYSDEC. *6NYCRR Part 375, Environmental Remediation Programs*. December 14, 2006.
2. NYSDEC. *DER-10 - Technical Guidance for Site Investigation and Remediation*. May 3, 2010.
3. TurnKey Environmental Restoration, LLC. *Limited Subsurface Investigation Report, Former Trico Plant, 791 Washington Street, Buffalo, New York*. July 2013.
4. Benchmark Environmental Engineering and Science, PLLC. *Remedial Investigation/ Alternatives Analysis Report, Former Trico Plant, 791 Washington Street, Buffalo, New York, BCP Site Number C915281*. January 2017.
5. NYSDEC, 1998. *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1*. June 1998 (April 2000 addendum).
6. NYSDOH. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October 2006 (and subsequent updates).
7. Benchmark Environmental Engineering and Science, PLLC. *Remedial Action Work Plan, Former Trico Plant, BCP Site Number C915281, Buffalo, New York*. July 2017.
8. Benchmark Environmental Engineering and Science, PLLC. *Remedial Action Work Plan Addendum for Areas Formerly Containing Oil-Filled Electrical Equipment & Loading Dock, Former Trico Plant, 791 Washington Street, Buffalo, New York, BCP Site Number C915281*. December 2019
9. Benchmark Environmental Engineering and Science, PLLC. *Loading Dock Concrete & Soil Sampling Work Plan, Former Trico Plant, BCP Site Number C915281*. November 18, 2019.
10. Benchmark Environmental Engineering and Science, PLLC. *Concrete-Slab Sampling Work Plan for Areas Formerly Containing Oil-Filled Electrical Equipment, Former Trico Plant, BCP Site Number C915281*. November 2019

11. Benchmark Environmental Engineering & Science, PLLC. *Final Engineering Report, Former Trico Plant, NYSDEC Site Number: C915281, Buffalo, New York.* December 2019.
12. Benchmark Civil/Environmental Engineering & Geology, PLLC. *Periodic Review Report, April 26, 2022 to April 26, 2023, Former Trico Plant, BCP Site No. C915281, Buffalo, New York.* May 2023.
13. Benchmark Civil/Environmental Engineering & Geology, PLLC. *Work Plan for Removal of Interior PCB-Impacted Wall, Former Trico Plant (BCP Site No. C915281), 791 Washington Street, Buffalo, New York.* July 11, 2023.
14. Roux Environmental Engineering and Geology, D.P.C. *Periodic Review Report, Former Trico Plant Site, NYSDEC BCP Site #C915281, Buffalo, New York.* Revised June 6, 2024.
15. Camios. *Buffalo Green Code, Unified Development Ordinance.* December 2016.
16. Roux Environmental Engineering and Geology, D.P.C. *Request for Site Management Plan Variance for Active Sub-Slab Depressurization System, Former Trico Plant, NYSDEC Site No. C915281, Buffalo, New York.* March 13, 2024.

TABLES

TABLE 2
MONITORING WELL CONSTRUCTION DETAILS & GROUNDWATER ELEVATIONS
SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BUFFALO, NEW YORK

| LOCATION | | Elevations | | | | | | | | | | | | Well Screen Data | | |
|----------------|----------------|---------------------------------|--|--------------------|-------------------------------|----------------------------------|--------------------------------------|---------------------------------|-------------------------------------|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|------------------------|------------------------------|---|
| Number | Date Installed | TOR Elevation (ft) ¹ | Top of Road Box Elevation (ft) ^{1, 2} | Total Depth (fbgs) | Bottom of Well Elevation (ft) | Water Level Depth 6/10/2016 (ft) | Water Level Elevation 6/10/2016 (ft) | Water Level Depth 8/2/2019 (ft) | Water Level Elevation 8/2/2019 (ft) | Water Level Depth 6/28/2023 (ft) | Water Level Elevation 6/28/2023 (ft) | Water Level Depth 7/25/2024 (ft) | Water Level Elevation 7/25/2024 (ft) | Well Diameter (inches) | Length of Well Screen (feet) | Well Screen Interval Elevation (ft) ^{1, 2} |
| RIMW-2 | 05/23/2016 | 503.09 | 503.74 | 16 | 487.74 | 11.75 | 491.34 | 11.79 | 491.30 | 10.66 | 492.43 | 12.12 | 490.97 | 2 | 10 | 487.74 to 497.74 |
| RIMW-4 | 05/25/2016 | 491.15 | 491.46 | 11 | 480.46 | 1.65 | 489.50 | 0.05 | 491.10 | 0.35 | 490.80 | 0.96 | 490.19 | 1 | 10 | 490.15 to 480.15 |
| RIMW-7R | 10/13/2023 | 491.00 | 491.30 | 16 | 475.30 | NI | NA | NI | NA | NI | NA | 3.15 | 487.85 | 2 | 10 | 475.30 to 485.30 |

Abbreviations:

ft = feet.
fbgs = feet below ground surface
NI = not installed
NA = not applicable
NM = not measured

Notes:

1. Elevations are based on an assumed vertical elevation established using an arbitrary benchmark (fire hydrant at corner of Washington St and Goodell).
2. Elevations were estimated based on survey measurements from nearby monitoring wells and assuming relatively level floors in the area.

TABLE 3
SUMMARY OF REMAINING SOIL/FILL SAMPLE EXCEEDANCES
SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BUFFALO, NEW YORK

| PARAMETER ¹ | Unrestricted Use SCOs ² | Restricted Residential Use SCOs ² | SAMPLE LOCATIONS | | | | | | | | | | | | | | | | C2 Soil | F2 Soil |
|--|------------------------------------|--|------------------|------------|-------------|--------------|-------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|----------------|----------------|-------|---------|---------|
| | | | SB-1 (1-2) | SB-2 (1-2) | SB-7 1-1.5) | SB-8 (1-1.5) | SB-10 (1-2) | SB-11 (1-2) | RI SB-12 (2-4) | RI SB-13 (1-3) | RI SB-15 (6-8) | RI SB-18 (2-4) | RI SB-24 (4-6) | RI SB-27 (7-8) | RI SB-27 (11-12) | RI SB-28 (4-6) | RI SB-32 (7-8) | | | |
| Volatile Organic Compounds (VOCs) - mg/Kg ³ | | | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | 0.27 | 26 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | ND | 0.026 J | 0.043 J | 0.0023 | -- | -- | |
| 1,1-Dichloroethene | 0.33 | 100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | ND | ND | ND | 0.0016 | -- | -- | |
| Acetone | 0.05 | 100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | ND | ND | ND | 0.0091 | -- | -- | |
| cis-1,2-Dichloroethene | 0.25 | 100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | 0.34 | 0.85 | 0.58 | 0.17 | -- | -- | |
| Methylcyclohexane | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | |
| trans-1,2-Dichloroethene | 0.19 | 100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | 0.079 J | 0.18 | 0.052 J | -- | -- | -- | |
| Trichloroethene | 0.47 | 21 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0026 J | -- | 1.9 | 2.8 | 5.4 | 0.024 | -- | -- | |
| Semi-Volatile Organic Compounds (SVOCs) - mg/Kg ³ | | | | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | -- | -- | 0.0062 J | 0.0084 | 0.061 | 0.012 J | 0.19 | 0.037 | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Acenaphthene | 20 | 100 | 0.0049 J | 0.0023 J | 0.025 | 0.015 J | 0.58 | 0.1 | ND | ND | ND | ND | 0.032 J | -- | -- | -- | -- | -- | -- | |
| Acenaphthylene | 100 | 100 | ND | ND | 0.0055 J | 0.23 | 0.074 J | 0.0061 J | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Anthracene | 100 | 100 | 0.0091 | 0.0054 J | 0.048 | 0.24 | 1.5 | 0.27 | ND | ND | ND | ND | 0.11 J | -- | -- | -- | -- | -- | -- | |
| Benzo(a)anthracene | 1 | 1 | 0.036 | 0.017 | 0.15 | 0.77 | 2.6 | 0.41 | 0.021 J | ND | ND | ND | 0.18 J | -- | -- | -- | -- | -- | -- | |
| Benzo(a)pyrene | 1 | 1 | 0.028 | 0.013 | 0.12 | 0.59 | 1.8 | 0.29 | ND | ND | ND | ND | 0.16 J | -- | -- | -- | -- | -- | -- | |
| Benzo(b)fluoranthene | 1 | 1 | 0.062 | 0.048 | 0.22 | 1 | 2.6 | 0.38 | ND | ND | ND | ND | 0.18 J | -- | -- | -- | -- | -- | -- | |
| Benzo(ghi)perylene | 100 | 100 | 0.013 | 0.0079 J | 0.1 | 0.28 | 0.9 | 0.13 | ND | ND | ND | ND | 0.1 J | -- | -- | -- | -- | -- | -- | |
| Benzo(k)fluoranthene | 0.8 | 3.9 | 0.02 | 0.013 | 0.073 | 0.4 | 0.97 | 0.14 | ND | ND | ND | ND | 0.087 J | -- | -- | -- | -- | -- | -- | |
| Bis(2-ethylhexyl) phthalate | -- | -- | -- | -- | -- | -- | -- | -- | ND | 0.13 J | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Carbazole | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | ND | 0.026 J | -- | -- | -- | -- | -- | -- | |
| Chrysene | 1 | 3.9 | 0.042 | 0.031 | 0.16 | 0.69 | 2.1 | 0.31 | ND | ND | ND | ND | 0.16 J | -- | -- | -- | -- | -- | -- | |
| Dibenzo(a,h)anthracene | 0.33 | 0.33 | ND | ND | 0.03 | 0.084 | 0.28 | 0.46 | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Diethyl phthalate | -- | -- | -- | -- | -- | -- | -- | -- | ND | 0.038 J | 0.032 J | ND | ND | -- | -- | -- | -- | -- | -- | |
| Dibenzofuran | -- | -- | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.032 J | -- | -- | -- | -- | -- | -- | |
| Fluoranthene | 100 | 100 | 0.081 | 0.065 | 0.26 | 2.1 | 6 | 0.84 | 0.037 J | ND | ND | ND | 0.39 | -- | -- | -- | -- | -- | -- | |
| Fluorene | 30 | 100 | 0.0042 J | 0.0029 J | 0.027 | 0.057 | 0.51 | 0.1 | ND | ND | ND | ND | 0.046 J | -- | -- | -- | -- | -- | -- | |
| Indeno(1,2,3-cd)pyrene | 0.5 | 0.5 | 0.019 | 0.013 | 0.1 | 0.37 | 1.1 | 0.16 | ND | ND | ND | ND | 0.089 J | -- | -- | -- | -- | -- | -- | |
| Naphthalene | 12 | 100 | 0.0047 J | 0.003 J | 0.073 | 0.019 J | 0.25 | 0.046 | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Phenanthrene | 100 | 100 | 0.048 | 0.03 | 0.22 | 1 | 5.4 | 0.72 | ND | ND | ND | ND | 0.33 | -- | -- | -- | -- | -- | -- | |
| Pyrene | 100 | 100 | 0.056 | 0.037 | 0.22 | 1.6 | 4.7 | 0.67 | 0.03 J | ND | ND | ND | 0.32 | -- | -- | -- | -- | -- | -- | |
| Total Metals - mg/Kg ³ | | | | | | | | | | | | | | | | | | | | |
| Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | 7,500 J | 9,750 B | 22,800 B | 3,460 B | 13,500 B | -- | -- | -- | -- | -- | -- | |
| Arsenic | 13 | 16 | 16 | 22 | 9.4 | 2 | 2.4 | 1.9 | 2.3 | 26.9 | 6.1 | ND | ND | -- | -- | -- | -- | -- | -- | |
| Barium | 350 | 400 | 200 | 69 | 73 | 530 | 57 | 42 | 28.7 | 94.1 | 230 | 17.5 | 49.1 | -- | -- | -- | -- | -- | -- | |
| Beryllium | 7.2 | 72 | -- | -- | -- | -- | -- | -- | 0.3 | 0.88 | 0.93 | ND | 0.57 | -- | -- | -- | -- | -- | -- | |
| Cadmium | 2.5 | 4.3 | 0.82 | 0.55 | 0.37 J | 2.6 | 0.4 J | 0.31 J | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Calcium | -- | -- | -- | -- | -- | -- | -- | -- | 20,700 B | 51,300 B | 51,100 B | 54,100 B | 38,500 B | -- | -- | -- | -- | -- | -- | |
| Chromium | 30 | 180 | 24 | 10 | 9.5 | 110 | 21 | 8.5 | 17.9 | 15.1 | 28.4 | 5.7 | 18.5 | -- | -- | -- | -- | -- | -- | |
| Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | 3.8 | 14.2 | 11.9 | 2.2 | 8.5 | -- | -- | -- | -- | -- | -- | |
| Copper | 50 | 270 | -- | -- | -- | -- | -- | -- | 11.8 | 20.2 | 22.4 | 5.2 | 17.7 | -- | -- | -- | -- | -- | -- | |
| Iron | -- | -- | -- | -- | -- | -- | -- | -- | 12,300 B | 17,100 B | 26,300 B | 7,680 B | 17,600 B | -- | -- | -- | -- | -- | -- | |
| Lead | 63 | 400 | 16 | 11 | 27 | 160 | 16 | 14 | 93.9 | 12.2 | 16.7 | 9.9 | 13.5 | -- | -- | -- | -- | -- | -- | |
| Magnesium | -- | -- | -- | -- | -- | -- | -- | -- | 10,500 B | 8,640 B | 19,400 B | 26,200 B | 16,900 B | -- | -- | -- | -- | -- | -- | |
| Manganese | 1,600 | 2,000 | -- | -- | -- | -- | -- | -- | 277 B | 331 B | 398 B | 292 B | 291 B | -- | -- | -- | -- | -- | -- | |
| Mercury | 0.18 | 0.81 | 0.34 | ND | 1.4 | ND | ND | ND | 0.044 | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Nickel | 30 | 310 | -- | -- | -- | -- | -- | -- | 9.6 | 20.4 | 33.6 | 116 | 20.8 | -- | -- | -- | -- | -- | -- | |
| Potassium | -- | -- | -- | -- | -- | -- | -- | -- | 1,900 | 2130 | 7160 | 1,030 | 4,360 | -- | -- | -- | -- | -- | -- | |
| Selenium | 3.9 | 180 | 0.68 J | 1.1 | 0.33 J | 0.4 J | ND | 0.28 J | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Silver | 2 | 180 | ND | ND | ND | 0.65 | ND | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | -- | -- | |
| Sodium | -- | -- | -- | -- | -- | -- | -- | -- | 1,910 | 963 | 2160 | 192 | 199 | -- | -- | -- | -- | -- | -- | |
| Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | 18.9 | 24.3 | 42.8 | 13.2 | 28.8 | -- | -- | -- | -- | -- | -- | |
| Zinc | 109 | 10,000 | -- | -- | -- | -- | -- | -- | 87 | 64.1 | 78.6 | 25.1 | 132 | -- | -- | -- | -- | -- | -- | |
| Cyanide - Total | 27 | 27 | -- | -- | -- | -- | -- | -- | ND | ND | ND | 23.7 | ND | -- | -- | -- | -- | -- | -- | |
| Polychlorinated biphenyls (PCBs) - mg/Kg ³ | | | | | | | | | | | | | | | | | | | | |
| Total PCBs | 0.1 | 1 | 0.39 | 0.15 | 0.23 | 2.4 | 0.023 J | ND | ND | ND | ND | ND | ND | -- | -- | -- | -- | 0.302 | 0.316 | |
| Pesticides and Herbicides - mg/Kg ³ | | | | | | | | | | | | | | | | | | | | |
| | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | |

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detected.
2. Values per NYSDEC Part 375 Soil Cleanup Objectives (SCOs).
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.

Definitions:
ND = Parameter not detected above laboratory detection limit.
-- = No SCO value available for the parameter; or parameter not analyzed for.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
* = ICV, CCV, ICB, CCB, ISA, ISB, CRI, DICK, or MRL standard; instrument related QC is outside acceptance limits.
F1 = MS and/or MSD Recovery is outside acceptance limits
F2 = MS/MSD RPD exceeds control limits
B = Compound was found in the blank and sample.

Bold = Result exceeds Part 375 Unrestricted SCOs
Bold = Results exceeds Part 375 Restricted Residential SCOs

Table 4
Summary of Groundwater Analytical Results
Site Management Report
Former Trico Plant
Buffalo, New York

| PARAMETER ¹ | GWQS ² | RI MW-1 <i>DECOMMISSIONED</i> | RI MW-2 | | | | | | | | | | | | RI MW-3 <i>DECOMMISSIONED</i> | RI MW-4 | | | | | | | | | | | | RI MW-5 <i>DECOMMISSIONED</i> |
|--|-------------------|----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|----------------------------------|
| | | 06/14/16 | 06/14/16 | 07/01/19 | 08/09/19 | 09/13/19 | 07/21/20 | 11/20/20 | 05/07/21 | 11/09/21 | 07/21/22 | 06/28/23 | 07/25/24 | 06/14/16 | 06/14/16 | 07/01/19 | 08/09/19 | 09/14/19 | 07/21/20 | 11/20/20 | 05/07/21 | 11/09/21 | 07/21/22 | 06/28/23 | 07/25/24 | 06/14/16 | | |
| Volatile Organic Compounds (VOCs) - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| 1,1-Dichloroethene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.6 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| 2-Butanone (MEK) | 50 | ND | ND | ND | 11 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 14 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Acetone | 50 | ND | 44 | ND | 5.8 J | ND | ND | ND | ND | ND | ND | ND | ND | 3 J | 3.2 J | ND | 12 | 12 | 8.8 J | 13 J | 5.4 J | 6 J | ND | ND | ND | ND | ND | |
| Benzene | 1 | ND | ND | 1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.73 J | ND | 32 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Carbon disulfide | 60 | ND | 0.96 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.56 J | 0.98 J | 3 | ND | 0.37 J | ND | ND | 0.41 J | ND | ND | ND | |
| Chlorobenzene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.93 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Chloroethane | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Chloroform | 7 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| cis-1,2-Dichloroethene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 140 | 110 | ND | 120 | 180 | 34 | 7.7 | 8.9 | 4.7 | 6 | 19 | ND | |
| Ethylbenzene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Isopropylbenzene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Methyl acetate | -- | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Methylcyclohexane | -- | 0.64 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Methyl tert butyl ether | 10 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 2 J | ND | ND | ND | ND | ND | 2.1 J | 1.8 | 1.5 | 0.94 | ND | 1.3 J | ND | |
| Methylene chloride | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 2.7 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Styrene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Tetrachloroethene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Toluene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| trans-1,2-Dichloroethene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 200 | 160 | ND | 89 | 230 D | 54 | 50 | 39 | 49 | 43 | 59 | ND | ND | |
| Trichloroethene | 5 | ND | 11 | 4.4 | 6.1 | 5.3 | 6.8 | 7.8 | 4.3 | 6.4 | 5.3 | 4.6 | 6 | ND | 82 | 78 | 1.3 | 32 | 1.1 J | ND | ND | ND | ND | ND | 0.96 J | ND | ND | |
| Vinyl chloride | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 2.1 | 8.7 | ND | 9.3 | 73 | 17 | 8 | 9.6 | 6.4 | 12 | 45 | ND | ND | |
| Xylenes , total | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 2.6 J | ND | |
| TOTAL cVOCs | -- | 0 | 11 | 4.4 | 6.1 | 5.3 | 6.8 | 7.8 | 4.3 | 6.4 | 5.3 | 4.6 | 6 | 0 | 424.7 J | 356.7 | 1.3 | 250.3 | 484.1 | 105 | 66 | 58 | 60 | 61 | 123.96 J | 0 | 0 | |
| Total VOCs | -- | 0.64 | 55.96 | 5.4 | 22.9 | 5.3 | 6.8 | 7.8 | 4.3 | 6.4 | 5.3 | 4.6 | 6 | 4.66 | 429.9 | 391.4 | 27.86 | 263.28 | 495.9 J | 120.1 | 73.3 | 65 | 61 | 61 | 127.86 J | 0 | 0 | |
| Semi-Volatile Organic Compounds (SVOCs) - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acetophenone | -- | ND | 0.95 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Benzaldehyde | -- | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.28 J | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Benzo(a)pyrene | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Benzo(b)fluoranthene | 0.002 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Benzo(ghi)perylene | -- | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Butyl benzyl phthalate | 50 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Chrysene | 0.002 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Diethyl phthalate | 50 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.7 J | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Fluoranthene | 50 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Phenanthrene | 50 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Pyrene | 50 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Total Metals - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | -- | 24,400 | 3,200 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 69,800 | 122,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15,000 | |
| Arsenic | 25 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 26 | 48 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Barium | 1,000 | 340 B | 55 B | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1600 B | 850 B | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 180 B | |
| Beryllium | 3 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.9 | 5.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Cadmium | 5 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3.9 | 3.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Calcium | -- | 610,000 | 219,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849,000 | 1,830,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 164,000 | |
| Chromium | 50 | 40 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 110 | 170 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 18 | |
| Cobalt | 5 | 20 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 75 | 120 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7.1 | |
| Copper | 200 | 42 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 130 | 210 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 16 | |
| Cyanide, Total | 200 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | 36 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Iron | 300 | 40,800 | 3,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 103,000 | 185,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 17,800 | |
| Lead | 25 | 81 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 220 | 390 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 32 | |
| Magnesium | 35,000 | 231,000 | 122,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 350,000 | 692,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 66,600 | |
| Manganese | 300 | 1,800 | 200 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,400 | 7,400 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 540 | |
| Mercury | 0.7 | ND | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.65 | 0.47 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Nickel | 100 | 44 | 18 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 160 | 260 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 17 | |
| Potassium | -- | 28,200 | 67,200 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30,600 | 44,600 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,000 | |
| Sodium | 20,000 | 2,260,000 | 882,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 563,000 | 362,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 566,000 | |
| Vanadium | 14 | 56 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 150 | 240 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 26 | |
| Zinc | 2,000 | 370 | 41 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,100 | 820 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 90 | |
| Dissolved Metals - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 270 J | 630 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | |
| Barium | 1,000 | -- | 17 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 60 J | 27 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 32 J | |
| Calcium | -- | -- | 20 | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 4
Summary of Groundwater Analytical Results
Site Management Report
Former Trico Plant
Buffalo, New York

| PARAMETER 1 | GWQS 2 | RI MW-6 <i>DISCONTINUED</i> | | | | | | | | | | | | RI MW-7/7R | | | | | | | | | | | | RI MW-8 <i>DISCONTINUED</i> | | |
|--|-----------|--------------------------------|----------|----------|----------|----------|----------|---|---|----------|----------|-----------|----------|------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|--------------------------------|-------|----|
| | | 06/14/16 | 07/01/19 | 08/09/19 | 09/13/19 | 07/21/20 | 11/20/20 | 05/07/21 | 11/09/21 | 07/21/22 | 09/13/22 | 06/28/23 | 06/14/16 | 07/01/19 | 08/09/19 | 09/13/19 | 07/21/20 | 11/20/20 | 05/07/21 | 11/09/21 | 07/21/22 | 01/24/23 | 06/15/23 | 07/25/24 | 06/14/16 | | | |
| Volatile Organic Compounds (VOCs) - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 5 | ND | ND | ND | ND | ND | ND | Was Not Sampled Due to heavy rains flooding well location | Was Not Sampled Due to heavy rains flooding well location | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 2.8 | ND | |
| 1,1-Dichloroethene | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | 0.57 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 2-Butanone (MEK) | 50 | ND | ND | 10 | ND | ND | ND | | | ND | ND | ND | ND | ND | 12 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Acetone | 50 | 3.8 J | ND | 4.4 J | ND | ND | ND | | | ND | ND | ND | ND | 14 | ND | 6.8 J | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 4.3 J | ND |
| Benzene | 1 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | 60 | 0.38 J | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | 0.42 J | 0.33 | ND | ND | ND | ND | ND | ND | ND | 0.67 J | ND | ND | ND | ND | ND |
| Chlorobenzene | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Chloroethane | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Chloroform | 7 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| cis-1,2-Dichloroethene | 5 | 1.9 | 2.2 | 3.1 | 2.8 | 3.8 | 3.5 | | | ND | ND | ND | ND | 3.8 J | 36 F 1 | 45 | 40 | ND | ND | ND | ND | ND | ND | 2.7 J | 10 | ND | ND | |
| Ethylbenzene | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 3.1 | ND | |
| Isopropylbenzene | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Methyl acetate | -- | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Methylcyclohexane | -- | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Methyl tert butyl ether | 10 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Methylene chloride | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Styrene | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Tetrachloroethene | 5 | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| Toluene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | | | |
| trans-1,2-Dichloroethene | 5 | 1.3 | 1.5 | 2.2 | ND | 1.8 J | 2.1 | ND | ND | ND | ND | 100 J | 110 D | 110 | 100 | ND | ND | ND | ND | ND | 65 | 68 | 17 | ND | ND | | | |
| Trichloroethene | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 89 J | 110 D | 100 | 100 | ND | ND | ND | ND | ND | ND | 1.2 J | 37 | ND | ND | | | |
| Vinyl chloride | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 15 | 12 | 14 | ND | ND | ND | ND | ND | 30 | 41 | ND | ND | ND | | | |
| Xylenes - total | 5 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | 15 | ND | ND | | | |
| TOTAL cVOCs | -- | 3.2 | 3.7 | 5.3 | 2.8 | 5.4 J | 3.5 | NS | 6.5 | NS | 0 | 3.8 | 225.54 | 280.57 | 262 | 253 | | | | | 95 | 112.9 | 64 | 0 | | | | |
| Total VOCs | -- | 7.38 | 3.7 | 19.7 | 2.8 | 5.4 J | 3.5 | NS | 6.5 | NS | 0 | 3.8 | 239.96 | 281.43 | 280.8 | 253 | | | | | 95.7 | 112.9 | 84.9 | 4.3 | | | | |
| Semi-Volatile Organic Compounds (SVOC) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acetophenone | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Benzaldehyde | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Benzo(a)pyrene | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Benzo(b)fluoranthene | 0.002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Benzo(ghi)perylene | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.3 J | | | |
| Butyl benzyl phthalate | 50 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Chrysene | 0.002 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Diethyl phthalate | 50 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Fluoranthene | 50 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Phenanthrene | 50 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.75 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Pyrene | 50 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Total Metals - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | -- | 3,700 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,800 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,400 | | | |
| Arsenic | 25 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Barium | 1,000 | 120 B | -- | -- | -- | -- | -- | -- | -- | -- | -- | 180 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 360 B | | | |
| Beryllium | 3 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Cadmium | 5 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Calcium | -- | 142,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 224,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 151,000 | | | |
| Chromium | 50 | 5.9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9.9 | | | |
| Cobalt | 5 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.6 | | | |
| Copper | 200 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13 | | | |
| Cyanide, Total | 300 | 3,800 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,700 | | | |
| Lead | 25 | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19 | | | |
| Magnesium | 35,000 | 71,700 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 103,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 61,600 | | | |
| Manganese | 300 | 120 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 140 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 160 | | | |
| Mercury | 0.7 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.24 | | | |
| Nickel | 100 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14 | | | |
| Potassium | -- | 9,800 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,700 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 37,900 | | | |
| Sodium | 20,000 | 300,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 78,600 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 248,000 | | | |
| Vanadium | 14 | 5.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Zinc | 2,000 | 70 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 100 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 190 | | | |
| Dissolved Metals - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Barium | 1,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19 J | | | |
| Calcium | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 215,000 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 144,000 J | | | |
| Cobalt | 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.5 J | | | |
| Iron | 300 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Magnesium | 35,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 99,900 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 59,700 J | | | |
| Manganese | 300 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 87 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 120 J | | | |
| Nickel | 100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Potassium | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,300 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 32,700 J | | | |
| Sodium | 20,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 77,900 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 244,000 J | | | |
| Zinc | 2,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 94 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 52 J | | | |
| PCB - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1248 | 0.09 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Pesticides and Herbicides - ug/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 0.3 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| delta-BHC | 0.01 | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | ND | | | |
| Field Measurements (Units as Indicated) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH (units) | 6.5 - 8.5 | 7.4 | NT | 7.74 | 7.53 | 7.55 | 7.49 | NS | 7.62 | NS | 7.42 | 7.42 | 7.2 | NT | 6.72 | 6.63 | NS | NS | NS | NS | 7.51 | 7.4 | 7.35 | 7.5 | | | | |
| Temperature (oC) | -- | 9.4 | NT | 14.7 | 13.2 | 12.2 | 11.6 | NS | 12.9 | NS | 13.3 | 13.3 | 9.5 | NT | 12.3 | 12.2 | NS | NS | NS | NS | 7.7 | 12.4 | 14.9 | 9.8 | | | | |
| Specific Conductance (uS) | -- | 2350 | 1843 | 2026 | 1914 | 2048 | NS | 1907 | NS | 1831 | 1831 | 1710 | NS | NT | 1787 | 1960 | NS | NS | NS | NS | 1647 | 1638 | 1638 | 2184 | | | | |
| Turbidity | -- | 47.9 | NT | 352 | 92.8 | 143 | 109 | NS | 49.2 | NS | 141 | 141 | 113 | NT | 57.3 | 15.4 | NS | NS | NS | NS | 128 | 45.4 | 299 | 172 | | | | |
| DO (ppm) | -- | 4.98 | NT | 2.82 | 2.35 | 1.71 | 1.95 | NS | 1.57 | NS | 1.67 | 1.67 | 5.34 | NT | 0.46 | 1.33 | NS | NS | NS | NS | 7.9</ | | | | | | | |

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds or analytes were reported as non-detect.

2. Values per NYSDEC Division of Water Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations - Class GA (TOGS 1.1.1)

Definitions:

ND = Parameter not detected above laboratory detection limit

"-" = No value available for the parameter; Parameter not analysed for.

B = Compound was found in the blank and the sample

F1 = MS and/or MSD Recovery is outside acceptance limits.

F2 = MS/MSD RPD exceeds control limits.

J = Estimated value; result is less than the reporting limit but greater than zero.

BOLD = Result exceeds GWQS.

Table 4
Summary of Groundwater Analytical Results
Site Management Report
Former Trico Plant
Buffalo, New York

[illegible]

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds or analytes were reported as non-detect.

2. Values per NYSDEC Division of Water Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations - Class GA (TOGS 1.1.1)

Definitions:

ND = Parameter not detected above laboratory detection limit.

"--" = No value available for the parameter; Parameter not analysed for.

B = Compound was found in the blank and the sample.

F1 = MS and/or MSD Recovery is outside acceptance limits.

F2 = MS/MSD RPD exceeds control limits.

J = Estimated value; result is less than the reporting limit but greater than zero.

BOLD = Result exceeds GWQS.

TABLE 5
SUMMARY OF SVI SAMPLE RESULTS COMPARED TO NYSDOH SVI GUIDANCE MATRICES
SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BUFFALO, NEW YORK

| Sample Location | Carbon Tetrachloride | | Trichloroethene (TCE) | | cis-1,2-Dichloroethene | | 1,1-Dichloroethene | | Tetrachloroethene (PCE) | | 1,1,1 -Trichloroethane | | Methylene Chloride | | Vinyl Chloride | | |
|----------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|------------|
| | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 1 | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 1 | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 2 | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 2 | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 2 | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 2 | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 2 | Lab Reported Concentration (ug/m³) | Soil Vapor / Indoor Air Matrix 1 | |
| | | | | | | | | | | | | | | | | | |
| Subslab/Indoor Air 1 | | | | | | | | | | | | | | | | | |
| SSV-1 | 0.26 J | NFA | 1.5 | I,R or Mitigate | ND | NFA | ND | NFA | 1.5 | NFA | ND | NFA | 0.88 J | NFA | ND | NFA | |
| SSV-2 | 0.78 J | | 260 | Mitigate | 0.5 J | | ND | | 2.4 | | ND | | 1.5 J | | ND | | |
| SSV-3 | ND | | 19000 | Mitigate | 730 | | 810 | | ND | | 890 | | ND | | ND | | |
| SSV-7 | 0.47 J | | 5.9 | Mitigate | ND | | ND | | 1.4 J | | ND | | 1.3 | | ND | | |
| IA-1 | 0.5 J | Background | 1.4 | Background | 0.22 J | NFA | ND | Background | 0.16 J | Background | 0.26 J | Background | 0.83 J | Background | ND | Background | |
| OA-1 | 0.41 J | Background | 0.23 J | | ND | | Background | | ND | | Background | | ND | Background | ND | | Background |
| Subslab/Indoor Air 2 | | | | | | | | | | | | | | | | | |
| SSV-4 | ND | NFA | 390 | Mitigate | 18 | Mitigation | ND | NFA | 2.8 | NFA | 13 | NFA | ND | NFA | ND | NFA | |
| SSV-5 | 0.27 J | | 9.4 | | Mitigate | | 0.71 J | | ND | | 0.89 J | | ND | | 0.79 J | | ND |
| SSV-6 | ND | | 610 | | Mitigate | | 220 | | ND | | 2.2 J | | ND | | ND | | ND |
| IA-2 | 0.46 J | Background | 35 | Background | 5.9 | Background | ND | Background | 0.24 J | Background | ND | Background | 0.69 J | NFA | 0.089 J | Background | |
| OA-1 | 0.41 J | Background | 0.23 J | | ND | | Background | | ND | | Background | | ND | Background | ND | | Background |

Notes:

1. Concentration in micrograms per cubic meter (ug/m³)

Definitions:

ND = Not Detected

NFA = No further action.

I, R = Take reasonable and practical actions to identify source(s) and reduce exposures and resample or mitigate.

Monitor = Monitor soil vapor / indoor air

Mitigate = Mitigate source of identified parameter.

Analytes Assigned:

Trichloroethene (TCE), cis-1,2-Dichloroethene (c12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³) | INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³) | | |
|---|---|----------------------|--|
| | < 0.2 | 0.2 to < 1 | 1 and above |
| < 6 | 1. No further action | 2. No Further Action | 3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE |
| 6 to < 60 | 4. No further action | 5. MONITOR | 6. MITIGATE |
| 60 and above | 7. MITIGATE | 8. MITIGATE | 9. MITIGATE |

Analytes Assigned:

Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³) | INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³) | | |
|---|---|----------------------|--|
| | < 3 | 3 to < 10 | 10 and above |
| < 100 | 1. No further action | 2. No Further Action | 3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE |
| 100 to < 1,000 | 4. No further action | 5. MONITOR | 6. MITIGATE |
| 1,000 and above | 7. MITIGATE | 8. MITIGATE | 9. MITIGATE |

Analytes Assigned:

Vinyl Chloride

| SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³) | INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³) | |
|---|---|--|
| | < 0.2 | 0.2 and above |
| < 6 | 1. No further action | 2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE |
| 6 to < 60 | 3. MONITOR | 4. MITIGATE |
| 60 and above | 5. MITIGATE | 6. MITIGATE |

TABLE 8

SUMMARY OF IMPORT CRITERIA

RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVES

SITE MANAGEMENT PLAN

FORMER TRICO PLANT

BUFFALO, NEW YORK

| PARAMETER | Restricted Residential Use SCOs ¹ |
|---|--|
| <i>Volatile Organic Compounds (VOCs) - mg/Kg</i> | |
| 1,1,1-Trichloroethane | 0.68 |
| 1,1-Dichloroethane | 0.27 |
| 1,1-Dichloroethene | 0.33 |
| 1,2-Dichlorobenzene | 1.1 |
| 1,2-Dichloroethane | 0.02 |
| cis-1,2-Dichloroethene | 0.25 |
| trans-1,2-Dichloroethene | 0.19 |
| 1,3-Dichlorobenzene | 2.4 |
| 1,4-Dichlorobenzene | 1.8 |
| 1,4-Dioxane | 0.1 |
| Acetone | 0.05 |
| Benzene | 0.06 |
| Butylbenzene | 12 |
| Carbon tetrachloride | 0.76 |
| Chlorobenzene | 1.1 |
| Chloroform | 0.37 |
| Ethylbenzene | 1 |
| Hexachlorobenzene | 1.2 |
| Methyl ethyl ketone | 0.12 |
| Methyl tert butyl ether | 0.93 |
| Methylene chloride | 0.05 |
| n-Propylbenzene | 3.9 |
| sec-Butylbenzene | 11 |
| tert-Butylbenzene | 5.9 |
| Tetrachloroethene | 1.3 |
| Toluene | 0.7 |
| Trichloroethene | 0.47 |
| 1,2,4-Trimethylbenzene | 3.6 |
| 1,3,4-Trimethylbenzene | 8.4 |
| Vinyl chloride | 0.02 |
| Xylene | 1.6 |

TABLE 8

SUMMARY OF IMPORT CRITERIA

RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVES

SITE MANAGEMENT PLAN

FORMER TRICO PLANT

BUFFALO, NEW YORK

| PARAMETER | Restricted Residential Use SCOs ¹ |
|---|--|
| <i>Semi-Volatile Organic Compounds (SVOCs) - mg/Kg</i> | |
| Acenaphthene | 98 |
| Acenaphthylene | 100 |
| Anthracene | 100 |
| Benzo(a)anthracene | 1 |
| Benzo(a)pyrene | 1 |
| Benzo(b)fluoranthene | 1 |
| Benzo(g,h,i)perylene | 100 |
| Benzo(k)fluoranthene | 1.7 |
| Chrysene | 1 |
| Dibenzo(a,h)anthracene | 0.33 |
| Fluoranthene | 100 |
| Fluorene | 100 |
| Indeno(1,2,3-cd)pyrene | 0.5 |
| m-Cresol | 0.33 |
| Naphthalene | 12 |
| o-Cresol | 0.33 |
| p-Cresol | 0.33 |
| Pentachlorophenol | 0.8 |
| Phenanthrene | 100 |
| Phenol | 0.33 |
| Pyrene | 100 |
| <i>Metals - mg/Kg</i> | |
| Arsenic | 16 |
| Barium | 400 |
| Beryllium | 47 |
| Cadmium | 4.3 |
| Chromium, trivalent | 180 |
| Chromium, hexavalent | 19 |
| Copper | 270 |
| Cyanide | 27 |
| Lead | 400 |
| Manganese | 2000 |
| Mercury | 0.73 |
| Nickel | 130 |
| Selenium | 4 |
| Silver | 8.3 |
| Zinc | 2480 |

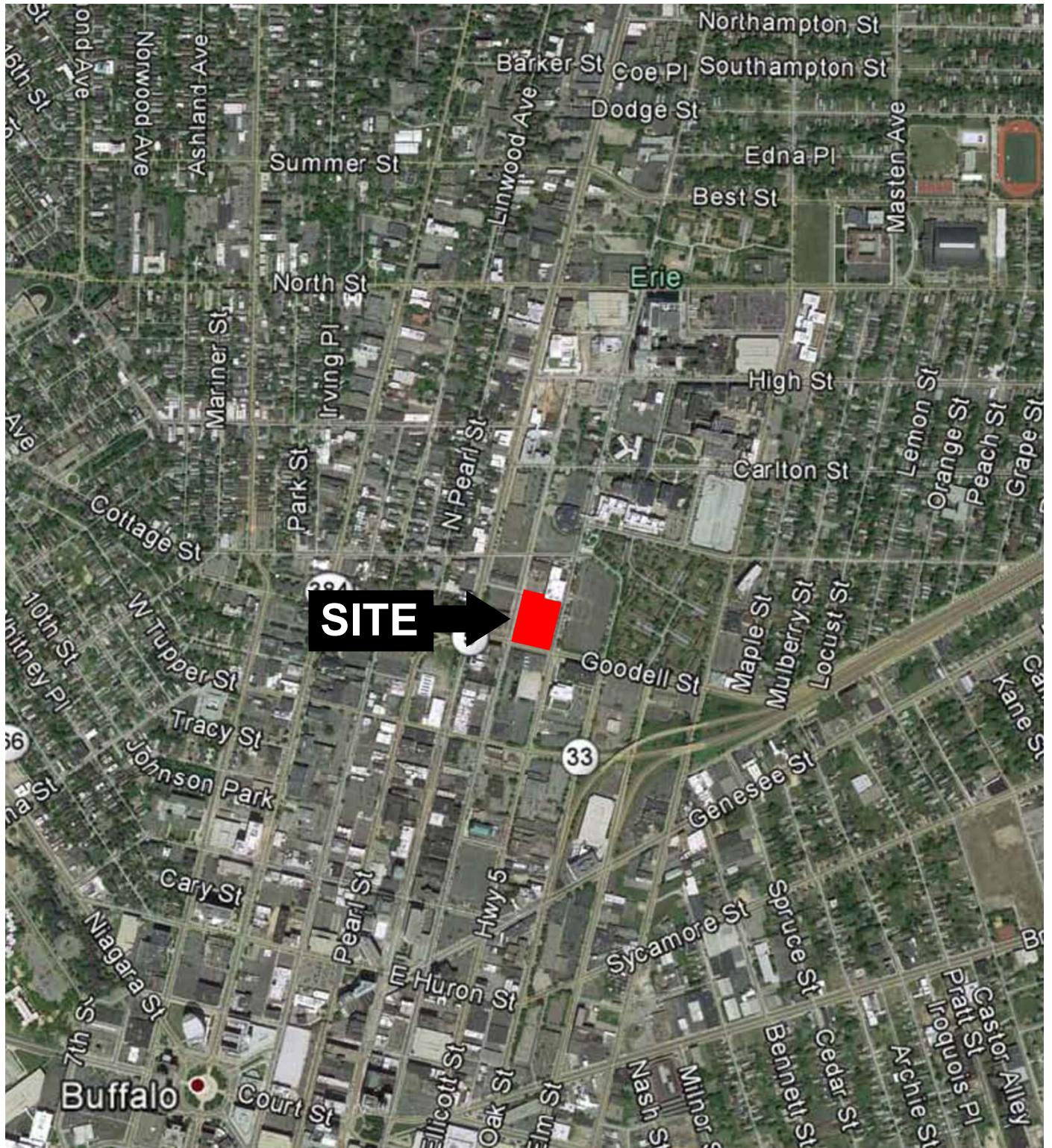
TABLE 8
SUMMARY OF IMPORT CRITERIA
RESTRICTED RESIDENTIAL USE SOIL CLEANUP OBJECTIVES
SITE MANAGEMENT PLAN
FORMER TRICO PLANT
BUFFALO, NEW YORK

| PARAMETER | Restricted Residential Use SCOs ¹ |
|--|--|
| <i>Pesticides/Herbicides and PCBs - mg/Kg</i> | |
| Silvex (2,4,5-TP) | 3.8 |
| 4,4'-DDE | 8.9 |
| 4,4'-DDT | 7.9 |
| 4,4'-DDD | 13 |
| Aldrin | 0.097 |
| alpha-BHC | 0.02 |
| beta-BHC | 0.09 |
| alpha-Chlordane | 2.9 |
| delta-BHC | 0.25 |
| Dibenzofuran | 59 |
| Dieldrin | 0.1 |
| Endosulfan I | 24 |
| Endosulfan II | 24 |
| Endosulfan sulfate | 24 |
| Endrin | 0.06 |
| Heptachlor | 0.38 |
| Lindane | 0.1 |
| Polychlorinated biphenyls (PCBs) | 1 |

Notes:

1. Values per NYSDEC DER-10 Appendix 5 Subdivision 5.4 (e).

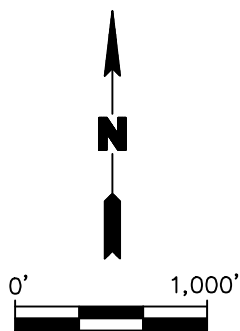
FIGURES



QUADRANGLE LOCATION



SOURCE:
BUFFALO, NY, 2010
USGS 7.5 MINUTE TOPOGRAPHIC MAP



Title: **SITE LOCATION AND VICINITY MAP**
SITE MANAGEMENT PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)

628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:

847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC

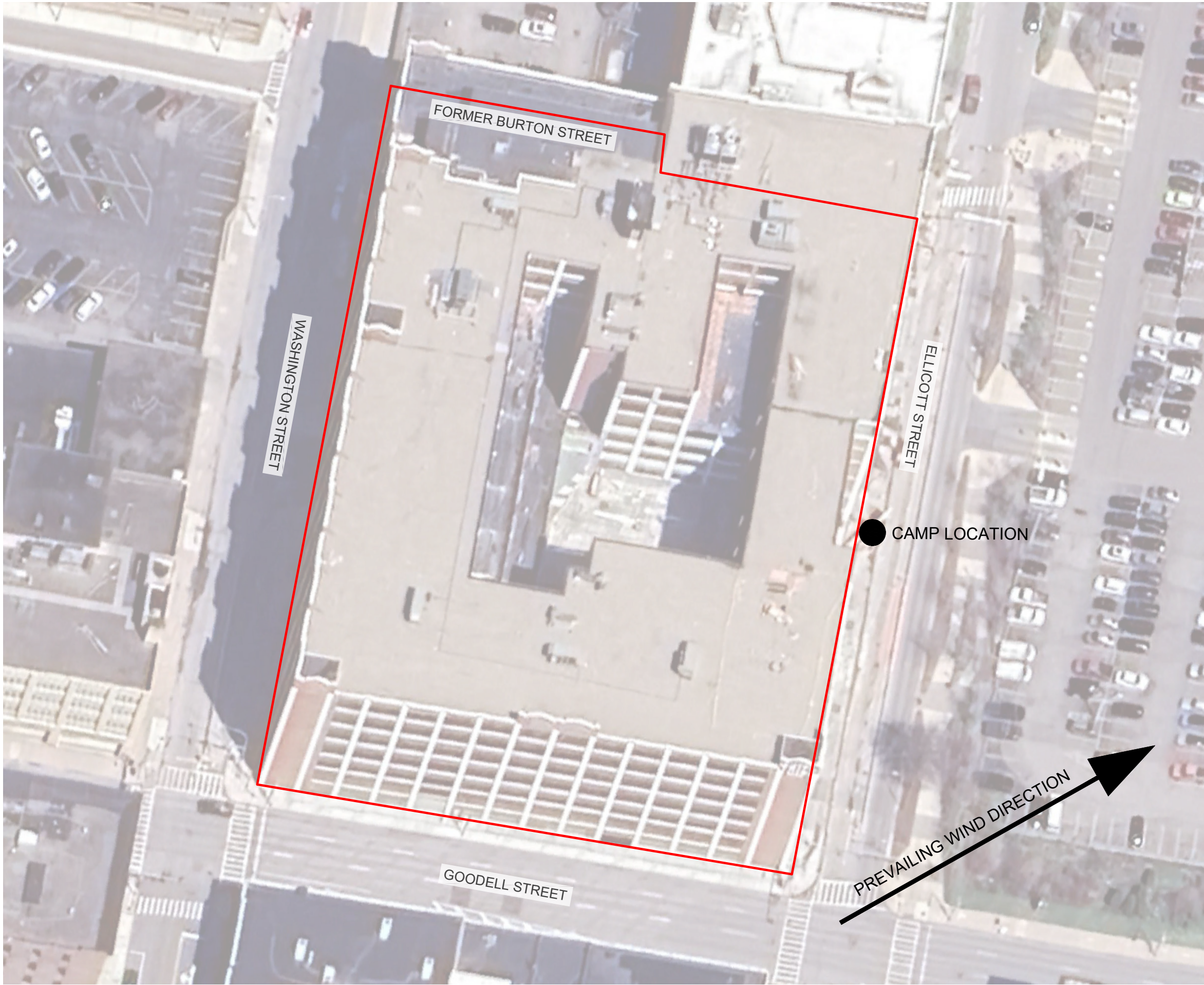


| | |
|--|------------------------|
| Compiled by: RFL | Date: SEPTEMBER 2024 |
| Prepared by: CNK | Scale: AS SHOWN |
| Project Mgr: CZB | Project: 4398.0001B000 |
| File: FIGURE 1: SITE LOCATION AND VICINITY MAP.DWG | |

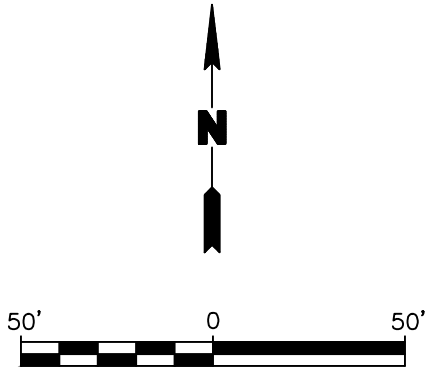
FIGURE

1

F:\CAD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SMPI\REVISED SMP\FIGURE 2: SITE PLAN AERIAL.DWG



LEGEND:
BCP SITE BOUNDARY
GOOGLE IMAGE DECEMBER 2024



Title:

SITE PLAN (AERIAL)

SITE MANAGEMENT PLAN

FORMER TRICO PLANT (BCP SITE NO. C915281)

628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)

BUFFALO, NEW YORK

Prepared for:

847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC

ROUX

Compiled by: RFL

Prepared by: CNK

Project Mgr: CZB

File: FIGURE 2: SITE PLAN AERIAL.DWG

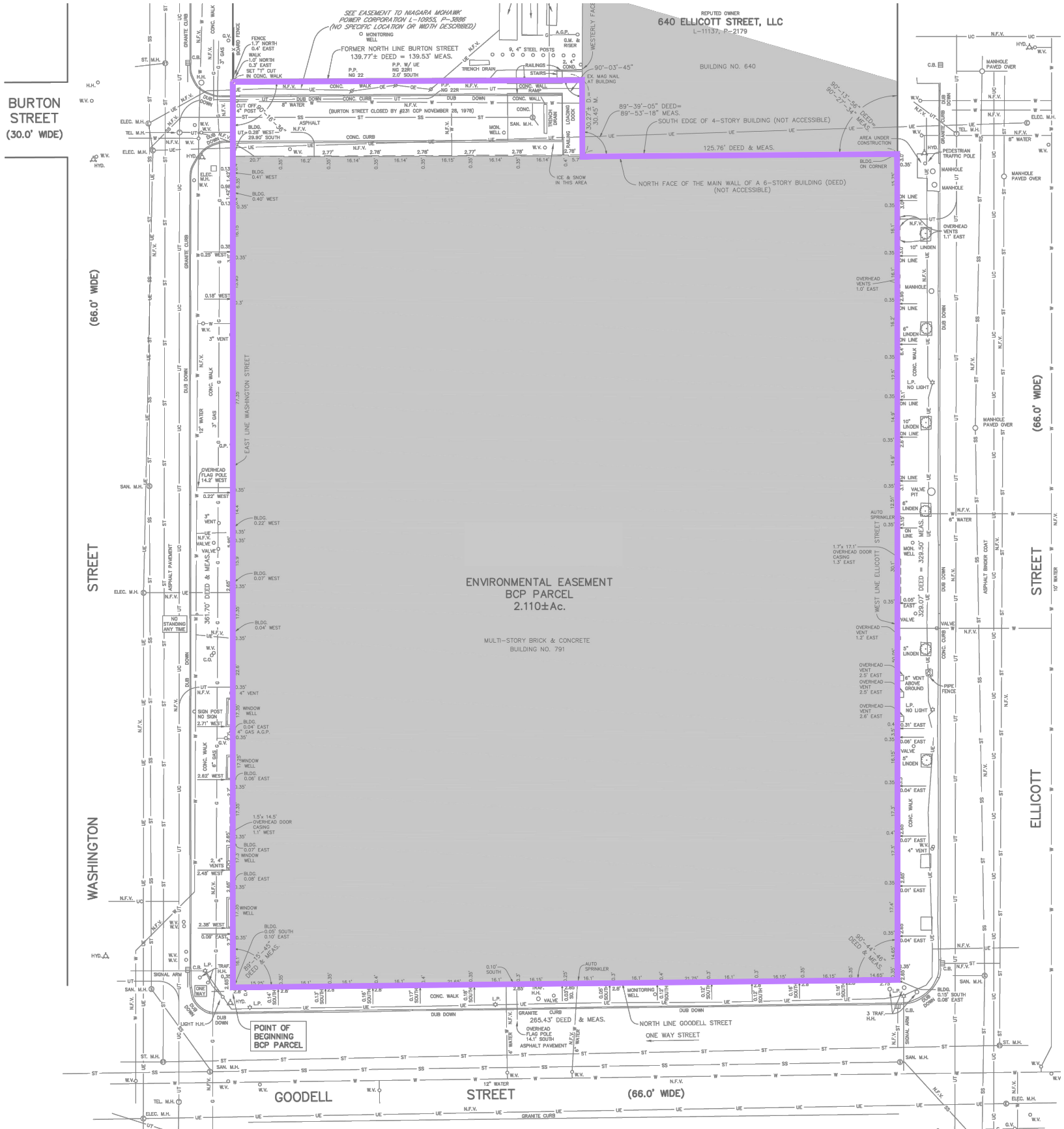
Date: MARCH 2025

Scale: AS SHOWN

Project: 4398.0001B000

FIGURE

2

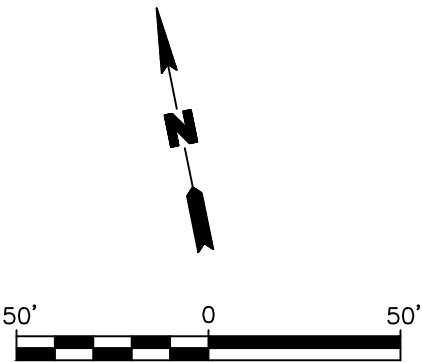


LEGEND:

ENVIRONMENTAL EASEMENT BOUNDARY

NOTE:

1. PARCEL ADDRESS CHANGED FROM 791 WASHINGTON STREET TO 628 ELlicott STREET.



Title:
**TAX MAP & INSTITUTIONAL CONTROL BOUNDARY
SITE MANAGEMENT PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)**

628 ELlicott STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:

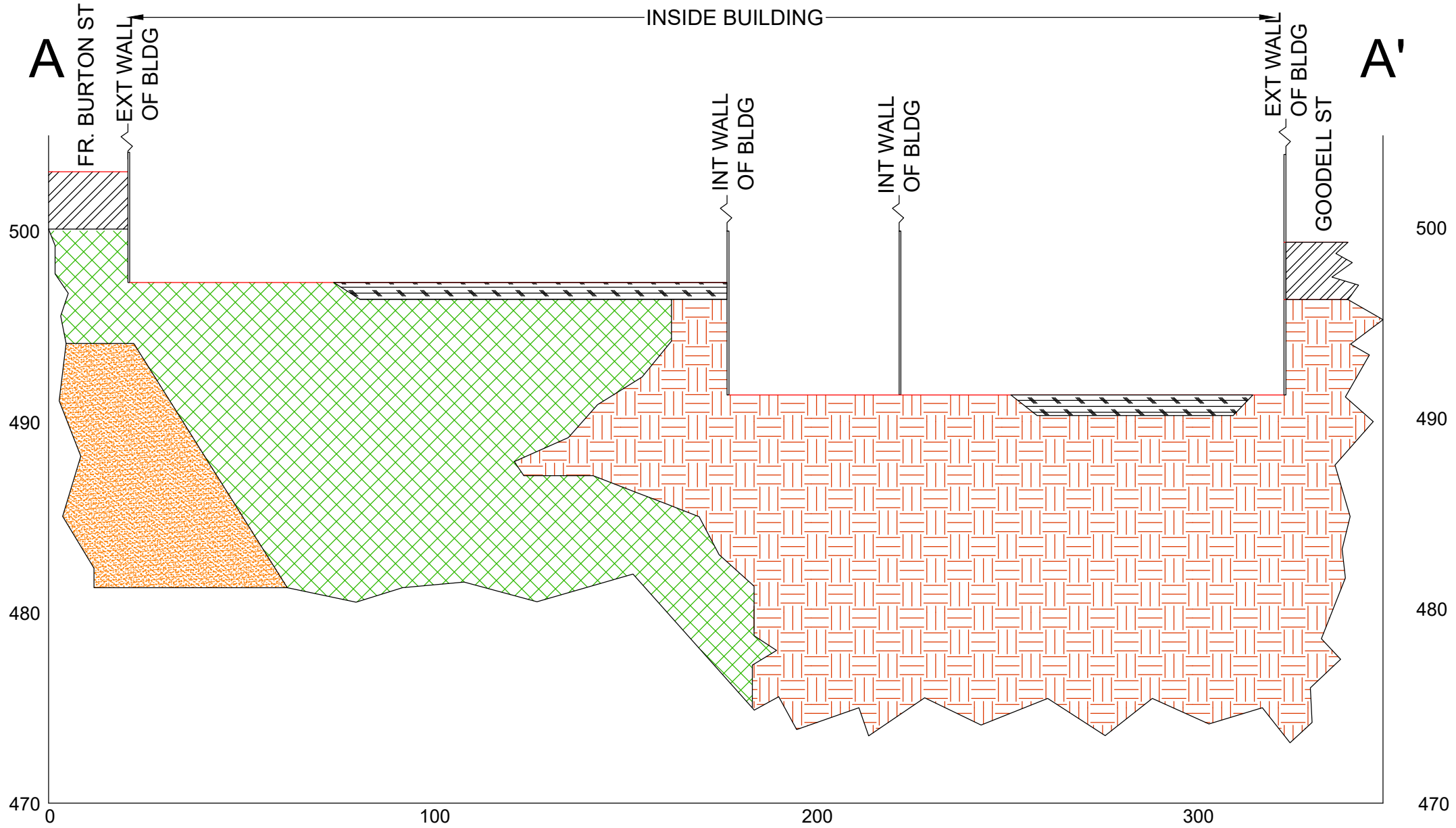
847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC

Compiled by: CMC
Prepared by: CNK
Project Mgr: CZB
File: FIGURE 3: TAX MAP & INSTITUTIONAL CONTROL BOUNDARY.DWG

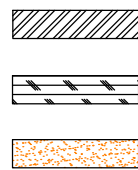
Date: SEPTEMBER 2024
Scale: AS SHOWN
Project: 4398.0001B000

FIGURE
3

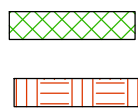
F:\CAD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SMPI\REVISED SMPI\FIGURE 4: CROSS SECTION AA TRICOAUG 2 WLS.DWG



LEGEND:



CONCRETE, ASPHALT, AND
SUBBASE
FILL
POORLY GRADED SAND

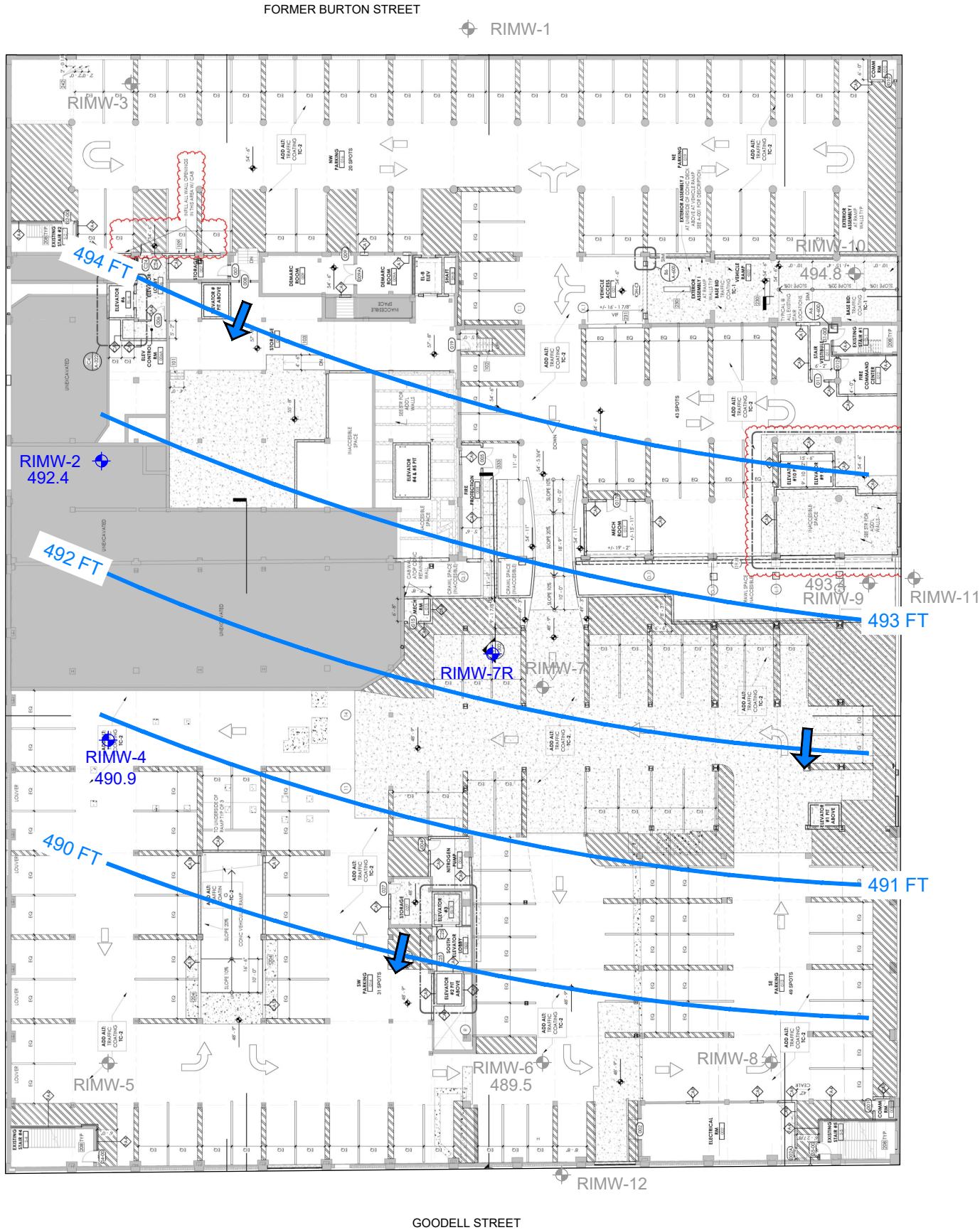


SILTY CLAY
SANDS AND SILTS WITH INTERBEDDED
CLAY AND SILT LENSES

| | | | |
|---|---|------------------------|------------------------|
| Title: | | | |
| <div>CROSS-SECTION A-A'</div> <div>SITE MANAGEMENT PLAN</div> <div>FORMER TRICO PLANT (BCP SITE NO. C915281)</div> <div>628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)</div> <div>BUFFALO, NEW YORK</div> | | | |
| Prepared for: | | | |
| <div>847 MAIN STREET, LLC &</div> <div>791 WASHINGTON STREET, LLC</div> | | | |
|  | Compiled by: RFL | Date: SEPTEMBER 2024 | FIGURE <div>4</div> |
| | Prepared by: CNK | Scale: AS SHOWN | |
| | Project Mgr: CZB | Project: 4398.0001B000 | |
| | File: FIGURE 4; CROSS SECTION AA TRICOAUG 2 WLS.DWG | | |

F:\CAD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SM\REVISED SM\FIGURE 5: GROUNDWATER ISOPOTENTIAL MAP.DWG

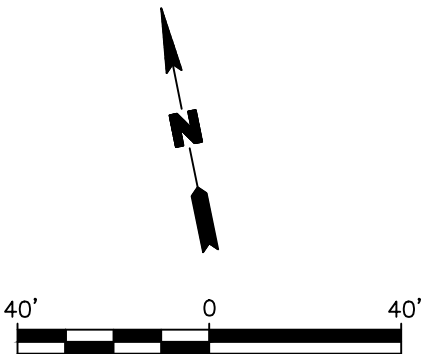
WASHINGTON STREET



LEGEND:


- RIMW-2 MONITORING WELL LOCATION
- RIMW-9 DECOMMISSIONED MONITORING WELL LOCATION
- 490 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

- NOTES:
- GROUNDWATER ELEVATION MEASUREMENTS COLLECTED JULY 9, 2022.

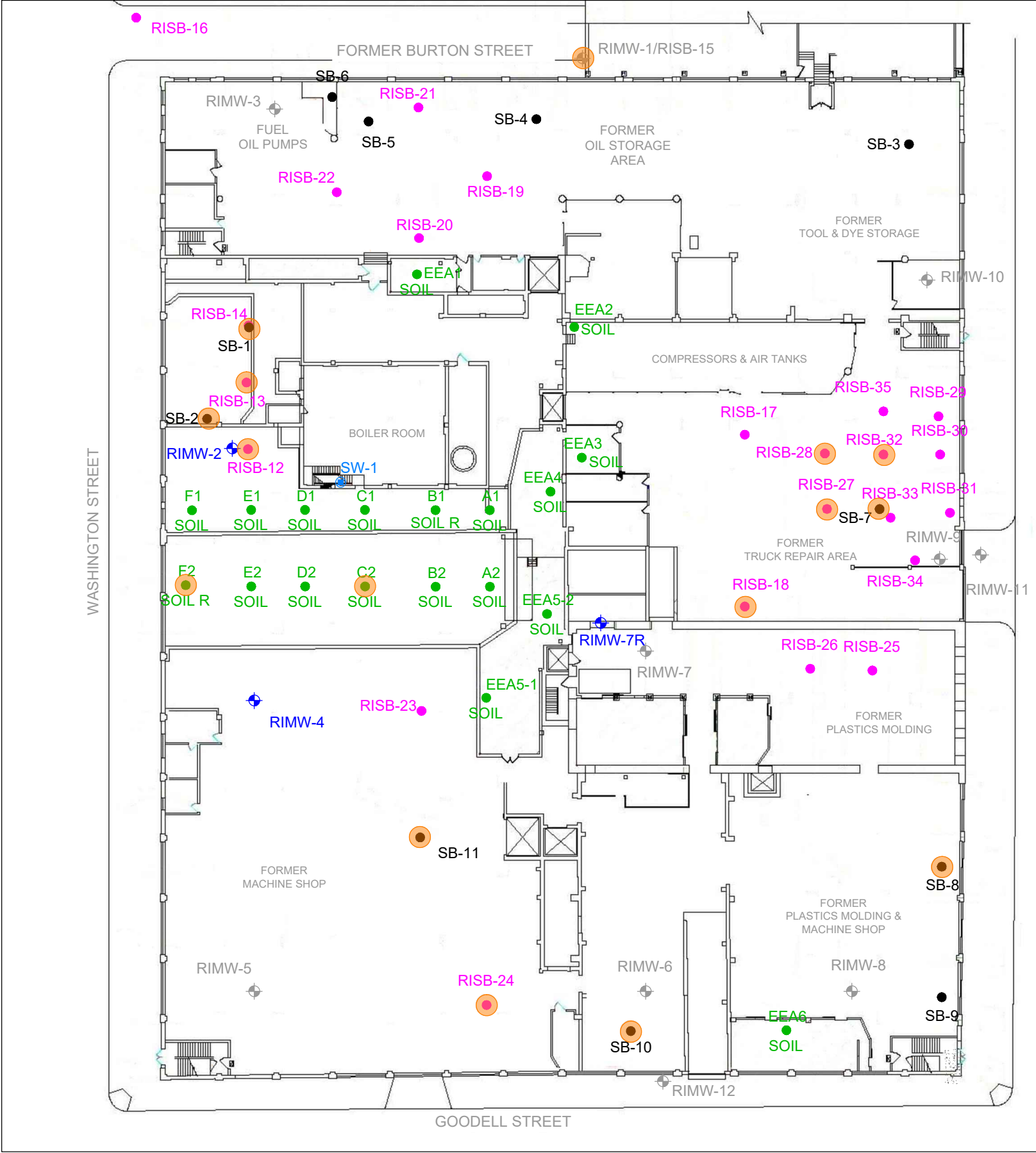


Title:
GROUNDWATER ISOPOTENTIAL MAP JULY 2022
SITE MANAGEMENT PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)
628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:
847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC

| | | | |
|---|--|------------------------|--------------------|
|  | Compiled by: RFL | Date: SEPTEMBER 2024 | FIGURE 5 |
| | Prepared by: CNK | Scale: AS SHOWN | |
| | Project Mgr: CZB | Project: 4398.0001B000 | |
| | File: FIGURE 5: GROUNDWATER ISOPOTENTIAL MAP.DWG | | |

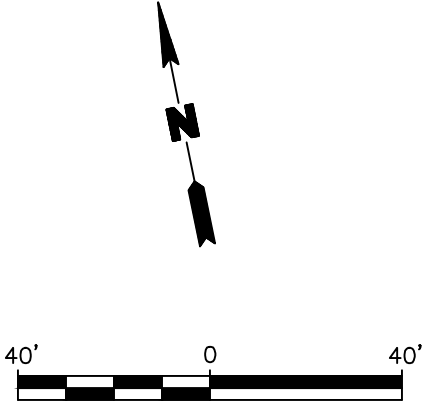
F:\CADD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SMPI\REVISED SMP\FIGURE 6; USCO EXCEEDANCE TRICOREV.DWG



LEGEND:

- SB-2 ● 2013 BORING LOCATION
- RISB-3 ● SOIL BORING LOCATION
- RIMW-2 ● SOIL BORING/MONITORING WELL LOCATION
- RIMW-9 ● DECOMMISSIONED MONITORING WELL LOCATION
- E2 ● SOIL SUB-SLAB SOIL SAMPLE LOCATION
- USCO EXCEEDANCE LOCATION

NOTES:
1. USCO = UNRESTRICTED SOIL CLEANUP OBJECTIVE



Title:
UNRESTRICTED SCO EXCEEDANCE LOCATIONS
SITE MANAGEMENT PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)
628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

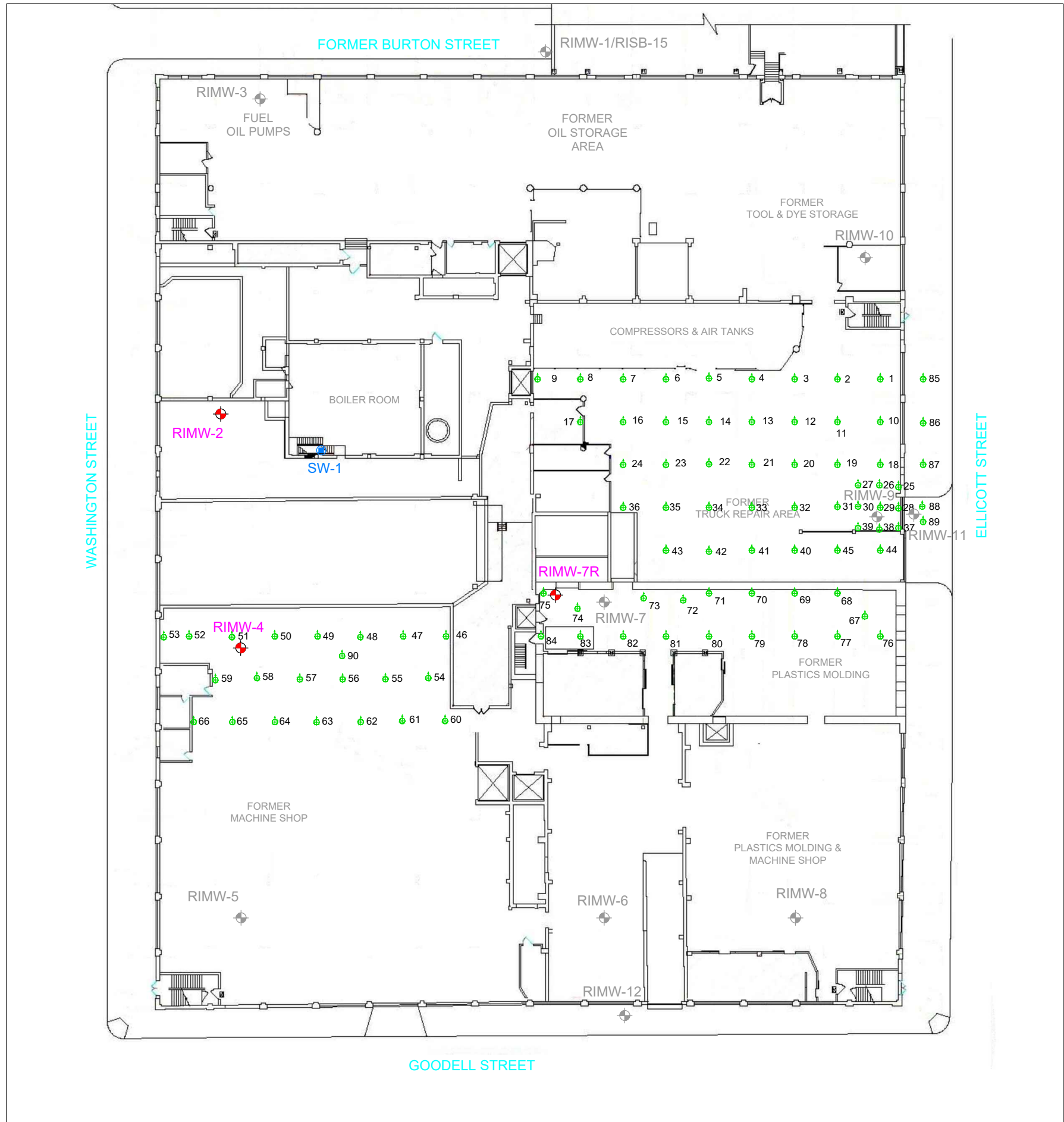
Prepared for:
**847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC**

Compiled by: RFL
Prepared by: CNK
Project Mgr: CZB
File: FIGURE 6; USCO EXCEEDANCE TRICOREV.DWG

Date: SEPTEMBER 2024
Scale: AS SHOWN
Project: 4398.0001B000

FIGURE
6

F:\CAD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SMPI\REVISED SMPI\FIGURE 7: GW AMEDMENT INJ LOC TRICOREV.DWG



LEGEND:

- AMENDMENT INJECTION LOCATION
- DECOMMISSIONED MONITORING WELL LOCATION
- EXISTING POST-INJECTION GROUNDWATER MONITORING LOCATION

Title:
GROUNDWATER AMENDMENT INJECTION LOCATIONS
SITE MANAGEMENT PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)
628 ELICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:
**847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC**



| | |
|--|------------------------|
| Compiled by: RFL | Date: SEPTEMBER 2024 |
| Prepared by: CNK | Scale: AS SHOWN |
| Project Mgr: CZB | Project: 4398.0001B000 |
| File: FIGURE 7: GW AMEDMENT INJ LOC TRICOREV.DWG | |

FIGURE
7

F:\CAD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SMP\REVISED SMP\FIGURE 8: GROUNDWATER RESULTS SUMMARY.DWG



LEGEND:

- RIMW-2  MONITORING WELL LOCATION
- RIMW-9  DECOMMISSIONED MONITORING WELL LOCATION

| | | |
|----------|---|----------------------|
| RIMW-2 | ← | WELL NUMBER |
| 06/14/16 | ← | SAMPLE DATE |
| TCE | ← | CONCENTRATION (ug/l) |


COMPOUND

NOTES:

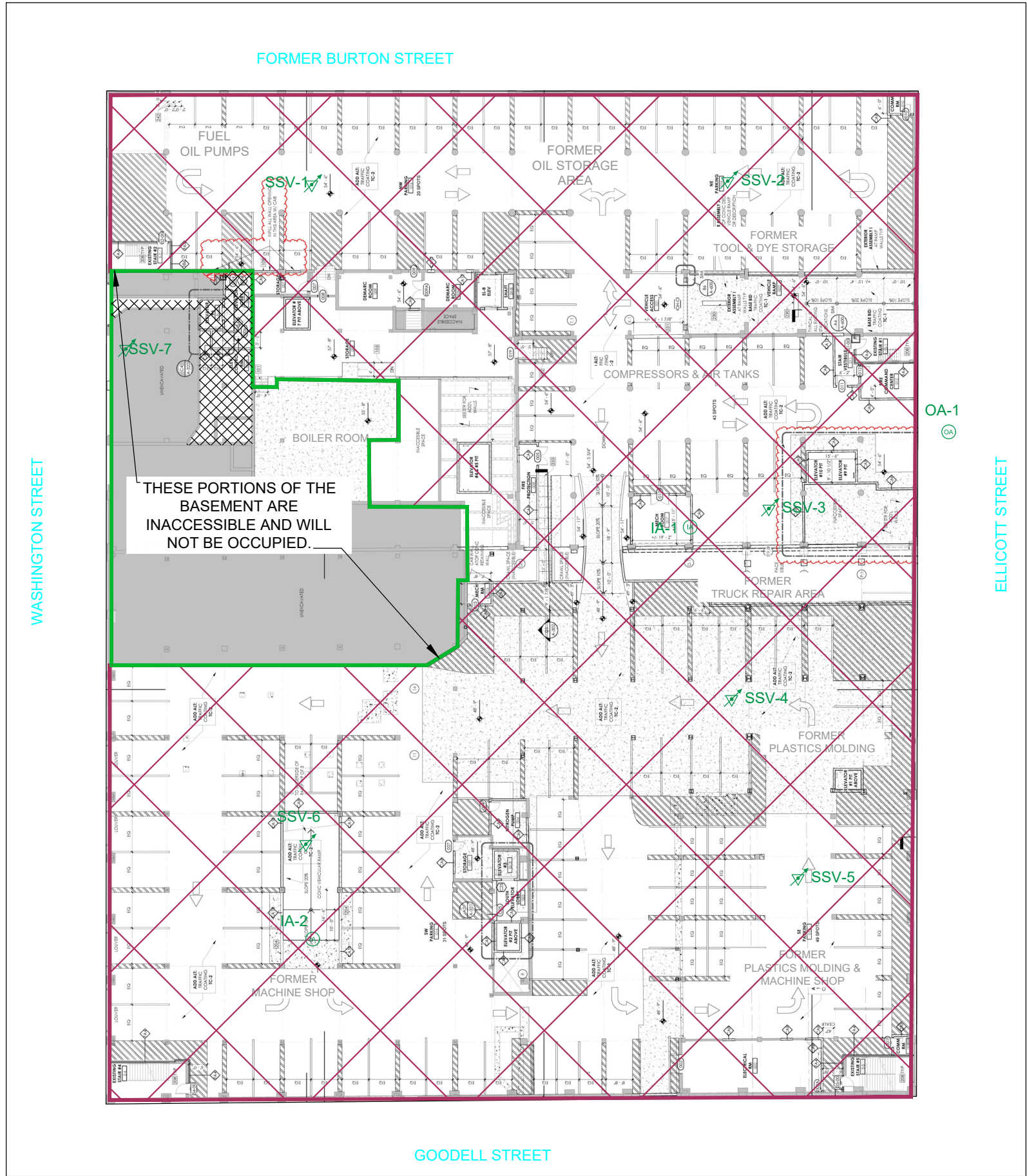
- CIS 1, 2 DCE = CIS-1,2-DICHLOROETHENE
TRANS 1, 2 DCE = TRANS-1,2-DICHLOROETHENE
PCE = TETRACHLOROETHENE
TCE = TRICHLOROETHENE
VC = VINYL CHLORIDE
- ug/l = MICROGRAMS PER LITER
- ONLY DISSOLVED METAL RESULTS SHOWN
- COMPLETE GROUNDWATER SUMMARY RESULTS PROVIDED ON TABLE 4 OF THE SMP.
- cVOC MEANS CHLORINATED VOLATILE ORGANIC COMPOUNDS LISTED ABOVE IN NOTE 3



Title:
GROUNDWATER SAMPLING LOCATIONS AND CVOC RESULTS
SITE MANAGEMENT PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)
628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

| | | | |
|---|---|--|--------------------|
| Prepared for: | | 847 MAIN STREET, LLC & 791 WASHINGTON STREET, LLC | FIGURE 8 |
|  | Compiled by: RFL | Date: MARCH 2025 | |
| | Prepared by: CNK | Scale: AS SHOWN | |
| | Project Mgr: CZB | Project: 4398.0001B000 | |
| | File: FIGURE 8: GROUNDWATER RESULTS SUMMARY.DWG | | |

F:\CAD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SMPI\REVISED SMP\FIGURE 9: AREA OF SOIL INTRUSION CONCERN.DWG



Title:
**AREA OF SOIL VAPOR INTRUSION CONCERN
SITE MANAGEMENT PLAN**
FORMER TRICO PLANT (BCP SITE NO. C915281)
628 ELLCOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:
847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC

| | | | |
|-------------|--|------------------------|--------------------|
| ROUX | Compiled by: RFL | Date: MARCH 2025 | FIGURE 9 |
| | Prepared by: CNK | Scale: AS SHOWN | |
| | Project Mgr: CZB | Project: 4398.0001B000 | |
| | File: FIGURE 9: AREA OF SOIL INTRUSION CONCERN.DWG | | |

F:\CAD\TURNKEY\FORMER TRICO BUILDING BCP\SMPIREVISED SMP\FIGURE 10; BUILDING FIRST FLOOR PLANREV.DWG

WASHINGTON STREET

FIRST FLOOR

FORMER BURTON STREET

ELLCOTT STREET

GOODELL STREET

LEGEND:

- BOUNDARY BETWEEN SLAB ON GRADE AND SUSPENDED CONCRETE SLAB OVER BASEMENT
- FORMER INTERIOR CLAY TILE ON WALL CONTAMINATED WITH PCBs
- FORMER SUSPENDED CONCRETE SLAB ABOVE BASEMENT REMOVED AND REPLACED WITH NEW CONCRETE
- FORMER SUSPENDED CONCRETE SLAB ABOVE BASEMENT REMOVED (NOT REPLACED)

NOTES:
PCB = POLYCHLORINATED BIPHENYLS
PPM = PARTS PER MILLION

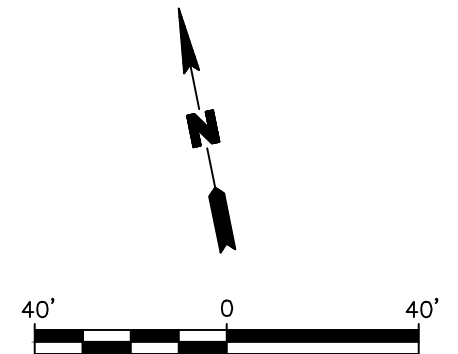
REMOVED IN
MAY 2023

SLAB ON GRADE
CONCRETE

CONCRETE REMOVED IN
DECEMBER 2019 AND
REPLACED WITH NEW
CONCRETE FLOOR

CONCRETE REMOVED IN FEBRUARY
2023 AND REPLACED WITH NEW
CONCRETE FLOOR

CONCRETE REMOVED IN DECEMBER
2019 (WAS NOT REPLACED DUE TO
REDEVELOPMENT PLANS)



Title:
**BUILDING MATERIALS REQUIRING MANAGEMENT
SITE MANAGEMENT PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)**

628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:

847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC

ROUX

Compiled by: RFL

Prepared by: CNK

Project Mgr: CZB

File: FIGURE 10; BUILDING FIRST FLOOR PLANREV.DWG

Date: DECEMBER 2024

Scale: AS SHOWN

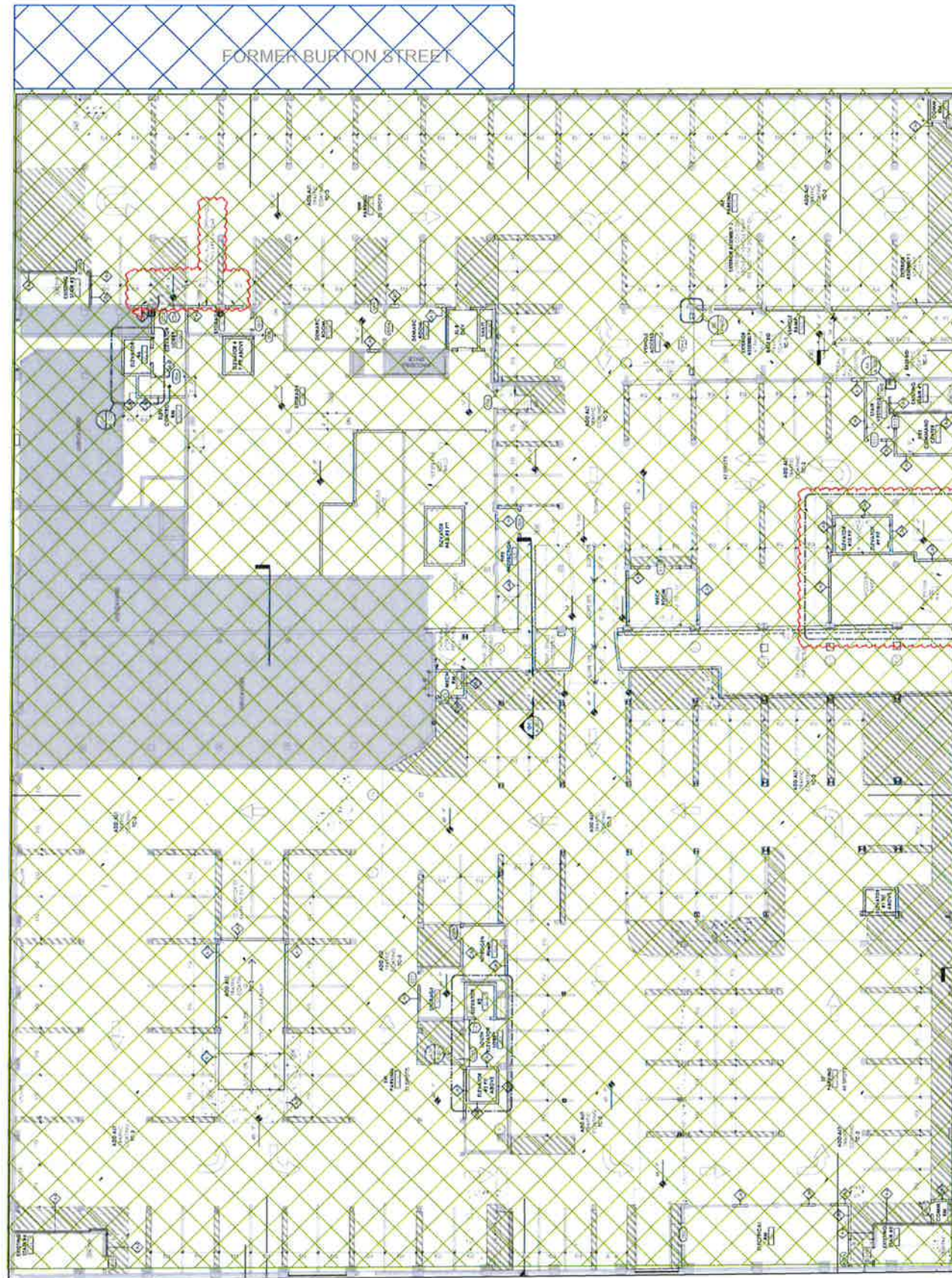
Project: 4398.0001B000

FIGURE

10

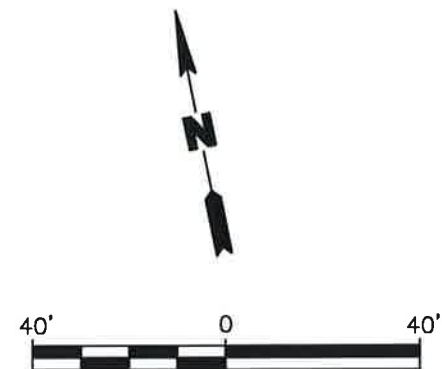
F:\CAD\TURNKEY\FORMER TRICO BUILDING BCP\SMP\REVISED SMP\FIGURE 11: SITE COVER SYSTEM MAP.DWG

WASHINGTON STREET





GOODSELL STREET

ELLICOTT STREET



LEGEND:

-  CONCRETE COVER SYSTEM
(VARIES FROM 4 INCHES TO 9 INCHES)
-  ASPHALT COVER SYSTEM
(MINIMUM 6 INCHES ASPHALT AND SUBBASE)



UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF STATE LAW.

THESE DOCUMENTS (OR COPIES OF ANY THEREOF) PREPARED BY OR BEARING THE SEAL OF THE ENGINEER, SHALL NOT BE REUSED FOR ANY EXTENSIONS OF THE PROJECT OR ANY OTHER PROJECT WITHOUT THE WRITTEN CONSENT OF THE ENGINEER.

Title:

COVER SYSTEM

SITE MANAGEMENT PLAN

FORMER TRICO PLANT (BCP SITE NO. C915281)

628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)

BUFFALO, NEW YORK

Prepared for:

847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC

ROUX

Compiled by: RFL

Prepared by: CNK

Project Mgr: CZB

File: FIGURE 11: SITE COVER SYSTEM MAP.DWG

Date: DECEMBER 2024

Scale: AS SHOWN

Project: 4398.0001B000

FIGURE

11

APPENDIX A

LIST OF SITE CONTACTS

SITE MANAGEMENT PLAN

Former Trico Plant

Appendix A

List of Site Contacts

| Name | Phone/Email Address |
|--|--|
| Site Owner – 791 Washington Street, LLC | 716-667-1234 plkrog@kroggrp.com |
| Remedial Party - 847 Main Street, LLC | 716-667-1234 plkrog@kroggrp.com |
| Remedial Party - 791 Washington Street, LLC | 716-667-1234 plkrog@kroggrp.com |
| Qualified Environmental Professional Christopher Boron, P.G. | 716-856-0599 cboron@rouxinc.com |
| NYSDEC DER Project Manager Megan Kuczka | 716-851-7220 megan.kuczka@dec.ny.gov |
| NYSDEC Regional HW Engineer Andrea Caprio, P.E. | 716-851-7220 andrea.caprio@dec.ny.gov |
| NYSDEC Site Control Kelly Lewandowski, P.E. | 518-402-9543 kelly.lewandowski@dec.ny.gov |
| NYSDOH Bureau of Environmental Exposure Investigation Stephen Lawrence | 518-402-0450 stephen.lawrence@health.ny.gov |

APPENDIX B

EXCAVATION WORK PLAN

BROWNFIELD CLEANUP PROGRAM SITE MANAGEMENT PLAN

APPENDIX B EXCAVATION WORK PLAN

**FORMER TRICO PLANT
NYSDEC SITE NUMBER: C915281
BUFFALO, NEW YORK**

March 2025

Prepared for:

**847 Main Street, LLC
and
791 Washington Street, LLC**

Prepared By:

Roux Environmental Engineering & Geology, DPC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

SITE MANAGEMENT PLAN
APPENDIX B: EXCAVATION PLAN
Former Trico Plant

Table of Contents

| | |
|--|-----------|
| B-1: NOTIFICATION | 1 |
| B-2: SOIL SCREENING METHODS | 2 |
| B-3: SOIL STAGING METHODS | 2 |
| B-4: MATERIALS EXCAVATION AND LOAD-OUT..... | 3 |
| B-5: MATERIALS TRANSPORT OFF-SITE | 4 |
| B-6: MATERIALS DISPOSAL OFF-SITE..... | 4 |
| B-7: MATERIALS REUSE ON-SITE..... | 5 |
| B-8: FLUIDS MANAGEMENT..... | 7 |
| B-9: COVER SYSTEM RESTORATION | 7 |
| B-10: BACKFILL FROM OFF-SITE SOURCES..... | 7 |
| B-11: STORMWATER POLLUTION PREVENTION..... | 8 |
| B-12: EXCAVATION CONTINGENCY PLAN..... | 9 |
| B-13: COMMUNITY AIR MONITORING PLAN..... | 9 |
| B-14: ODOR CONTROL PLAN..... | 11 |
| B-15: DUST CONTROL PLAN..... | 12 |
| B-16: OTHER NUISANCES | 12 |

B-1: NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table 1: Notifications*

| Name | Contact Information |
|--|--|
| Region 9 Project Manager Megan Kuczka | 716-851-7220 megan.kuczka@dec.ny.gov |
| Region 9 Engineer Andrea Caprio, P.E. | 716-851-7220 andrea.caprio@dec.ny.gov |
| NYSDEC Site Control Kelly Lewandowski, P.E. | 518-402-9543 kelly.lewandowski@dec.ny.gov |
| NYSDOH Bureau of Environmental Exposure Investigation Stephen Lawrence | 518-402-0450 stephen.lawrence@health.ny.gov |
| | |

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the cover system, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work, and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work;
- A summary of the applicable components of this EWP;

- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix H of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

B-2: SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section B-6 of this Appendix.

B-3: SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. 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.

B-4: MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE 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 owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

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 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.

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. 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.

B-5: 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.

Material transported by trucks exiting the site will be secured with 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.

Truck transport routes shall be selected to involve the shortest commute but are anticipated to follow: Washington Street south to East Tupper Street which allow access to Route 33 East or East Tupper Street to Oak Street (south) which allows access to Interstate Route 190 north and south bound.

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes 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 dirt and other materials during site remediation and development.

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

B-6: MATERIALS DISPOSAL OFF-SITE

All 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 this 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 formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6NYCRR Subpart 361-5 registered or permitted facility).

B-7: MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) does not remain on-site. 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, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for

all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances [November 2022 or date of current version, whichever is later] guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections B-2 and B-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos, unless documentation of previous asbestos abatement is provided to the Department, and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

Notwithstanding the suspended concrete slab or clay tile wall area requirements discussed in Section 2.5.4, any other porous historic building materials, such as concrete slabs, concrete block, brick, clay tile, etc. generated from demolition work (e.g.; removal of floors, walls or ceilings), during current or future renovation of the building will be tested for PCBs prior to on-site reuse and/or off-site recycling. Sampling will be completed in accordance with composite sample requirements for volume quantities outlined in DER-10 Table 5.4(e)10. The analytical results will be provided to NYSDEC with the type of building materials that were sampled, the quantity of materials to be generated, and the proposed location of the on-site reuse and/or off-site recycling location. Building materials with PCB concentrations less than 10 mg/kg can be reused on-site under the cover system with NYSDEC approval. Porous building materials with PCB concentrations less than 1 mg/kg can be taken off-site for recycling. Building materials that cannot be reused nor meet the off-site recycling criteria will be characterized for proper landfill disposal.

B-8: FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. 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 NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream, or river) will be performed under a SPDES permit.

B-9: COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Decision Document. The existing cover system is comprised of a minimum of concrete covered sidewalks, asphalt cover and concrete building. A demarcation layer, consisting of orange snow fencing material, white geotextile or equivalent material, etc. will be placed beneath 2 feet of soil cover system areas to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP, if hardscape is replaced with soil cover in the future. If the type of cover system changes from that which exists, this will constitute a modification of the cover element of the remedy. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

B-10: BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP 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. A copy of the form is presented in Appendix I.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d) and DER-10 Appendix 5 for Restricted Residential Use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 8. 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. Solid waste will not be imported onto the site.

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.

B-11: STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a 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. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

B-12: EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides, PFAS, and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone 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 the Periodic Review Report.

B-13: COMMUNITY AIR MONITORING PLAN

A figure showing the location of air sampling stations based on generally prevailing wind conditions is shown in Figure 2. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

B-13A: Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent

exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 part-per-million, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 micrograms per cubic meter, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 micrograms per cubic meter or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

B-13B: Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be

adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

B-14: ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors at on and off-site locations. Specific odor control methods to be used on a routine basis will include foam suppressants, if necessary. If nuisance odors are identified at the site boundary, or if odor complaints are 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. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams 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 in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

B-15: DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section B-13. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- 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 truck sprinkling.

B-16: 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.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX C

RESPONSIBILITIES OF OWNER & REMEDIAL PARTY

C-1: RESPONSIBILITIES

The responsibilities for implementing the Site Management Plan (“SMP”) for the Former Trico Plant site (the “site”), number C915281, are divided between the site owner(s) and Remedial Party, as defined below. The owner(s) and Remedial Party are currently listed as:

Owner:

791 Washington Street, LLC Peter Krog 716-667-1234

Remedial Parties

791 Washington Street, LLC Peter Krog 716-667-1234

847 Main Street, LLC Peter Krog 716-667-1234

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party (“RP”) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (“NYSDEC”) is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

- 847 Main Street, LLC Peter Krog, 4 Center Dr. Orchard Park, NY 716-667-1234
- 791 Washington Street, LLC, Peter Krog, 4 Center Dr. Orchard Park, NY 716-667-1234

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

C-2: SITE OWNER’S RESPONSIBILITIES:

- 1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

- 2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a(n) Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.
- 3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.
- 4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
- 5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. In the event that damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.
- 6) In the event some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and (ii) coordinate the performance of necessary corrective actions with the RP.
- 7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.
- 8) The owner will ultimately be responsible for maintaining the engineering controls.

- 9) The owner shall operate the basement ventilation system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.
- 10) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

C-3: REMEDIAL PARTY RESPONSIBILITIES

- 1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.
- 2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.
- 3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.
- 4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).
- 5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.

- 6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 - Notifications of the SMP.
- 7) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.
- 8) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and/or RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX D

ENVIRONMENTAL EASEMENT

MICHAEL P. KEARNS, ERIE COUNTY CLERK
REF:

DATE: 10/31/2019
TIME: 11:13:31 AM
RECEIPT: 19183760

PARALEGAL SERVICES OF BUFFALO
ACCOUNT #: 9273

ITEM - 01 785
RECD: 10/31/2019 11:19:15 AM
FILE: 2019239853 BK/PG D 11352/76
Deed Sequence: TT2019007005
791 WASHINGTON STREET LLC
NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERV
ATION

| | |
|----------------|--------|
| Recording Fees | 90.00 |
| TP584 | 10.00 |
| Subtotal | 100.00 |

| | |
|-------------|----------|
| TOTAL DUE | \$100.00 |
| PAID TOTAL | \$100.00 |
| PAID ESCROW | \$100.00 |

REC BY: Mary Grace
COUNTY RECORDER

FILED

OCT 31 2019

ERIE COUNTY
CLERK'S OFFICE

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36
OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 2nd day of October, 2019, between Owner(s) 791 Washington Street, LLC, having an office at 4 Centre Drive, Orchard Park, New York 14127, County of Erie, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 791 Washington Street in the City of Buffalo, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel numbers: Section 111.31 Block 1 Lot 1.11, being the same as that property conveyed to Grantor by deed dated May 31, 2017 and recorded in the Erie County Clerk's Office in Liber and Page 11313/7681. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 2.110 +/- acres, and is hereinafter more fully described in the Land Title Survey dated April 9, 2014 and last revised May 16, 2019 prepared by John E. McIntosh, III of McIntosh & McIntosh, P.C., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation

established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C915281-10-13 as amended July 17, 2019, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

**Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii),
Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial
as described in 6 NYCRR Part 375-1.8(g)(2)(iv)**

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held

by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to: Site Number: C915281
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to: Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail

and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

791 Washington Street, LLC:

By: 

Print Name: PETER KROG

Title: UGR Date: 9/19/19

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ERIE)

On the 19th day of September in the year 2019, before me, the undersigned, personally appeared Peter L. Krog, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Colette Ann Gorcica
Notary Public - State of New York

COLETTE ANN GORCICA
NOTARY PUBLIC-STATE OF NEW YORK
No. 01GO6032325
Qualified in Erie County
My Commission Expires October 25, 2021

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By:


Michael J. Ryan, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 2nd day of October, in the year 2019 before me, the undersigned, personally appeared Michael J. Ryan, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.



Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2022

SCHEDULE "A" PROPERTY DESCRIPTION

ALL THAT TRACT OR PARCEL OF LAND situate in the City of Buffalo, County of Erie and State of New York, being part of Outer Lots Nos. 146 and 147 in said City, bounded and described as follows:

BEGINNING at the point of intersection of the easterly line of Washington Street (as a street 66 feet wide) with the northerly line of Goodell Street (as a street 66 feet wide), said easterly line of Washington Street forming an interior angle of $89^{\circ} 15' 45''$ with the northerly line of Goodell Street as measured in the northeasterly quadrant formed by said street lines; thence easterly and along the northerly line of Goodell Street, a distance of 265.43 feet to the intersection of said northerly line of Goodell Street with the westerly line of Ellicott Street (as a street 66 feet wide); thence northerly and along the westerly line of Ellicott Street, said westerly line of Ellicott Street forming an interior angle of $90^{\circ} 44' 46''$ as measured in the northwest quadrant formed by said street lines, a distance of 329.50 feet to the intersection of the westerly line of Ellicott Street with the northerly face of the northerly main wall of a 6-story brick building standing on premises herein described; thence westerly and along the northerly face of the northerly main wall of said 6-story brick building standing on premises herein described, said line forming an exterior angle of $90^{\circ} 27' 34''$ as measured in the northwesterly quadrant with the westerly line of Ellicott Street, a distance of 125.76 feet to the westerly exterior face of the westerly wall of a 4-story brick building standing on that parcel situate to the east and north of premises herein described; thence northerly and along the westerly face of the westerly wall of the aforesaid 4-story brick building and forming an exterior angle of $89^{\circ} 53' 18''$ as measured in the northeasterly quadrant formed by said westerly wall and the last described course, a distance of 30.45 feet to the intersection of the aforesaid westerly face of the 4-story brick building with the northerly line of former Burton Street (as a street 30 feet wide, now closed by #231 CCP November 28, 1978); thence westerly and along the northerly line of former Burton Street, a distance of 139.53 feet to a point in the aforementioned easterly line of Washington Street; thence southerly and along the easterly line of Washington Street, a distance of 361.70 feet to the point or place of beginning.

Containing 2.110 acres, be the same, more or less.

NOTES

- 1) REFERENCE MAP - SURVEY MAP PREPARED BY RAY L. SONNENBERGER, LAND SURVEYOR, DATED SEPTEMBER 29, 2000 AND IDENTIFIED AS JOB NO. 00-483-R-1.
- 2) FOR TOPOGRAPHICAL INFORMATION (TABLE A, ITEM #5) SEE MAP PREPARED BY MCINTOSH & MCINTOSH, P.C., DATED APRIL 9, 2014 AND IDENTIFIED AS JOB NO. 8346-A.
- 3) SBL - CITY OF BUFFALO TAX MAP NO. 111.31-1-1.11
- 4) NO TITLE REPORT OR ABSTRACT HAD BEEN SUPPLIED AT THE TIME OF THIS SURVEY.

BURTON STREET
(30.0' WIDE)

(66.0' WIDE)

STREET

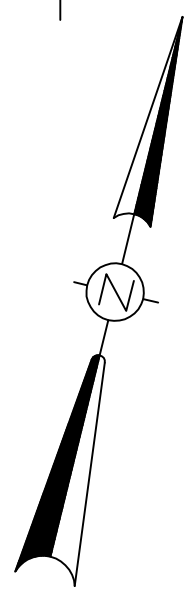
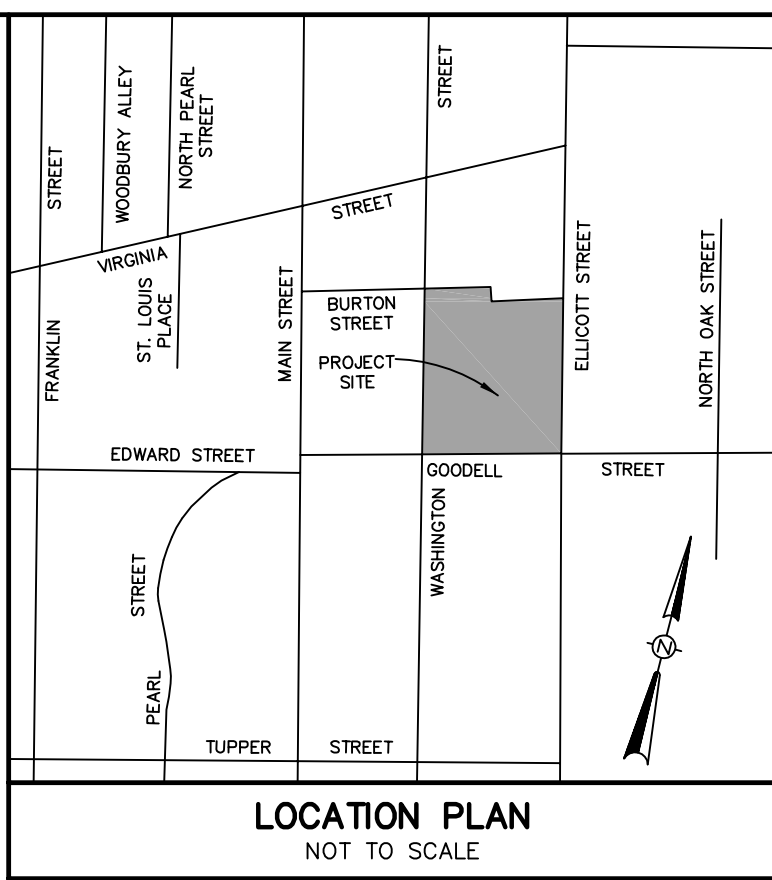
WASHINGTON

640 ELLICOTT STREET, LLC
L-11137, P-2179FORMERLY
ROCHEVOT ALLEY
CLOSED #184 CCP 4/15/80640 ELLICOTT STREET, LLC
L-11137, P-2179791 WASHINGTON STREET, LLC
L-11131, P-7681ENVIRONMENTAL EASEMENT
BCP PARCEL
2.110±Ac.MULTI-STORY BRICK & CONCRETE
BUILDING NO. 791791 WASHINGTON STREET, LLC
ENVIRONMENTAL EASEMENT AREA DESCRIPTION
NYS DEC BCP SITE NO. C915281

ALL THAT TRACT OR PARCEL OF LAND, situate in the City of Buffalo, County of Erie and State of New York, being part of Outer Lots Nos. 146 and 147 in said City, bounded and described as follows: BEGINNING at the point of intersection of the easterly line of Washington Street (as a street 66 feet wide) with the northerly line of Goodell Street (as a street 66 feet wide); thence easterly along the northerly line of Goodell Street forming an interior angle of 89°-15'-45" with the northerly line of Goodell Street as measured in the northeasterly quadrant formed by said street lines; thence easterly along the northerly line of Goodell Street a distance of 265.43 feet to the intersection of said northerly line of Goodell Street with the westerly line of Ellicott Street (as a street 66 feet wide); thence northerly along the westerly line of Ellicott Street, said westerly line of Ellicott Street forming an interior angle of 90°-44'-46" as measured in the northwest quadrant formed by said street lines, a distance of 329.50 feet to the intersection of the westerly line of Ellicott Street with the northerly face of the northerly main wall of a 6-story brick building standing on premises herein described; thence westerly along the northerly face of the northerly main wall of said 6-story brick building standing on premises herein described, said line forming an exterior angle of 90°-27'-34" as measured in the northeasterly quadrant formed by said westerly wall and the last described course, a distance of 30.45 feet to the intersection of the aforesaid westerly face of the 4-story brick building with the northerly line of former Burton Street (as a street 30 feet wide, now closed by #231 CCP November 28, 1978); thence westerly along the northerly line of former Burton Street a distance of 139.53 feet to a point in the aforementioned easterly line of Washington Street; thence southerly along the easterly line of Washington Street a distance of 361.70 feet to the point or place of beginning, containing 2.110 Acres, be the same, more or less.

RECORD DESCRIPTION: L-11313, P-7681

ALL THAT TRACT OR PARCEL OF LAND, situate in the City of Buffalo, County of Erie and State of New York, being part of Outer Lots Nos. 146 and 147 in said City, bounded and described as follows: BEGINNING at the point of intersection of the easterly line of Washington Street (as a street 66 feet wide) with the northerly line of Goodell Street (as a street 66 feet wide); thence easterly along the northerly line of Goodell Street forming an interior angle of 89°-15'-45" with the northerly line of Goodell Street as measured in the northeasterly quadrant formed by said street lines; thence easterly along the northerly line of Goodell Street a distance of 265.43 feet to the intersection of said northerly line of Goodell Street with the westerly line of Ellicott Street (as a street 66 feet wide); thence northerly along the westerly line of Ellicott Street, said westerly line of Ellicott Street forming an interior angle of 90°-44'-46" as measured in the northwest quadrant formed by said street lines, a distance of 329.50 feet to the intersection of the westerly line of Ellicott Street with the northerly face of the northerly main wall of a 6-story brick building standing on premises herein described; thence westerly along the northerly face of the northerly main wall of said 6-story brick building standing on premises herein described, said line forming an exterior angle of 90°-27'-34" as measured in the northeasterly quadrant formed by said westerly wall and the last described course, a distance of 30.45 feet to the intersection of the aforesaid westerly face of the 4-story brick building with the northerly line of former Burton Street (as a street 30 feet wide, now closed by #231 CCP November 28, 1978); thence westerly along the northerly line of former Burton Street a distance of 139.53 feet to a point in the aforementioned easterly line of Washington Street; thence southerly along the easterly line of Washington Street a distance of 361.70 feet to the point or place of beginning.



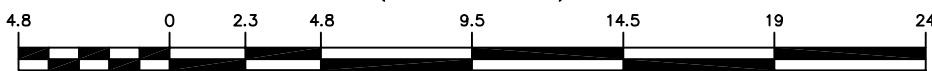
HYD.

LEGEND

- OE — OVERHEAD ELECTRIC
- UE — UNDERGROUND ELECTRIC
- UT — UNDERGROUND TELEPHONE
- UC — UNDERGROUND COMMUNICATIONS
- SS — SANITARY SEWER
- ST — STORM SEWER
- W — WATER
- G — GAS
- X — FENCE
- P.P. — POWER POLE
- L.P. — LIGHT POLE
- C.B. — CATCH BASIN
- S.M.H. — STORM MANHOLE
- H.M.H. — HAND HOLE
- C.O. — CLEANOUT
- G.V. — GAS VALVE
- G.M. — GAS METER
- W.V. — WATER VALVE
- H.V. — HYDRANT
- T.E.M.H. — TELEPHONE MANHOLE
- E.E.M.H. — ELECTRIC MANHOLE
- C.M.M.H. — COMMUNICATIONS MANHOLE
- S — SIGN
- A.G.P. — ABOVE GROUND PIPE
- N.F.V. — NOT FIELD VERIFIED
- M.W. — MONITORING WELL
- ENV. EASEMENT BOUNDARY

GRAPHIC SCALE

(IN METERS)



1 : 240

GRAPHIC SCALE

(IN FEET)



1 inch = 20 ft.

© 2014 MCINTOSH & MCINTOSH, P.C.
ALL RIGHTS RESERVED

NOTE: THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF AN ABSTRACT OF TITLE AND IS SUBJECT TO ANY STATE OF FACTS THAT MAY BE REVEALED BY AN EXAMINATION OF SUCH.

| RESURVEY | REVISION |
|--------------|--|
| MAY 16, 2019 | REVISED BCP SITE NUMBER DECEMBER 18, 2019 |

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209, PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

MAY 16, 2019
DATE OF PLAT OR MAP
JOHN E. MCINTOSH, III LICENSE NO. 49928

NYS DEC BCP SITE NO. C915281, SITE ADDRESS: 791 WASHINGTON STREET

McINTOSH & MCINTOSH, P.C.
CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS
429 PINE STREET, LOCKPORT, NEW YORK 14094
PHONE 433-2535 PHONE 625-8360

| SURVEY OF PART OF OUTER LOTS 146 & 147 CITY OF BUFFALO, ERIE COUNTY, NEW YORK | | | |
|--|-----------------|-----------------|---------------------|
| LOCATION | JOB NO. 8346-EE | SCALE: 1" = 20' | DATE: APRIL 9, 2014 |
| DRAWN | MAS | COMP. | JEM. III |
| DESC. | 8346R2019 | | |

APPENDIX E

MONITORING WELL BORING & CONSTRUCTION LOGS

Project No: 0092-016-001

Borehole Number: RI MW-2

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

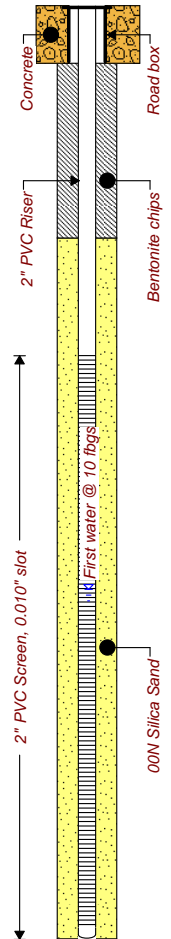
Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|-----------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.8 | Fill | | | | | | | |
| | 0.8 | Black, moist, mostly ash, some fine to coarse sand, loose | | | | | | | |
| | | Silty Sand | S-1 | NA | 2.7 | | | | |
| | | Brown, moist, mostly fine sand, some non-plastic fines, loose when disturbed, massive | | | | | | | |
| | -4.0 | Sandy Lean Clay | | | | | | | |
| | 4.0 | Reddish brown, moist, mostly medium plasticity fines, some fine sand, stiff massive | S-2 | NA | 3.2 | | | | |
| 5.0 | | | | | | | | | |
| | -8.0 | As above, moist to wet (10') | | | | | | | |
| | 8.0 | | S-3 | NA | 4.0 | | | Sampled (8-10') | |
| 10.0 | | | | | | | | | |
| | -12.0 | As above, wet | | | | | | | |
| | 12.0 | | S-4 | NA | 4.0 | | | | |
| | | | | | | | | | |
| 15.0 | | | | | | | | | |
| | -16.0 | End of Borehole | | | | | | | |
| | 16.0 | | | | | | | | |
| 20.0 | | | | | | | | | |



Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-23-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1



| | | | | | |
|--|------------------------------------|--|-----------------------------|----------------------------------|----------------------------------|
| Client: 847 Main Street, LLC & 791 Washington Street, LLC | | Site: Former Trico Plant | | Project Number: 4398.0001B000 | |
| Address: 628 Ellicott Street | | City/State: Buffalo, New York | | Logged By: PWW | |
| Start to Finish Date: 5/25/2016 - 5/25/2016 | | Contractor: Trec Environmental Inc. | | Drill Type: Geoprobe | |
| Borehole Depth: 11 feet | | Backfill: | | Borehole Diameter: 3-inches | |
| Area: NM | | Elevation: TOR 491.15 | | DTW: 1 feet | |
| | | Northing: NM | | Easting: NM | |
| Well Depth: 11 feet | Well Dia./Materials: 1-inch PVC | Screen Interval: 1-11 feet | Screen Slot Size: 0.010" | Sand/Filter Pack Size: #00N | Annular Seal: Bentonite Chips |

| Depth (ft) | Well Diagram | USCS | USCS Graphic | Visual Description | Sample Interval | Recovery (ft) | PID | Notes |
|------------|--------------|-------|--------------|---|-----------------|---------------|-----|----------------|
| | | CONC | | Concrete | | | | |
| | | SP-SM | | Silty Sand Brown, moist to wet (1'), mostly fine sand, some non-plastic fines, medium dense, massive | | | | Sampled (0-2') |
| 0 | | | | | | | 0 | |
| 2.4 | | | | | | 2.4 | 0 | |
| 5 | | | | | | | 0 | |
| 3.2 | | | | | | 3.2 | 0 | |
| 10 | | | | | | | 0 | |
| 1 | | | | | | 1 | 0 | |
| | | | | | | | 0 | |

Bottom of monitoring well at 11 feet

ROUX STANDARD LOG - 3/12/25 12:01 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\CLIP\PROJECTS\FORMER TRICO PLANT.GPJ



FIELD BOREHOLE LOG

| | | | | | | | | |
|----------------------|-------------------------------|--|------------------------|-----------|----------------|---------------------------|-------------------|----------|
| PROJECT: | FORMER TRICO PLANT | | Log of Boring No.: | RI-MW-7R | | | | |
| BORING LOCATION: | Buffalo, NY | | ELEVATION AND DATUM: | | | | | |
| DRILLING CONTRACTOR: | Trec Environmental Inc. | | DATE STARTED: | 10/13/23 | DATE FINISHED: | 10/13/23 | | |
| DRILLING METHOD: | 4 1/4-inch Hollow Stem Augers | | TOTAL DEPTH: | 16.0 fbgs | | SCREEN INTERVAL: | 16.0 ft to 6.0 ft | |
| DRILLING EQUIPMENT: | Geoprobe 6620DT | | DEPTH TO FIRST: 3.5 ft | COMPL.: | CASING: | | PVC | |
| SAMPLING METHOD: | 4-foot macro core | | LOGGED BY: | | | | TAB | |
| HAMMER WEIGHT: | NA | | DROP: | NA | | RESPONSIBLE PROFESSIONAL: | TAB | REG. NO. |

| Depth (fbgs) | SAMPLES | | | | | PID Scan (ppm) | SAMPLE DESCRIPTION (ASTM D 2488) | REMARKS |
|--------------|------------|--------|----------------|-------------|----------|----------------|---|---------|
| | Sample No. | Sample | Blows (per 6") | SPT N-Value | Recovery | | | |
| | | | | | | | USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other | |
| | | | | | | | SURFACE ELEVATION: | |
| 0 | | | | | | | 0.0 - 0.6 ft: CONCRETE | |
| 2' | 1' | | | | 2.5 feet | 0.0 ppm | 0.6 ft - 1.5 ft: CRUSHED STONE - Two inch minus, crushed limestone. | |
| 4' | | | | | | | 1.5 ft - 4.0 ft: SILTY SAND - Brown, wet (3.5 ft), mostly silt, some fine sand, medium dense. | |
| 6' | 2' | | | | 2.9 feet | 0.0 ppm | 4.0 ft - 8.0 ft: POORLY GRADED FINE SAND - Brown, wet, mostly fine sand, few silt, loose when disturbed, rapid dilatancy. | |
| 8' | | | | | | | 8.0 ft - 10.5 ft: As above. | |
| 10' | 3' | | | | 4.0 feet | 0.0 ppm | 10.5 - 11.0 ft: SANDY LEAN CLAY - Reddish brown, wet, mostly clay, some fine sand, stiff. | |
| 12' | | | | | | | 11.0 ft - 12.0 ft: POORLY GRADED FINE SAND - As 8.0 to 10.5 ft. | |
| 14' | 4' | | | | 4.0 feet | 0.0 ppm | 12.0 ft - 16.0 ft: As above. | |
| 16' | | | | | | | End of Boring 16.0 ft. | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| | |
|---------------------------------|---|
| Borehole depth = | 16.0 feet |
| Borehole diameter = | 8 1/4 inch |
| Has bridging of grout occurred? | <input type="checkbox"/> yes <input checked="" type="checkbox"/> no |
| If yes, explain resolution: | |
| Method of installation: | 4-foot macro core, followed by 4 1/4 inch hollow stem auger. |

Project No: 0092-016-001

Borehole Number: RI SB-12

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|----------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | 0.0 | | |
| | -0.5 | Fill Black, moist, mostly ash, some fine to coarse sand, loose | | | | | 0.0 | | |
| | 0.5 | Silty Sand Brown, moist, mostly fine sand, some non-plastic fines, loose when disturbed, massive | S-1 | NA | 2.5 | | 0.0 | Sampled (2-4') | |
| | -4.0 | As above | | | | | 0.0 | | |
| 5.0 | 4.0 | | S-2 | NA | 3.2 | | 0.0 | | |
| | -7.0 | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, stiff massive | | | | | 0.0 | | |
| | -8.0 | As above | | | | | 0.0 | | |
| | 8.0 | | S-3 | NA | 4.0 | | 0.0 | | |
| 10.0 | | | | | | | 0.0 | | |
| | -12.0 | As above, moist to wet (13') | | | | | 0.0 | | |
| | 12.0 | | S-4 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| 15.0 | | | | | | | 0.0 | | |
| | -16.0 | End of Borehole | | | | | 0.0 | | |
| | 16.0 | | | | | | | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-23-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Borehole Number: RI SB-13

A.K.A.:

Logged By: PWW

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 0.0 | Ground Surface | | | | | 0 ppm 12.5 25 | | |
| | -1.0 1.0 | Concrete | | | | | 0.0 0.0 | | |
| | | Gravel and Sand Grey, moist, mostly fine to coarse gravel and, some fine to coarse sand, loose | S-1 | NA | 1.4 | | 0.0 0.0 | | |
| | -4.0 4.0 | Refusal on concrete | | | | | 0.0 0.0 | | |
| | | End of Borehole | | | | | | | |
| 5.0 | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 10.0 | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 15.0 | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 20.0 | | | | | | | | | |

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Drill Date(s): 5-23-16

Project No: 0092-016-001

Borehole Number: RI SB-14

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete and Concrete Block | | | | | | | |
| | | | S-1 | NA | 1.4 | | | | |
| | -3.0 | Void Space | | | | | | | |
| | 3.0 | Open void space | | | | | | | |
| 5.0 | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 10.0 | | | | | | | | | |
| | -11.0 | Refusal on concrete @ 11 fbgs | | | | | | | |
| | 11.0 | End of Borehole | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 15.0 | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-23-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Project No: 0092-016-001

Borehole Number: RI SB-17

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|----------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | 0.0 | | |
| | -0.8 | Fill | | | | | 0.0 | | |
| | 0.8 | Black, moist, mostly ash, some fine to coarse sand, loose | | | | | | | |
| | | Sandy Lean Clay | S-1 | NA | 4.0 | | 0.0 | | |
| | | Reddish brown, moist to wet (2'), mostly medium plasticity fines, some fine sand, stiff massive | | | | | | | |
| | -4.0 | As above, wet | | | | | 0.0 | | |
| 5.0 | 4.0 | | S-2 | NA | 4.0 | | 0.0 | Sampled (4-6') | |
| | | | | | | | 0.0 | | |
| | -8.0 | As above | | | | | 0.0 | | |
| | 8.0 | | | | | | 0.0 | | |
| 10.0 | | | S-3 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | -12.0 | As above | | | | | 0.0 | | |
| | 12.0 | | | | | | 0.0 | | |
| | | | S-4 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| 15.0 | | | | | | | 0.0 | | |
| | -16.0 | End of Borehole | | | | | 0.0 | | |
| | 16.0 | | | | | | | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-24-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Project No: 0092-016-001

Borehole Number: RI SB-18

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|----------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | 0.0 | | |
| | -0.8 | Fill | | | | | 0.0 | | |
| | 0.8 | Black, moist, mostly ash, some fine to coarse sand, loose | | | | | | | |
| | | Silty Sand | S-1 | NA | 4.0 | | 0.0 | | |
| | | Brown, moist, mostly fine sand, some non-plastic fines, loose when disturbed, massive | | | | | | Sampled (2-4') | |
| | -4.0 | Sandy Lean Clay | | | | | 0.0 | | |
| | 4.0 | Reddish brown, moist to wet (6'), mostly medium plasticity fines, some fine sand, stiff massive | S-2 | NA | 4.0 | | 0.0 | | |
| 5.0 | | | | | | | 0.0 | | |
| | -8.0 | As above, wet | | | | | 0.0 | | |
| | 8.0 | | | | | | 0.0 | | |
| 10.0 | | | S-3 | NA | 4.0 | | 0.0 | | |
| | -12.0 | As above | | | | | 0.0 | | |
| | 12.0 | | | | | | 0.0 | | |
| | | | S-4 | NA | 4.0 | | 0.0 | | |
| 15.0 | | | | | | | 0.0 | | |
| | -16.0 | End of Borehole | | | | | 0.0 | | |
| | 16.0 | | | | | | | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-24-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Borehole Number: RI SB-19

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

[illegible]

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-24-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Borehole Number: RI SB-20





A.K.A.:

Logged By: PWW

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs | | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--|-------------|-------------|-------------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | | |
| | | | | | | | 0 | ppm 12.5 | 25 | |
| 0.0 | 0.0 | Ground Surface | | | | | | | | |
| | 0.0 | Concrete | S-1 | NA | 4.0 |  | 0.0 | | | |
| | -0.8 | Fill | | | | | 0.0 | | | |
| | 0.8 | Black, moist, mostly ash, some fine to coarse sand, loose | | | | | | | | |
| | | Sandy Lean Clay | | | | | 0.0 | | | |
| | | Reddish brown, moist to wet (2'), mostly medium plasticity fines, some fine sand, stiff massive | | | | | | | | |
| | -4.0 | As above, wet | S-2 | NA | 4.0 |  | 0.0 | | Sampled (4-6') | |
| 5.0 | 4.0 | | | | | | 0.0 | | | |
| | | | | | | | | | | |
| | | | | | | | 0.0 | | | |
| | -8.0 | As above | S-3 | NA | 4.0 |  | 0.0 | | | |
| | 8.0 | | | | | | 0.0 | | | |
| | | | | | | | | | | |
| 10.0 | | | | | | | 0.0 | | | |
| | | | | | | | | | | |
| | -12.0 | As above | S-4 | NA | 4.0 |  | 0.0 | | | |
| | 12.0 | | | | | | 0.0 | | | |
| | | | | | | | | | | |
| | | | | | | | 0.0 | | | |
| 15.0 | | | | | | | | | | |
| | -16.0 | End of Borehole | | | | | 0.0 | | | |
| | 16.0 | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 20.0 | | | | | | | | | | |

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Drill Date(s): 5-24-16

Project No: 0092-016-001

Borehole Number: RI SB-21

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|----------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | 0.0 | | |
| | -0.8 | Fill | | | | | 0.0 | | |
| | 0.8 | Black, moist, mostly ash, some fine to coarse sand, loose | S-1 | NA | 3.1 | | 0.0 | | |
| | | Sandy Lean Clay | | | | | 0.0 | | |
| | | Reddish brown, moist, mostly medium plasticity fines, some fine sand, stiff massive | | | | | 0.0 | | |
| | -4.0 | As above, moist to wet (6') | S-2 | NA | 4.0 | | 0.0 | | |
| 5.0 | 4.0 | | | | | | 0.0 | Sampled (6-8') | |
| | -8.0 | As above, wet | S-3 | NA | 4.0 | | 0.0 | | |
| | 8.0 | | | | | | 0.0 | | |
| 10.0 | | | S-4 | NA | 4.0 | | 0.0 | | |
| | -12.0 | As above | | | | | 0.0 | | |
| | 12.0 | | | | | | 0.0 | | |
| 15.0 | | | | | | | 0.0 | | |
| | -16.0 | End of Borehole | | | | | 0.0 | | |
| | 16.0 | | | | | | 0.0 | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-24-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Project No: 0092-016-001

Borehole Number: RI SB-22

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|--------------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | 0.0 | | |
| | -0.8 | | | | | | 0.0 | | |
| | 0.8 | Fill Black, moist, mostly ash, some fine to coarse sand, loose | S-1 | NA | 4.0 | | 0.0 | | |
| | | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, stiff massive | | | | | 0.0 | | |
| | -4.0 | | | | | | 0.0 | | |
| | 4.0 | As above, moist to wet (6') | S-2 | NA | 4.0 | | 0.0 | | |
| 5.0 | | | | | | | 0.0 | | |
| | -8.0 | | | | | | 0.0 | | |
| | 8.0 | As above, wet | S-3 | NA | 4.0 | | 0.0 | Sampled (8-10') | |
| 10.0 | | | | | | | 0.0 | | |
| | -12.0 | | | | | | 0.0 | | |
| | 12.0 | As above | S-4 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| 15.0 | | | | | | | 0.0 | | |
| | -16.0 | | | | | | 0.0 | | |
| | 16.0 | End of Borehole | | | | | 0.0 | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-24-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Project No: 0092-016-001

Borehole Number: RI SB-23

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|-----------------------------------|-------------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | 0.0 | | |
| | -0.8 | | | | | | 0.0 | | |
| | 0.8 | Sandy Lean Clay Reddish brown, moist to wet (1'), mostly medium plasticity fines, some fine sand, stiff massive | S-1 | NA | 2.8 | | 0.0 | | |
| | | | | | | | 0.0 | Sampled (2-4') | |
| | -4.0 | | | | | | 0.0 | | |
| | 4.0 | As above, wet | S-2 | NA | 4.0 | | 0.0 | | |
| 5.0 | | | | | | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | -8.0 | | | | | | 0.0 | | |
| | 8.0 | As above | S-3 | NA | 4.0 | | 0.0 | | |
| 10.0 | | | | | | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | -12.0 | | | | | | 0.0 | | |
| | 12.0 | As above | S-4 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | | | | | | | 0.0 | | |
| 15.0 | | | | | | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | -16.0 | | | | | | 0.0 | | |
| | 16.0 | End of Borehole | | | | | 0.0 | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-24-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Project No: 0092-016-001

Borehole Number: RI SB-24

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: PWW

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|-----------------------------------|-------------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | 0.0 | | |
| | -0.8 | | | | | | 0.0 | | |
| | 0.8 | Sandy Lean Clay Reddish brown, moist to wet (1'), mostly medium plasticity fines, some fine sand, stiff massive | S-1 | NA | 3.0 | | 0.0 | | |
| | -4.0 | | | | | | 0.0 | | |
| | 4.0 | As above, wet | | | | | 0.0 | Sampled (4-6') | |
| 5.0 | | | S-2 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | -8.0 | | | | | | 0.0 | | |
| | 8.0 | As above | | | | | 0.0 | | |
| | | | | | | | 0.0 | | |
| 10.0 | | | S-3 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | -12.0 | | | | | | 0.0 | | |
| | 12.0 | As above | | | | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | | | S-4 | NA | 4.0 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| 15.0 | | | | | | | 0.0 | | |
| | -16.0 | | | | | | 0.0 | | |
| | 16.0 | End of Borehole | | | | | 0.0 | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 20.0 | | | | | | | | | |

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe LT54 Track Mounted Rig

Drill Method: Direct Push w/ 4' macro-core

Comments:

Drill Date(s): 5-24-16

Hole Size: 3"

Stick-up: NA

Datum:

Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-25

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
 2558 Hamburg Turnpike, Suite 300
 Buffalo, NY 14218
 (716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | 0.4 | Poorly Graded Gravel with Silt and Sand Grey, moist, mostly sub-rounded fine gravel, little fine sand, trace non-plastic fines, medium dense loose when disturbed. | | | | | | | |
| | | Poorly Graded Sand with Silt Reddish brown, wet (0.5 fbgs), mostly fine sand, few non-plastic fines, medium dense, rapid dilatancy. | C1 | NA | 3.2 | | 0.0 | | |
| | -3.0 | | | | | | 0.0 | | |
| | 3.0 | Lean Clay Reddish brown, moist, mostly medium plasticity fines, trace fine sand, stiff, medium toughness, medium dry strength, massive. | | | | | | | |
| | -4.0 | | | | | | 0.0 | | |
| | 4.0 | | | | | | | | |
| 5.0 | | | C2 | NA | 2.4 | | 0.0 | | |
| | | | | | | | | | |
| | | | | | | | 0.0 | | |
| | -8.0 | | | | | | | | |
| | 8.0 | Lean Clay with Sand Reddish brown, moist, mostly medium plasticity fines, little fine sand, stiff, medium toughness, medium dry strength. | | | | | 0.0 | | |
| | | | | | | | | | |
| 10.0 | | | C3 | NA | 0.8 | | 0.0 | | |
| | | | | | | | | | |
| | -11.5 | | | | | | 0.0 | | |
| | 11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | -12.0 | | | | | | | | |
| | 12.0 | End of Borehole | | | | | | | |

Drilled By: Trec Environmental Inc.
Drill Rig Type: Geoprobe 54LT
Drill Method: Directpush w/4' macro-core.
Comments:
Drill Date(s): 11/14/16

Hole Size: 3-inch.
Stick-up: NA
Datum: NA
Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-26

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC.

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
 2558 Hamburg Turnpike, Suite 300
 Buffalo, NY 14218
 (716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | 0.4 | Poorly Graded Gravel with Silt and Sand Grey, moist, mostly sub-rounded fine gravel, little fine sand, trace non-plastic fines, medium dense loose when disturbed. | | | | | | | |
| | | Lean Clay Reddish brown, wet, mostly medium plasticity fines, trace fine sand, stiff, medium toughness, medium dry strength, massive. | C1 | NA | 1.5 | | | | |
| | -4.0 | As above, moist. | | | | | | | |
| | 4.0 | | | | | | | | |
| 5.0 | | | C2 | NA | 2.9 | | | | |
| | | | | | | | | | |
| | -8.0 | | | | | | | | |
| | 8.0 | | | | | | | | |
| 10.0 | | | C3 | NA | 2.5 | | | | |
| | | | | | | | | | |
| | -11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | 11.5 | | | | | | | | |
| | -12.0 | End of Borehole | | | | | | | |
| | 12.0 | | | | | | | | |

Drilled By: Trec Environmental Inc.
Drill Rig Type: Geoprobe 54LT
Drill Method: Directpush w/ 4' macro-core.
Comments:
Drill Date(s): 11/14/16

Hole Size: 3-inch.
Stick-up: NA
Datum: NA
Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-27

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | 0.4 | Poorly Graded Gravel with Silt and Fill Black, moist, mostly angular gravel, trace non-plastic fines, cinders, loose. | | | | | | | |
| | | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, stiff, medium toughness, medium dry strength, massive. | C1 | NA | 2.5 | | 0.0 | | |
| | | | | | | | 0.0 | | |
| | | | | | | | 1.4 | | |
| | -4.0 | | | | | | 2.2 | | |
| 5.0 | 4.0 | | | | | | | | |
| | -6.0 | Poorly Graded Sand with Silt Reddish brown, wet (7.0 fbgs), mostly fine sand, few non-plastic fines, medium dense, rapid dilatancy. | C2 | NA | 3.6 | | 4.6 | | |
| | 6.0 | | | | | | 0.6 | | |
| | -7.5 | Sandy Lean Clay As above (0.60 to 4.0 fbgs). | | | | | 0.0 | | |
| | 7.5 | | | | | | | | |
| | -8.0 | | | | | | | | |
| | 8.0 | | | | | | | | |
| | | | C3 | NA | 2.6 | | | | |
| | | | | | | | 9.0 | | |
| 10.0 | | | | | | | | | |
| | -11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | 11.5 | | | | | | | | |
| | -12.0 | End of Borehole | | | | | | | |
| | 12.0 | | | | | | | | |

First water 7.0 fbgs.

Drilled By: Trec Environmental Inc.
Drill Rig Type: Geoprobe 54LT
Drill Method: Directpush w/ 4' macro-core
Comments:
Drill Date(s): 11/14/16

Hole Size: 3-inch.
Stick-up: NA
Datum: NA
Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-28

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

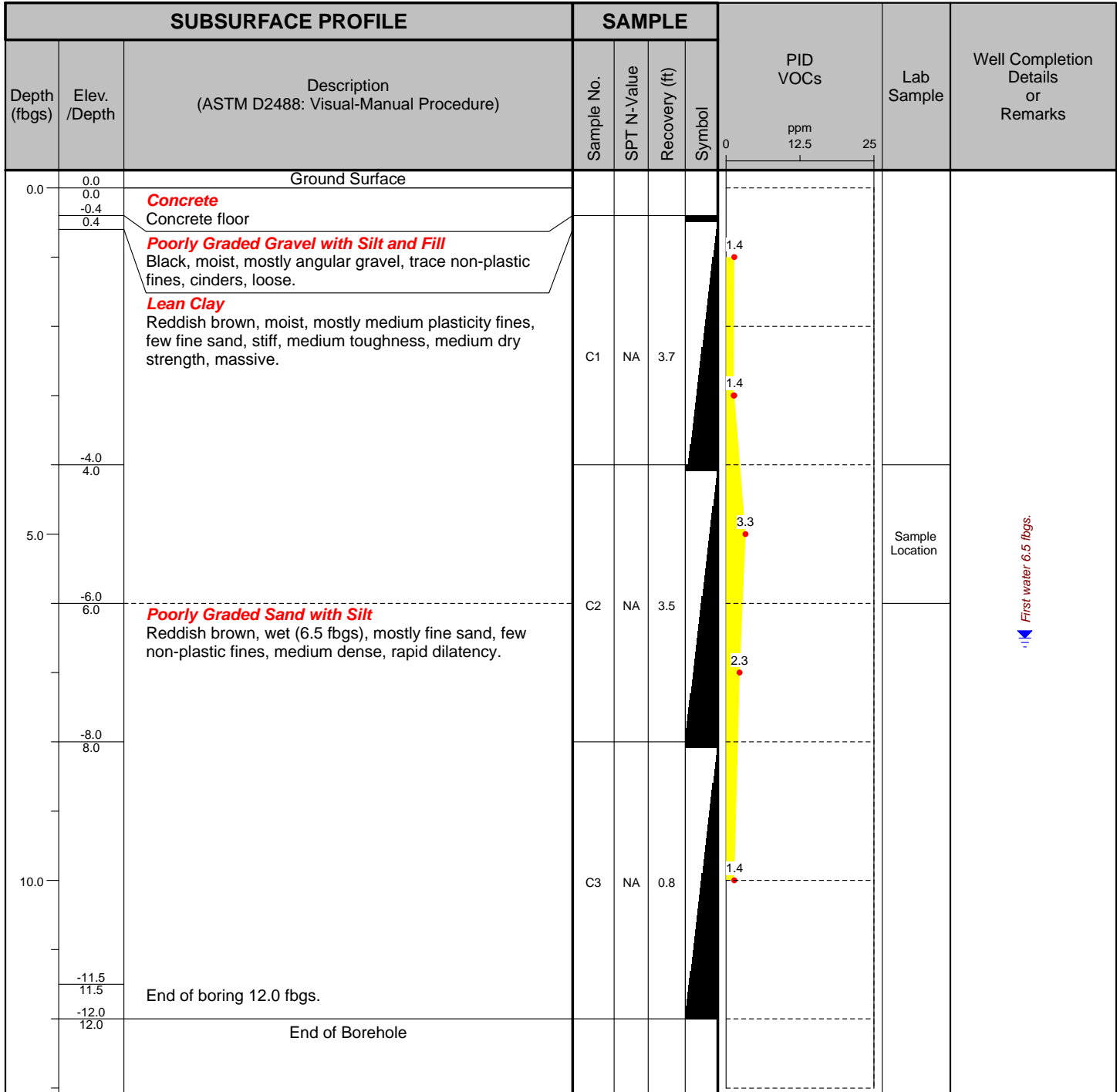
Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635



Drilled By: Trec Environmental Inc.
Drill Rig Type: Geoprobe 54LT
Drill Method: Directpush w/ 4' macro-core.
Comments:
Drill Date(s): 11/14/16

Hole Size: 3-inch.
Stick-up: NA
Datum: NA
Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-29

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | 0.4 | | | | | | | | |
| | | Poorly Graded Gravel with Silt and Fill Black, moist, mostly angular gravel, trace non-plastic fines, cinders, loose. | | | | | 0.0 | | |
| | | Lean Clay with Sand Reddish brown, moist, mostly low plasticity fines, little fine sand, stiff, medium toughness, medium dry strength, massive. | C1 | NA | 3.9 | | 0.0 | | |
| | -4.0 | | | | | | | | |
| | 4.0 | Poorly Graded Sand Brown, moist, mostly fine sand, trace non-plastic fines, medium dense, loose when disturbed. | | | | | 0.0 | | |
| | -4.5 | | | | | | | | |
| | 4.5 | Poorly Graded Sand with Silt Reddish brown, wet (7.0 fbgs), mostly fine sand, few non-plastic fines, medium dense, rapid dilatancy. | C2 | NA | 2.5 | | 0.0 | | |
| | -7.0 | | | | | | | | |
| | 7.0 | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, stiff, medium toughness, medium dry strength, massive. | | | | | 0.0 | | |
| | -8.0 | | | | | | | | |
| | 8.0 | Silty Sand Reddish brown, wet, mostly fine sand, some non-plastic fines, medium dense, rapid dilatancy. | | | | | 0.0 | | |
| | -10.0 | | | | | | | | |
| | 10.0 | Sandy Lean Clay As (7.0 to 8.0 fbgs) above. | C3 | NA | 1.8 | | 0.0 | | |
| | -11.5 | | | | | | | | |
| | 11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | -12.0 | | | | | | | | |
| | 12.0 | End of Borehole | | | | | | | |

First water 7.0 fbgs.

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe 54LT

Drill Method: Directpush w/4' macro-core.

Comments:

Drill Date(s): 11/14/16

Hole Size: 3-inch.

Stick-up: NA

Datum: NA

Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-30

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|--|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | -0.4 | | | | | | | | |
| | -1.0 | Poorly Graded Gravel with Silt and Fill | | | | | | | |
| | 1.0 | Black, moist, mostly angular gravel, trace non-plastic fines, cinders, loose. | | | | | | | |
| | | Poorly Graded Sand | | | | | | | |
| | | Brown, moist, mostly fine sand, trace non-plastic fines, medium dense, loose when disturbed. | | | | | | | |
| | | Sandy Lean Clay | | | | | | | |
| | | Reddish brown, moist, mostly medium plasticity fines, some fine sand, stiff, medium toughness, medium dry strength, massive. | C1 | NA | 2.9 | | | | |
| | -3.5 | | | | | | | | |
| | 3.5 | Poorly Graded Sand with Silt | | | | | | | |
| | -4.0 | Reddish brown, moist, mostly fine sand, few non-plastic fines, medium dense, rapid dilatency. | | | | | | | |
| | 4.0 | | | | | | | | |
| 5.0 | | As above, wet (7.0 fbgs). | C2 | NA | 1.9 | | | | |
| | | | | | | | | | |
| | -8.0 | As above. | | | | | | | |
| | 8.0 | | | | | | | | |
| 10.0 | -10.0 | Sandy Lean Clay | | | | | | | |
| | 10.0 | As (1.0 to 3.5fbgs) above. | C3 | NA | 2.8 | | | | |
| | | | | | | | | | |
| | -11.5 | | | | | | | | |
| | 11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | -12.0 | | | | | | | | |
| | 12.0 | End of Borehole | | | | | | | |

First water 7.0 fbgs.

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe 54LT

Drill Method: Directpush w/4' macro-core

Comments:

Drill Date(s): 11/14/16

Hole Size: 3-inch.

Stick-up: NA

Datum: NA

Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-31

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | -0.4 | Poorly Graded Gravel with Silt and Fill Black, moist, mostly angular gravel, trace non-plastic fines, cinders, loose. | | | | | | | |
| | | Poorly Graded Sand Brown, moist, mostly fine sand, trace non-plastic fines, medium dense, loose when disturbed. | C1 | NA | 1.8 | | 0.0 | | |
| | | | | | | | 0.2 | | |
| | -4.0 | | | | | | | | |
| | 4.0 | | | | | | | | |
| 5.0 | | | | | | | 0.0 | | |
| | -6.0 | | | | | | | | |
| | 6.0 | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, medium toughness, medium dry strength, massive. | C2 | NA | 2.8 | | 0.0 | | |
| | -6.5 | | | | | | | | |
| | 6.5 | Silty Sand Reddish brown, wet (7.0 fbgs), mostly fine sand, little non-plastic fines, medium dense, rapid dilatancy. | | | | | | | |
| | -8.0 | | | | | | | | |
| | 8.0 | | | | | | | | |
| 10.0 | -10.0 | Sandy Lean Clay As (6.0 to 6.5 fbgs) above. | C3 | NA | 2.1 | | 0.0 | | |
| | | | | | | | | | |
| | -11.5 | | | | | | | | |
| | 11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | -12.0 | | | | | | | | |
| | 12.0 | End of Borehole | | | | | | | |

First water 7.0 fbgs.

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe 54LT

Drill Method: Directpush w/ 4' macro-core.

Comments:

Drill Date(s): 11/14/16

Hole Size: 3-inch.

Stick-up: NA

Datum: NA

Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-32

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

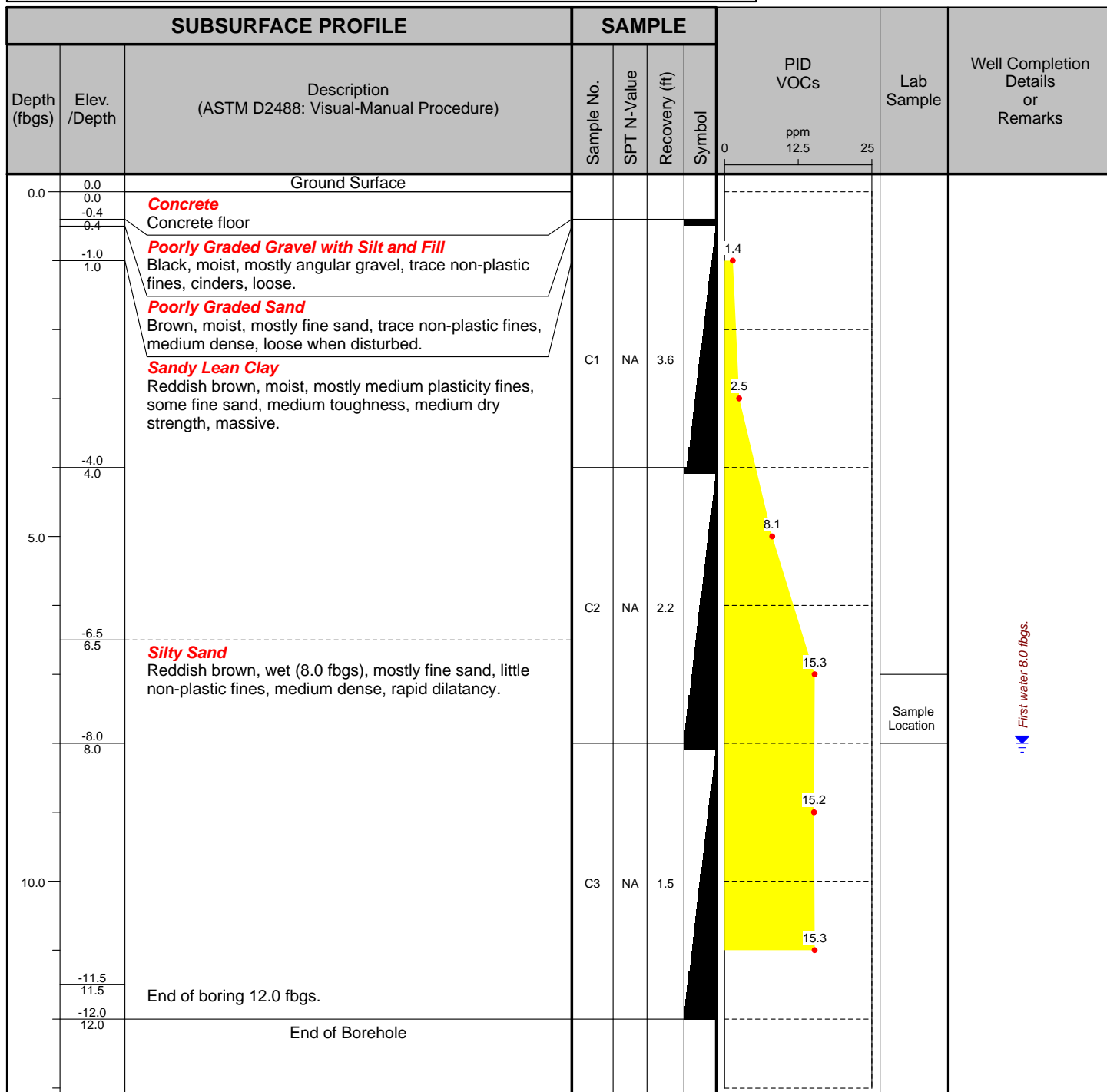
Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635



Drilled By: Trec Environmental Inc.
Drill Rig Type: Geoprobe 54LT
Drill Method: Directpush w/ 4' macro-core.
Comments:
Drill Date(s): 11/14/16

Hole Size: 3-inch.
Stick-up: NA
Datum: NA
Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-33

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | -0.4 | Poorly Graded Gravel with Silt and Fill Black, moist, mostly angular gravel, trace non-plastic fines, cinders, loose. | | | | | 0.6 | | |
| | | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, medium toughness, medium dry strength, massive. | C1 | NA | 3.8 | | 1.6 | | |
| | -4.0 | | | | | | 1.4 | | |
| 5.0 | 4.0 | | C2 | NA | 2.7 | | 1.8 | | |
| | -7.0 | As above, wet (7.0 fbgs). | | | | | 1.9 | | |
| | -8.0 | Silty Sand Reddish brown, wet, mostly fine sand, little non-plastic fines, medium dense, rapid dilatancy. | C3 | NA | 2.5 | | 3.6 | | |
| 10.0 | 8.0 | | | | | | | | |
| | -11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | -12.0 | End of Borehole | | | | | | | |

First water 7.0 fbgs.

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe 54LT

Drill Method: Directpush w/ 4' macro-core.

Comments:

Drill Date(s): 11/14/16

Hole Size: 3-inch.

Stick-up: NA

Datum: NA

Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-34

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
 2558 Hamburg Turnpike, Suite 300
 Buffalo, NY 14218
 (716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|---------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete | | | | | | | |
| | -0.4 | Concrete floor | | | | | | | |
| | 0.4 | Poorly Graded Gravel with Silt and Fill Black, moist, mostly angular gravel, trace non-plastic fines, cinders, loose. | | | | | 0.0 | | |
| | | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, medium toughness, medium dry strength, massive. | C1 | NA | 1.7 | | 0.0 | | |
| | -3.5 | | | | | | | | |
| | 3.5 | Silty Sand Reddish brown, moist, mostly fine sand, little non-plastic fines, medium dense, rapid dilatancy. | | | | | 0.0 | | |
| | -4.0 | | | | | | | | |
| | 4.0 | Sandy Lean Clay As (0.6 to 3.5 fbgs) above. | | | | | 0.0 | | |
| 5.0 | | | | | | | | | |
| | -6.0 | | C2 | NA | 2.7 | | 0.0 | | |
| | 6.0 | Silty Sand As (3.5 to 4.0 fbgs) above, wet at (7.0 fbgs). | | | | | 0.0 | | |
| | | | | | | | | | |
| | -8.0 | | | | | | 0.0 | | |
| | 8.0 | | | | | | | | |
| | | | | | | | | | |
| 10.0 | -10.0 | Sandy Lean Clay As (0.6 to 3.5 fbgs) above. | C3 | NA | 3.1 | | 0.0 | | |
| | 10.0 | | | | | | | | |
| | | | | | | | | | |
| | -11.5 | | | | | | 0.0 | | |
| | 11.5 | End of boring 12.0 fbgs. | | | | | | | |
| | -12.0 | | | | | | | | |
| | 12.0 | End of Borehole | | | | | | | |

First water 7.0 fbgs.

Drilled By: Trec Environmental Inc.

Drill Rig Type: Geoprobe 54LT

Drill Method: Directpush w/ 4' macro-core.

Comments:

Drill Date(s): 11/14/16

Hole Size: 3-inch.

Stick-up: NA

Datum: NA

Sheet: 1 of 1

Project No: 0092-016-001-005-001

Borehole Number: RISB-35

Project: Remedial Investigation

A.K.A.:

Client: The Krog Group, LLC

Logged By: TAB

Site Location: 791 Washington Street, Buffalo, NY

Checked By: CZB



TurnKey Environmental Restoration, LLC
 2558 Hamburg Turnpike, Suite 300
 Buffalo, NY 14218
 (716) 856-0635

| SUBSURFACE PROFILE | | | SAMPLE | | | | PID VOCs ppm 12.5 25 | Lab Sample | Well Completion Details or Remarks |
|--------------------|-----------------|---|------------|-------------|---------------|--------|-----------------------------------|------------------|---|
| Depth (fbgs) | Elev. /Depth | Description (ASTM D2488: Visual-Manual Procedure) | Sample No. | SPT N-Value | Recovery (ft) | Symbol | | | |
| 0.0 | 0.0 | Ground Surface | | | | | | | |
| | 0.0 | Concrete floor | | | | | | | |
| | -0.4 | | | | | | | | |
| | 0.4 | Poorly Graded Gravel with Silt and Fill Black, moist, mostly angular gravel, trace non-plastic fines, cinders, loose. | | | | | 0.0 | | |
| | -1.0 | | | | | | | | |
| | 1.0 | Poorly Graded Sand Brown, moist, mostly, fine sand, trace non-plastic fines, medium dense, loose when disturbed. | | | | | | | |
| | | | | | | | | | |
| | -3.0 | | C1 | NA | 1.7 | | 0.0 | | |
| | 3.0 | Sandy Lean Clay Reddish brown, moist, mostly medium plasticity fines, some fine sand, medium toughness, medium dry strength, massive. | | | | | | | |
| | -4.0 | | | | | | | | |
| | 4.0 | Silty Sand Reddish brown, moist, mostly fine sand, little non-plastic fines, medium dense, rapid dilatancy. | | | | | | | |
| | | | | | | | | | |
| | -5.0 | | | | | | | | |
| | 5.0 | Sandy Lean Clay As (1.0 to 3.0 fbgs) above. | C2 | NA | 2.7 | | 0.0 | Sample location. | |
| | -7.0 | | | | | | | | |
| | 7.0 | As above, wet (7.0 fbgs). | | | | | 0.0 | | |
| | -8.0 | | | | | | | | |
| | 8.0 | | | | | | | | |
| | | | | | | | | | |
| | -10.0 | | C3 | NA | 3.1 | | 0.0 | | |
| | | | | | | | | | |
| | -11.5 | | | | | | | | |
| | 11.5 | End of boring 12.0 fbgs. | | | | | 0.0 | | |
| | -12.0 | | | | | | | | |
| | 12.0 | End of Borehole | | | | | | | |

First water 7.0 fbgs.

Drilled By: Trec Environmental Inc.
Drill Rig Type: Geoprobe 54LT
Drill Method: Directpush w/4' macro-core.
Comments:
Drill Date(s): 11/14/16

Hole Size: 3-inch.
Stick-up: NA
Datum: NA
Sheet: 1 of 1

APPENDIX F

FIELD OPERATING PROCEDURES

(PROVIDED ELECTRONICALLY)

FIELD OPERATING PROCEDURES

| FOP Number | Description |
|------------|--|
| 007.0 | Calibration and Maintenance of Portable Dissolved Oxygen Meter |
| 008.0 | Calibration and Maintenance of Portable Field pH/Eh Meter |
| 009.0 | Calibration and Maintenance of Portable Field Turbidity Meter |
| 011.1 | Calibration and Maintenance of Portable Photoionization Detector |
| 012.0 | Calibration and Maintenance of Portable Specific Conductance Meter |
| 022.0 | Groundwater Level Measurement |
| 023.1 | Groundwater Purging Procedures Prior to Sample Collection |
| 024.1 | Groundwater Sample Collection Procedures |

Notes:

1. FOPs are identified by the sequential FOP number and revision number.

**CALIBRATION AND MAINTENANCE OF PORTABLE
DISSOLVED OXYGEN METER**

PURPOSE

This guideline describes a method for calibration of a portable dissolved oxygen meter. This meter measures the concentration of dissolved oxygen within a water sample. This parameter is of interest both as a general indicator of water quality, and because of its pertinence to fate and transport of organics and inorganics. This guideline presents a method for calibration of this meter, which is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the dissolved oxygen meter will be within $\pm 1\%$ of full-scale over the temperature range of 23° to 113° F (-5° to +45° C).

PROCEDURE

1. Calibrate the dissolved oxygen meter to ambient air based on probe temperature and true local atmospheric pressure conditions (or feet above sea level). Because procedures vary with different brands and models of meters, refer to the manufacturer's recommended calibration procedures.
2. In the event of a failure to adequately calibrate, follow the corrective action directed by the manufacturer.
3. If calibration cannot be achieved or maintained, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

**CALIBRATION AND MAINTENANCE OF PORTABLE
DISSOLVED OXYGEN METER**

4. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:
- Time, date, and initials of the field team member performing the calibration
 - The unique identifier for the meter, including manufacturer, model, and serial number
 - The brand and expiration dates of calibration solutions
 - The calibration readings
 - The instrument settings (if applicable)
 - The approximate response time
 - The overall adequacy of calibration including the Pass or fail designation in accordance with the accuracy specifications presented above
 - Corrective action taken (see Step 5 above) in the event of failure to adequately calibrate

MAINTENANCE

- When not in use or between measurements, the dissolved oxygen probe will be kept immersed in or moist with deionized water.
- The meter batteries will be checked prior to each meter's use and will be replaced when the meter cannot be redline adjusted.
- The meter response time and stability will be tracked to determine the need for instrument maintenance. When response time becomes greater than two minutes, probe service is indicated.

ATTACHMENTS

Equipment Calibration Log (sample)

FOP 007.0

CALIBRATION AND MAINTENANCE OF PORTABLE DISSOLVED OXYGEN METER



EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: _____

Date: _____

Project No.: _____

Client: _____

Instrument Source: ☐ BM ☐ Rental

| METER TYPE | UNITS | TIME | MAKE/MODEL | SERIAL NUMBER | CAL. BY | STANDARD | READING | SETTLE |
|--|-------------------|------|------------------------------------|---------------|---------|-----------------|---------|---------------------|
| <input type="checkbox"/> pH meter | units | | Myron L. Company Ultra Meter 6P | 606987 | | 4.00 | | |
| | | | | | | 7.00 | | |
| | | | | | | 10.01 | | |
| | | | | | | < 0.4 | | |
| <input type="checkbox"/> Turbidity meter | NTU | | Hach 2100P Turbidimeter | 970600014560 | | 20 | | |
| | | | | | | 100 | | |
| | | | | | | 800 | | |
| <input type="checkbox"/> Sp. conductance meter | uS/mS | | Myron L. Company Ultra Meter 6P | 606987 | | uS @ 25 °C | | |
| <input type="checkbox"/> PID | ppm | | Photovac 2020 PID | | | open air zero | | MIBK re factor : |
| | | | | | | ppm Iso. Gas | | |
| <input type="checkbox"/> Particulate meter | mg/m ³ | | | | | zero air | | |
| <input type="checkbox"/> Oxygen | % | | | | | open air | | |
| <input type="checkbox"/> Hydrogen sulfide | ppm | | | | | open air | | |
| <input type="checkbox"/> Carbon monoxide | ppm | | | | | open air | | |
| <input type="checkbox"/> LEL | % | | | | | open air | | |
| <input type="checkbox"/> Radiation Meter | uR/h | | | | | background area | | |
| <input type="checkbox"/> | | | | | | | | |

ADDITIONAL REMARKS:

PREPARED BY: _____

DATE: _____



**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD pH/Eh METER**

PURPOSE

This guideline describes a method for calibration of a portable pH/Eh meter. The pH/Eh meter measures the hydrogen ion concentration or acidity of a water sample (pH function), and the oxidation/reduction potential of a water sample (Eh function). Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the pH/Eh meter will be:

pH ± 0.2 pH unit, over the temperature range of ± 0.2 C.

Eh ± 0.2 millivolts (mV) over the range of ± 399.9 mV, otherwise ± 2 mV.

PROCEDURE

Note: Meters produced by different manufacturers may have different calibration procedures. These instructions will take precedence over the procedure provided herein. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

1. Obtain and active the meter to be used. As stated above, initial calibrations will be performed at the beginning of each sampling day.

**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD pH/Eh METER**

2. Immerse the sensing probe in a container of certified pH 7.0 buffer solution traceable to the National Bureau of Standards.
3. Measure the temperature of the buffer solution, and adjust the temperature setting accordingly.
4. Compare the meter reading to the known value of the buffer solution while stirring. If the reading obtained by the meter does not agree with the known value of the buffer solution, recalibrate the meter according to the manufacturer's instructions until the desired reading is obtained. This typically involves accessing and turning a dial or adjustment screw while measuring the pH of the buffer solution. The meter is adjusted until the output agrees with the known solution pH.
5. Repeat Steps 2 through 5 with a pH 4.0 and 10.0 buffer solution to provide a three-point calibration. Standards used to calibrate the pH meter will be of concentrations that bracket the expected values of the samples to be analyzed, especially for two-point calibrations (see note below).

Note: Some pH meters only allow two-point calibrations. Two-point calibrations should be within the suspected range of the groundwater to be analyzed. For example, if the groundwater pH is expected to be approximately 8, the two-point calibration should bracket that value. Buffer solutions of 7 and 10 should then be used for the two-point calibration.

6. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:
 - Time, date, and initials of the field team member performing the calibration
 - The unique identifier for the meter, including manufacturer, model, and serial number
 - The brand and expiration dates of buffer solutions
 - The instrument readings
 - The instrument settings (if applicable)

FOP 008.0

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH/Eh METER

- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate

MAINTENANCE

- When not in use, or between measurements, keep the pH/Eh probe immersed in or moist with buffer solutions.
- Check the meter batteries at the end of each day and recharge or replace as needed.
- Replace the pH/Eh probe any time that the meter response time becomes greater than two minutes or the meter consistently fails to retain its calibrated accuracy for a minimum of ten sample measurements.
- If a replacement of the pH/Eh probe fails to resolve instrument response time and stability problems, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

ATTACHMENTS

Equipment Calibration Log (sample)

FOP 008.0

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH/Eh METER



EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: _____

Date: _____

Project No.: _____

Client: _____

Instrument Source: ☐ BM ☐ Rental

| METER TYPE | UNITS | TIME | MAKE/MODEL | SERIAL NUMBER | CAL. BY | STANDARD | READING | SETTLE |
|--|-------------------|------|------------------------------------|---------------|---------|-----------------|---------|------------------|
| <input type="checkbox"/> pH meter | units | | Myron L. Company Ultra Meter 6P | 606987 | | 4.00 | | |
| | | | | | | 7.00 | | |
| | | | | | | 10.01 | | |
| | | | | | | < 0.4 | | |
| <input type="checkbox"/> Turbidity meter | NTU | | Hach 2100P Turbidimeter | 970600014560 | | 20 | | |
| | | | | | | 100 | | |
| | | | | | | 800 | | |
| <input type="checkbox"/> Sp. conductance meter | uS/mS | | Myron L. Company Ultra Meter 6P | 606987 | | uS @ 25 °C | | |
| <input type="checkbox"/> PID | ppm | | Photovac 2020 PID | | | open air zero | | MIBK re factor : |
| | | | | | | ppm Iso. Gas | | |
| <input type="checkbox"/> Particulate meter | mg/m ³ | | | | | zero air | | |
| <input type="checkbox"/> Oxygen | % | | | | | open air | | |
| <input type="checkbox"/> Hydrogen sulfide | ppm | | | | | open air | | |
| <input type="checkbox"/> Carbon monoxide | ppm | | | | | open air | | |
| <input type="checkbox"/> LEL | % | | | | | open air | | |
| <input type="checkbox"/> Radiation Meter | uR/h | | | | | background area | | |
| <input type="checkbox"/> | | | | | | | | |

ADDITIONAL REMARKS:

PREPARED BY: _____

DATE: _____



**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD TURBIDITY METER**

PURPOSE

This guideline describes the method for calibration of the HACH 2100P portable field turbidity meter. Turbidity is one water quality parameter measured during purging and development of wells. Turbidity is measured as a function of the samples ability to transmit light, expressed as Nephelometric Turbidity Units (NTUs). The turbidity meter is factory calibrated and must be checked daily prior to using the meter in the field. Calibration is performed to verify instrument accuracy and function. This procedure also documents critical maintenance activities for this meter.

ACCURACY

Accuracy shall be $\pm 2\%$ of reading below 499 NTU or $\pm 3\%$ of reading above 500 NTU with resolution to 0.01 NTU in the lowest range. The range key provides for automatic or manual range selection for ranges of 0.00 to 9.99, 0.0 to 99.9 and 0 to 1000 NTU. Another key provides for selecting automatic signal averaging. Pressing the key shall toggle signal averaging on or off.

PROCEDURE

Calibration of the 2100P Turbidimeter is based on formazin, the primary standard for turbidity. The instrument's electronic and optical design provides long-term stability and minimizes the need for frequent calibration. The two-detector ratioing system compensates for most fluctuations in lamp output. **A formazin recalibration should be performed at least once every three months**, more often if experience indicates the need. During calibration, use a primary standard such as StablCal™ Stabilized Standards or formazin standards.

**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD TURBIDITY METER**

Note: Meters produced by different manufacturers may have different calibration check procedures. These manufacturers' instructions will take precedence over the procedure provided here. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

Note: Because the turbidity meter measures light transmission, it is critical that the meter and standards be cared for as precision optical instruments. Scratches, dirt, dust, etc. can all temporarily or permanently affect the accuracy of meter readings.

Preparing StablCal Stabilized Standards in Sealed Vials

Sealed vials that have been sitting undisturbed for longer than a month must be shaken to break the condensed suspension into its original particle size. Start at *step 1* for these standards. If the standards are used on at least a weekly interval, start at *step 3*.

Note: These instructions do not apply to < 0.1 NTU StablCal Standards; < 0.1 NTU StablCal Standards should not be shaken or inverted.

1. Shake the standard vigorously for 2-3 minutes to re-suspend any particles.
2. Allow the standard to stand undisturbed for 5 minutes.
3. Gently invert the vial of StablCal 5 to 7 times.
4. Prepare the vial for measurement using traditional preparation techniques. This usually consists of oiling the vial (see *Section 2.3.2 on page 11 of the manual*)

**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD TURBIDITY METER**

and marking the vial to maintain the same orientation in the sample cell compartment (see *Section 2.3.3 on page 12 of the manual*). This step will eliminate any optical variations in the sample vial.

5. Let the vial stand for one minute. The standard is now ready for use in the calibration procedure.

Calibration Procedure

1. Turn the meter on.
2. Shake pre-mixed formazin primary standards in accordance with the above procedure.
3. Wipe the outside of the < 0.1 NTU standard and insert the sample cell in the cell compartment by aligning the orientation mark on the cell with the mark on the front of the cell compartment.
4. Close the lid and press **I/O**.
5. Press the **CAL** button. The **CAL** and **S0** icons will be displayed and the 0 will flash. The four-digit display will show the value of the **S0** standard for the previous calibration. If the blank value was forced to 0.0, the display will be blank. Press the right arrow key (\rightarrow) to get a numerical display.
6. Press **READ**. The instrument will count from 60 to 0, read the blank and use it to calculate a correction factor for the 20 NTU standard measurement. If the dilution water is ≥ 0.5 NTU, E 1 will appear when the calibration is calculated (see *Section 3.6.2.3 on page 31 of the manual*). The display will automatically increment to the next standard. Remove the sample cell from the cell compartment

**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD TURBIDITY METER**

Note: The turbidity of the dilution water can be “forced” to zero by pressing → rather than reading the dilution water. The display will show “S0 NTU” and the ↑ key must be pressed to continue with the next standard.

7. Repeat steps 1 through 7 for the 20, 100 and 800 standards.
8. Following the 800 NTU standard calibration, the display will increment back to the **S0** display. Remove the sample cell from the cell compartment.
9. Press **CAL** to accept the calibration. The instrument will return to measurement mode automatically.
10. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample). Information will include, at a minimum:
 - Time, date, and initials of the field team member performing the calibration
 - The unique identifier for the meter, including manufacturer, model, and serial number
 - The brand of calibration standards
 - The instrument readings
 - The instrument settings (if applicable)
 - Pass or fail designation in accordance with the accuracy specifications presented above
 - Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

Note: Pressing **CAL** completes the calculation of the calibration coefficients. If calibration errors occurred during calibration, error messages will appear after **CAL** is pressed. If **E 1** or **E 2** appear, check the standard preparation and review the calibration; repeat the calibration if necessary. If “**CAL?**” appears, an error may have

**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD TURBIDITY METER**

occurred during calibration. If “CAL?” is flashing, the instrument is using the default calibration.

NOTES

- If the **I/O** key is pressed during calibration, the new calibration data is lost and the old calibration will be used for measurements. Once in calibration mode, only the **READ**, **I/O**, **↑**, and **→** keys function. Signal averaging and range mode must be selected before entering the calibration mode.
- If **E 1** or **E 2** are displayed, an error occurred during calibration. Check the standard preparation and review the calibration; repeat the calibration if necessary. Press **DIAG** to cancel the error message (**E 1** or **E 2**). To continue without repeating the calibration, press **I/O** twice to restore the previous calibration. If “CAL?” is displayed, an error may have occurred during calibration. The previous calibration may not be restored. Either recalibrate or use the calibration as is.
- To review a calibration, press **CAL** and then **↑** to view the calibration standard values. As long as **READ** is never pressed and **CAL** is not flashing, the calibration will not be updated. Press **CAL** again to return to the measurement mode.

MAINTENANCE

- **Cleaning:** Keep the turbidimeter and accessories as clean as possible and store the instrument in the carrying case when not in use. Avoid prolonged exposure to sunlight and ultraviolet light. Wipe spills up promptly. Wash sample cells with non-abrasive laboratory detergent, rinse with distilled or demineralized water, and air dry. Avoid scratching the cells and wipe all moisture and fingerprints off the cells before inserting them into the instrument. Failure to do so can give inaccurate readings. See *Section 2.3.1 on page 11 of the manual* for more information about sample cell care.
- **Battery Replacement:** AA alkaline cells typically last for about 300 tests with the signal-averaging mode off, about 180 tests if signal averaging is used. The “battery” icon flashes when battery replacement is needed. Refer to *Section 1.4.2 on page 5 of the manual* for battery installation instructions. If the batteries are changed within 30

**CALIBRATION AND MAINTENANCE OF PORTABLE
FIELD TURBIDITY METER**

seconds, the instrument retains the latest range and signal average selections. If it takes more than 30 seconds, the instrument uses the default settings. If, after changing batteries, the instrument will not turn off or on and the batteries are good, remove the batteries and reinstall them. If the instrument still won't function, contact Hach Service or the nearest authorized dealer.

- **Lamp Replacement:** The procedure in *Section 4.0 on page 49 of the manual* explains lamp installation and electrical connections. Use a small screwdriver to remove and install the lamp leads in the terminal block. The instrument requires calibration after lamp replacement.

ATTACHMENTS

Equipment Calibration Log (sample)

FOP 009.0

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD TURBIDITY METER



EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: _____

Date: _____

Project No.: _____

Client: _____

Instrument Source: ☐ BM ☐ Rental

| METER TYPE | UNITS | TIME | MAKE/MODEL | SERIAL NUMBER | CAL. BY | STANDARD | READING | SETTLE |
|--|-------------------|------|------------------------------------|---------------|---------|-----------------|---------|---------------------|
| <input type="checkbox"/> pH meter | units | | Myron L. Company Ultra Meter 6P | 606987 | | 4.00 | | |
| | | | | | | 7.00 | | |
| | | | | | | 10.01 | | |
| | | | | | | < 0.4 | | |
| <input type="checkbox"/> Turbidity meter | NTU | | Hach 2100P Turbidimeter | 970600014560 | | 20 | | |
| | | | | | | 100 | | |
| | | | | | | 800 | | |
| <input type="checkbox"/> Sp. conductance meter | uS/mS | | Myron L. Company Ultra Meter 6P | 606987 | | uS @ 25 °C | | |
| <input type="checkbox"/> PID | ppm | | Photovac 2020 PID | | | open air zero | | MIBK re factor : |
| | | | | | | ppm Iso. Gas | | |
| <input type="checkbox"/> Particulate meter | mg/m ³ | | | | | zero air | | |
| <input type="checkbox"/> Oxygen | % | | | | | open air | | |
| <input type="checkbox"/> Hydrogen sulfide | ppm | | | | | open air | | |
| <input type="checkbox"/> Carbon monoxide | ppm | | | | | open air | | |
| <input type="checkbox"/> LEL | % | | | | | open air | | |
| <input type="checkbox"/> Radiation Meter | uR/h | | | | | background area | | |
| <input type="checkbox"/> | | | | | | | | |

ADDITIONAL REMARKS:

PREPARED BY: _____

DATE: _____



**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

PURPOSE

This procedure describes a general method for the calibration and maintenance of a portable photoionization detector (PID). The PID detects and initially quantifies a reading of the volatile organic compound (VOC) concentration in air. The PID is used as a field-screening tool for initial evaluation of soil samples and for ambient air monitoring of compounds with ionization potentials (IP) less than the PID lamp electron voltage (eV) rating. The IP is the amount of energy required to move an electron to an infinite distance from the nucleus thus creating a positive ion plus an electron. It should be noted that all of the major components of air (i.e., carbon dioxide, methane, nitrogen, oxygen etc.) have IP's above 12 eV. As a result, they will not be ionized by the 9.8, 10.6, or 11.7 eV lamps typically utilized in field PIDs. The response of the PID will then be the sum of the organic and inorganic compounds in air that are ionized by the appropriate lamp (i.e., 9.8, 10.6 or 11.7 eV). Attached to this FOP is a table summarizing common organic compounds and their respective IPs.

Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Compound-specific calibration methods should be selected on a project-by-project basis to increase the accuracy of the instrument. The best way to calibrate a PID to different compounds is to use a standard of the gas of interest. However, correction factors have been determined that enable the user to quantify a large number of chemicals using only a single calibration gas, typically isobutylene. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

FOP 011.1

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

Note: The information included below is equipment manufacturer- and model-specific, however, accuracy, calibration, and maintenance procedures for this type of portable equipment are typically similar. The information below pertains to the MiniRAE 2000 Portable VOC Monitor equipped with a 10.6 eV lamp. The actual equipment to be used in the field will be equivalent or similar. The following information is provided for general reference; the equipment-specific manufacturer's manual should be followed with precedence over this FOP.

Note: The PID indicates total VOC concentration readings that are normalized to a calibration standard, so actual quantification of individual compounds is not provided. In addition, the PID response to compounds is highly variable, dependent on ionization potential of the compound, and the presence or absence of other compounds.

ACCURACY

The MiniRAE 2000 is accurate to ± 2 ppm or 10% of the reading for concentrations ranging from 0-2,000 ppm and $\pm 20\%$ of the reading at concentrations greater than 2,000 ppm. Response time is less than two seconds to 90 percent of full-scale. The operating temperature range is 0 to 45° C and the operating humidity range is 0 to 95 % relative humidity (non-condensing).

CALIBRATION PROCEDURE

The calibration method and correction factor, if applicable, will be selected on a project-by-project basis and confirmed with the Project Manager prior to the start of field work.

1. Calibrate all field test equipment at the beginning of each sampling day. Check and recalibrate the PID according to the manufacture's specifications.

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

2. Calibrate the PID using a compressed gas cylinder or equivalent containing the calibration standard, a flow regulator, and a tubing assembly. In addition, a compressed gas cylinder containing zero air (“clean” air) may be required if ambient air conditions do not permit calibration to “clean air”.
3. Fill two Tedlar® bags equipped with a one-way valve with zero-air (if applicable) and the calibration standard gas.
4. Assemble the calibration equipment and actuate the PID in its calibration mode.
5. Select the appropriate calibration method. Calibration may be completed with two methods: 1) where the calibration standard gas is the same as the measurement gas (no correction factor is applied) or 2) where the calibration standard gas is not the same as the measurement gas and a correction factor will be applied. An isobutylene standard gas must be used as the calibration standard gas for the use of correction factors with the MiniRAE 2000. See below for additional instructions for calibration specific to use with or without correction factors.

Calibrating Without a Correction Factor

Navigate within the menu to select the “cal memory” for the specific calibration standard gas prior to calibration. The default gas selections for the MiniRAE 2000 are as follows:

| | |
|---------------|----------------|
| Cal Memory #0 | Isobutylene |
| Cal Memory #1 | Hexane |
| Cal Memory #2 | Xylene |
| Cal Memory #3 | Benzene |
| Cal Memory #4 | Styrene |
| Cal Memory #5 | Toluene |
| Cal Memory #6 | Vinyl Chloride |
| Cal Memory #7 | Custom |

**CALIBRATION AND MAINTENANCE OF PORTABLE
PHOTOIONIZATION DETECTOR**

The calibration standard gas for Cal Memory #1-7 may be toggled for selection of any of the approximately 100 preprogrammed calibration standard gases for use without an applied correction factor (i.e., the calibration gas must be the same as the measurement gas).

Calibrating With a Correction Factor

Navigate within the menu to select the “Cal Memory”.

Select “Cal Memory #0” and toggle for selection of any of the approximately 100 preprogrammed chemicals. During calibration, the unit requests isobutylene gas and displays the isobutylene concentration immediately following calibration, but when the unit is returned to the normal reading mode, it displays the selected chemical and applies the correction factor.

If the pre-programmed list does not include the desired chemical or a user-defined measurement gas and correction factor is desired, toggle Cal Memory #0 to “user defined custom gas”. A list of approximately 300 correction factors is attached in Technical Note 106 generated by MiniRAE.

6. Once the PID settings have been verified, connect the PID probe to the zero air calibration bag (or calibrate to ambient air if conditions permit) and wait for a stable indication.
7. Connect the PID probe to the calibration standard bag. Measure an initial reading of the standard and wait for a stable indication.
8. Keep the PID probe connected to the calibration standard bag, calibrate to applicable concentration (typically 100 ppm with isobutylene) with the standard and wait for a stable indication.
9. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish

FOP 011.1

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

maintenance schedules and component replacement. Information will include, at a minimum:

- Time, date and initials of the field team member performing the calibration
- The unique identifier for the meter, including manufacturer, model, and serial number
- The calibration standard and concentration
- Correction factors used, if any
- The brand and expiration date of the calibration standard gas
- The instrument readings: before and after calibration
- The instrument settings (if applicable)
- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

MAINTENANCE

- The probe and dust filter of the PID should be checked before and after every use for cleanliness. Should instrument response become unstable, recalibration should be performed. If this does not resolve the problem, access the photoionization bulb and clean with the manufacturer-supplied abrasive compound, then recalibrate.
- The PID battery must be recharged after each use. Store the PID in its carrying case when not in use. Additional maintenance details related to individual components of the PID are provided in the equipment manufacturer's instruction manual. If calibration or instrument performance is not in accordance with specifications, send the instrument to the equipment manufacturer for repair.
- Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

FOP 011.1

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

ATTACHMENTS

Table 1; Summary of Ionization Potentials
Equipment Calibration Log (sample)
Technical Note TN-106

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|---------------------------|---------------------------|-------------------------------|
| A | | |
| 2-Amino pyridine | 8 | |
| Acetaldehyde | 10.21 | |
| Acetamide | 9.77 | |
| Acetic acid | 10.69 | X |
| Acetic anhydride | 10 | |
| Acetone | 9.69 | |
| Acetonitrile | 12.2 | X |
| Acetophenone | 9.27 | |
| Acetyl bromide | 10.55 | |
| Acetyl chloride | 11.02 | X |
| Acetylene | 11.41 | X |
| Acrolein | 10.1 | |
| Acrylamide | 9.5 | |
| Acrylonitrile | 10.91 | X |
| Allyl alcohol | 9.67 | |
| Allyl chloride | 9.9 | |
| Ammonia | 10.2 | |
| Aniline | 7.7 | |
| Anisidine | 7.44 | |
| Anisole | 8.22 | |
| Arsine | 9.89 | |
| B | | |
| 1,3-Butadiene (butadiene) | 9.07 | |
| 1-Bromo-2-chloroethane | 10.63 | X |
| 1-Bromo-2-methylpropane | 10.09 | |
| 1-Bromo-4-fluorobenzene | 8.99 | |
| 1-Bromobutane | 10.13 | |
| 1-Bromopentane | 10.1 | |
| 1-Bromopropane | 10.18 | |
| 1-Bromopropene | 9.3 | |
| 1-Butanethiol | 9.14 | |
| 1-Butene | 9.58 | |
| 1-Butyne | 10.18 | |
| 2,3-Butadione | 9.23 | |
| 2-Bromo-2-methylpropane | 9.89 | |
| 2-Bromobutane | 9.98 | |
| 2-Bromopropane | 10.08 | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|---------------------|---------------------------|-------------------------------|
| 2-Bromothiophene | 8.63 | |
| 2-Butanone (MEK) | 9.54 | |
| 3-Bromopropene | 9.7 | |
| 3-Butene nitrile | 10.39 | |
| Benzaldehyde | 9.53 | |
| Benzene | 9.25 | |
| Benzenethiol | 8.33 | |
| Benzonitrile | 9.71 | |
| Benzotrifluoride | 9.68 | |
| Biphenyl | 8.27 | |
| Boron oxide | 13.5 | X |
| Boron trifluoride | 15.56 | X |
| Bromine | 10.54 | |
| Bromobenzene | 8.98 | |
| Bromochloromethane | 10.77 | X |
| Bromoform | 10.48 | |
| Butane | 10.63 | X |
| Butyl mercaptan | 9.15 | |
| cis-2-Butene | 9.13 | |
| m-Bromotoluene | 8.81 | |
| n-Butyl acetate | 10.01 | |
| n-Butyl alcohol | 10.04 | |
| n-Butyl amine | 8.71 | |
| n-Butyl benzene | 8.69 | |
| n-Butyl formate | 10.5 | |
| n-Butyraldehyde | 9.86 | |
| n-Butyric acid | 10.16 | |
| n-Butyronitrile | 11.67 | X |
| o-Bromotoluene | 8.79 | |
| p-Bromotoluene | 8.67 | |
| p-tert-Butyltoluene | 8.28 | |
| s-Butyl amine | 8.7 | |
| s-Butyl benzene | 8.68 | |
| sec-Butyl acetate | 9.91 | |
| t-Butyl amine | 8.64 | |
| t-Butyl benzene | 8.68 | |
| trans-2-Butene | 9.13 | |
| C | | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|-----------------------------------|---------------------------|-------------------------------|
| 1-Chloro-2-methylpropane | 10.66 | X |
| 1-Chloro-3-fluorobenzene | 9.21 | |
| 1-Chlorobutane | 10.67 | X |
| 1-Chloropropane | 10.82 | X |
| 2-Chloro-2-methylpropane | 10.61 | X |
| 2-Chlorobutane | 10.65 | X |
| 2-Chloropropane | 10.78 | X |
| 2-Chlorothiophene | 8.68 | |
| 3-Chloropropene | 10.04 | |
| Camphor | 8.76 | |
| Carbon dioxide | 13.79 | X |
| Carbon disulfide | 10.07 | |
| Carbon monoxide | 14.01 | X |
| Carbon tetrachloride | 11.47 | X |
| Chlorine | 11.48 | X |
| Chlorine dioxide | 10.36 | |
| Chlorine trifluoride | 12.65 | X |
| Chloroacetaldehyde | 10.61 | X |
| α -Chloroacetophenone | 9.44 | |
| Chlorobenzene | 9.07 | |
| Chlorobromomethane | 10.77 | X |
| Chlorofluoromethane (Freon 22) | 12.45 | X |
| Chloroform | 11.37 | X |
| Chlorotrifluoromethane (Freon 13) | 12.91 | X |
| Chrysene | 7.59 | |
| Cresol | 8.14 | |
| Crotonaldehyde | 9.73 | |
| Cumene (isopropyl benzene) | 8.75 | |
| Cyanogen | 13.8 | X |
| Cyclohexane | 9.8 | |
| Cyclohexanol | 9.75 | |
| Cyclohexanone | 9.14 | |
| Cyclohexene | 8.95 | |
| Cyclo-octatetraene | 7.99 | |
| Cyclopentadiene | 8.56 | |
| Cyclopentane | 10.53 | |
| Cyclopentanone | 9.26 | |
| Cyclopentene | 9.01 | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|--|---------------------------|-------------------------------|
| Cyclopropane | 10.06 | |
| m-Chlorotoluene | 8.83 | |
| o-Chlorotoluene | 8.83 | |
| p-Chlorotoluene | 8.7 | |
| D | | |
| 1,1-Dibromoethane | 10.19 | |
| 1,1-Dichloroethane | 11.12 | X |
| 1,1-Dimethoxyethane | 9.65 | |
| 1,1-Dimethylhydrazine | 7.28 | |
| 1,2-Dibromoethane | 9.45 | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon 114) | 12.2 | X |
| 1,2-Dichloroethane | 11.12 | X |
| 1,2-Dichloropropane | 10.87 | X |
| 1,3-Dibromopropane | 10.07 | |
| 1,3-Dichloropropane | 10.85 | X |
| 2,2-Dimethyl butane | 10.06 | |
| 2,2-Dimethyl propane | 10.35 | |
| 2,3-Dichloropropene | 9.82 | |
| 2,3-Dimethyl butane | 10.02 | |
| 3,3-Dimethyl butanone | 9.17 | |
| cis-Dichloroethene | 9.65 | |
| Decaborane | 9.88 | |
| Diazomethane | 9 | |
| Diborane | 12 | X |
| Dibromochloromethane | 10.59 | |
| Dibromodifluoromethane | 11.07 | X |
| Dibromomethane | 10.49 | |
| Dibutylamine | 7.69 | |
| Dichlorodifluoromethane (Freon 12) | 12.31 | X |
| Dichlorofluoromethane | 12.39 | X |
| Dichloromethane | 11.35 | X |
| Diethoxymethane | 9.7 | |
| Diethyl amine | 8.01 | |
| Diethyl ether | 9.53 | |
| Diethyl ketone | 9.32 | |
| Diethyl sulfide | 8.43 | |
| Diethyl sulfite | 9.68 | |
| Difluorodibromomethane | 11.07 | X |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|-------------------------------|---------------------------|-------------------------------|
| Dihydropyran | 8.34 | |
| Diiodomethane | 9.34 | |
| Diisopropylamine | 7.73 | |
| Dimethoxymethane (methylal) | 10 | |
| Dimethyl amine | 8.24 | |
| Dimethyl ether | 10 | |
| Dimethyl sulfide | 8.69 | |
| Dimethylaniline | 7.13 | |
| Dimethylformamide | 9.18 | |
| Dimethylphthalate | 9.64 | |
| Dinitrobenzene | 10.71 | X |
| Dioxane | 9.19 | |
| Diphenyl | 7.95 | |
| Dipropyl amine | 7.84 | |
| Dipropyl sulfide | 8.3 | |
| Durene | 8.03 | |
| m-Dichlorobenzene | 9.12 | |
| N,N-Diethyl acetamide | 8.6 | |
| N,N-Diethyl formamide | 8.89 | |
| N,N-Dimethyl acetamide | 8.81 | |
| N,N-Dimethyl formamide | 9.12 | |
| o-Dichlorobenzene | 9.06 | |
| p-Dichlorobenzene | 8.95 | |
| p-Dioxane | 9.13 | |
| trans-Dichloroethene | 9.66 | |
| E | | |
| Epichlorohydrin | 10.2 | |
| Ethane | 11.65 | X |
| Ethanethiol (ethyl mercaptan) | 9.29 | |
| Ethanolamine | 8.96 | |
| Ethene | 10.52 | |
| Ethyl acetate | 10.11 | |
| Ethyl alcohol | 10.48 | |
| Ethyl amine | 8.86 | |
| Ethyl benzene | 8.76 | |
| Ethyl bromide | 10.29 | |
| Ethyl chloride (chloroethane) | 10.98 | X |
| Ethyl disulfide | 8.27 | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|--|---------------------------|-------------------------------|
| Ethyl ether | 9.51 | |
| Ethyl formate | 10.61 | X |
| Ethyl iodide | 9.33 | |
| Ethyl isothiocyanate | 9.14 | |
| Ethyl mercaptan | 9.29 | |
| Ethyl methyl sulfide | 8.55 | |
| Ethyl nitrate | 11.22 | X |
| Ethyl propionate | 10 | |
| Ethyl thiocyanate | 9.89 | |
| Ethylene chlorohydrin | 10.52 | |
| Ethylene diamine | 8.6 | |
| Ethylene dibromide | 10.37 | |
| Ethylene dichloride | 11.05 | X |
| Ethylene oxide | 10.57 | |
| Ethylenimine | 9.2 | |
| Ethynylbenzene | 8.82 | |
| F | | |
| 2-Furaldehyde | 9.21 | |
| Fluorine | 15.7 | X |
| Fluorobenzene | 9.2 | |
| Formaldehyde | 10.87 | X |
| Formamide | 10.25 | |
| Formic acid | 11.05 | X |
| Freon 11 (trichlorofluoromethane) | 11.77 | X |
| Freon 112 (1,1,2,2-tetrachloro-1,2-difluoroethane) | 11.3 | X |
| Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane) | 11.78 | X |
| Freon 114 (1,2-dichloro-1,1,2,2-tetrafluoroethane) | 12.2 | X |
| Freon 12 (dichlorodifluoromethane) | 12.31 | X |
| Freon 13 (chlorotrifluoromethane) | 12.91 | X |
| Freon 22 (chlorofluoromethane) | 12.45 | X |
| Furan | 8.89 | |
| Furfural | 9.21 | |
| m-Fluorotoluene | 8.92 | |
| o-Fluorophenol | 8.66 | |
| o-Fluorotoluene | 8.92 | |
| p-Fluorotoluene | 8.79 | |
| H | | |
| 1-Hexene | 9.46 | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|------------------------|---------------------------|-------------------------------|
| 2-Heptanone | 9.33 | |
| 2-Hexanone | 9.35 | |
| Heptane | 10.08 | |
| Hexachloroethane | 11.1 | X |
| Hexane | 10.18 | |
| Hydrazine | 8.1 | |
| Hydrogen | 15.43 | X |
| Hydrogen bromide | 11.62 | X |
| Hydrogen chloride | 12.74 | X |
| Hydrogen cyanide | 13.91 | X |
| Hydrogen fluoride | 15.77 | X |
| Hydrogen iodide | 10.38 | |
| Hydrogen selenide | 9.88 | |
| Hydrogen sulfide | 10.46 | |
| Hydrogen telluride | 9.14 | |
| Hydroquinone | 7.95 | |
| I | | |
| 1-Iodo-2-methylpropane | 9.18 | |
| 1-Iodobutane | 9.21 | |
| 1-Iodopentane | 9.19 | |
| 1-Iodopropane | 9.26 | |
| 2-Iodobutane | 9.09 | |
| 2-Iodopropane | 9.17 | |
| Iodine | 9.28 | |
| Iodobenzene | 8.73 | |
| Isobutane | 10.57 | |
| Isobutyl acetate | 9.97 | |
| Isobutyl alcohol | 10.12 | |
| Isobutyl amine | 8.7 | |
| Isobutyl formate | 10.46 | |
| Isobutyraldehyde | 9.74 | |
| Isobutyric acid | 10.02 | |
| Isopentane | 10.32 | |
| Isophorone | 9.07 | |
| Isoprene | 8.85 | |
| Isopropyl acetate | 9.99 | |
| Isopropyl alcohol | 10.16 | |
| Isopropyl amine | 8.72 | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|---------------------------------|---------------------------|-------------------------------|
| Isopropyl benzene | 8.69 | |
| Isopropyl ether | 9.2 | |
| Isovaleraldehyde | 9.71 | |
| m-Iodotoluene | 8.61 | |
| o-Iodotoluene | 8.62 | |
| p-Iodotoluene | 8.5 | |
| K | | |
| Ketene | 9.61 | |
| L | | |
| 2,3-Lutidine | 8.85 | |
| 2,4-Lutidine | 8.85 | |
| 2,6-Lutidine | 8.85 | |
| M | | |
| 2-Methyl furan | 8.39 | |
| 2-Methyl naphthalene | 7.96 | |
| 1-Methyl naphthalene | 7.96 | |
| 2-Methyl propene | 9.23 | |
| 2-Methyl-1-butene | 9.12 | |
| 2-Methylpentane | 10.12 | |
| 3-Methyl-1-butene | 9.51 | |
| 3-Methyl-2-butene | 8.67 | |
| 3-Methylpentane | 10.08 | |
| 4-Methylcyclohexene | 8.91 | |
| Maleic anhydride | 10.8 | X |
| Mesityl oxide | 9.08 | |
| Mesitylene | 8.4 | |
| Methane | 12.98 | X |
| Methanethiol (methyl mercaptan) | 9.44 | |
| Methyl acetate | 10.27 | |
| Methyl acetylene | 10.37 | |
| Methyl acrylate | 9.9 | |
| Methyl alcohol | 10.85 | X |
| Methyl amine | 8.97 | |
| Methyl bromide | 10.54 | |
| Methyl butyl ketone | 9.34 | |
| Methyl butyrate | 10.07 | |
| Methyl cellosolve | 9.6 | |
| Methyl chloride | 11.28 | X |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|---|---------------------------|-------------------------------|
| Methyl chloroform (1,1,1-trichloroethane) | 11 | X |
| Methyl disulfide | 8.46 | |
| Methyl ethyl ketone | 9.53 | |
| Methyl formate | 10.82 | X |
| Methyl iodide | 9.54 | |
| Methyl isobutyl ketone | 9.3 | |
| Methyl isobutyrate | 9.98 | |
| Methyl isocyanate | 10.67 | X |
| Methyl isopropyl ketone | 9.32 | |
| Methyl isothiocyanate | 9.25 | |
| Methyl mercaptan | 9.44 | |
| Methyl methacrylate | 9.7 | |
| Methyl propionate | 10.15 | |
| Methyl propyl ketone | 9.39 | |
| α -Methyl styrene | 8.35 | |
| Methyl thiocyanate | 10.07 | |
| Methylal (dimethoxymethane) | 10 | |
| Methylcyclohexane | 9.85 | |
| Methylene chloride | 11.32 | X |
| Methyl-n-amyl ketone | 9.3 | |
| Monomethyl aniline | 7.32 | |
| Monomethyl hydrazine | 7.67 | |
| Morpholine | 8.2 | |
| n-Methyl acetamide | 8.9 | |
| N | | |
| 1-Nitropropane | 10.88 | X |
| 2-Nitropropane | 10.71 | X |
| Naphthalene | 8.12 | |
| Nickel carbonyl | 8.27 | |
| Nitric oxide, (NO) | 9.25 | |
| Nitrobenzene | 9.92 | |
| Nitroethane | 10.88 | X |
| Nitrogen | 15.58 | X |
| Nitrogen dioxide | 9.78 | |
| Nitrogen trifluoride | 12.97 | X |
| Nitromethane | 11.08 | X |
| Nitrotoluene | 9.45 | |
| p-Nitrochloro benzene | 9.96 | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|-------------------------------|---------------------------|-------------------------------|
| O | | |
| Octane | 9.82 | |
| Oxygen | 12.08 | X |
| Ozone | 12.08 | X |
| P | | |
| 1-Pentene | 9.5 | |
| 1-Propanethiol | 9.2 | |
| 2,4-Pentanedione | 8.87 | |
| 2-Pentanone | 9.38 | |
| 2-Picoline | 9.02 | |
| 3-Picoline | 9.02 | |
| 4-Picoline | 9.04 | |
| n-Propyl nitrate | 11.07 | X |
| Pentaborane | 10.4 | |
| Pentane | 10.35 | |
| Perchloroethylene | 9.32 | |
| Pheneloic | 8.18 | |
| Phenol | 8.5 | |
| Phenyl ether (diphenyl oxide) | 8.82 | |
| Phenyl hydrazine | 7.64 | |
| Phenyl isocyanate | 8.77 | |
| Phenyl isothiocyanate | 8.52 | |
| Phenylene diamine | 6.89 | |
| Phosgene | 11.77 | X |
| Phosphine | 9.87 | |
| Phosphorus trichloride | 9.91 | |
| Phthalic anhydride | 10 | |
| Propane | 11.07 | X |
| Propargyl alcohol | 10.51 | |
| Propiolactone | 9.7 | |
| Propionaldehyde | 9.98 | |
| Propionic acid | 10.24 | |
| Propionitrile | 11.84 | X |
| Propyl acetate | 10.04 | |
| Propyl alcohol | 10.2 | |
| Propyl amine | 8.78 | |
| Propyl benzene | 8.72 | |
| Propyl ether | 9.27 | |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|--|---------------------------|-------------------------------|
| Propyl formate | 10.54 | |
| Propylene | 9.73 | |
| Propylene dichloride | 10.87 | X |
| Propylene imine | 9 | |
| Propylene oxide | 10.22 | |
| Propyne | 10.36 | |
| Pyridine | 9.32 | |
| Pyrrole | 8.2 | |
| Q | | |
| Quinone | 10.04 | |
| S | | |
| Stibine | 9.51 | |
| Styrene | 8.47 | |
| Sulfur dioxide | 12.3 | X |
| Sulfur hexafluoride | 15.33 | X |
| Sulfur monochloride | 9.66 | |
| Sulfuryl fluoride | 13 | X |
| T | | |
| o-Terphenyls | 7.78 | |
| 1,1,2,2-Tetrachloro-1,2-difluoroethane (Freon 112) | 11.3 | X |
| 1,1,1-Trichloroethane | 11 | X |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | 11.78 | X |
| 2,2,4-Trimethyl pentane | 9.86 | |
| o-Toluidine | 7.44 | |
| Tetrachloroethane | 11.62 | X |
| Tetrachloroethene | 9.32 | |
| Tetrachloromethane | 11.47 | X |
| Tetrahydrofuran | 9.54 | |
| Tetrahydropyran | 9.25 | |
| Thiolacetic acid | 10 | |
| Thiophene | 8.86 | |
| Toluene | 8.82 | |
| Tribromoethene | 9.27 | |
| Tribromofluoromethane | 10.67 | X |
| Tribromomethane | 10.51 | |
| Trichloroethene | 9.45 | |
| Trichloroethylene | 9.47 | |
| Trichlorofluoromethane (Freon 11) | 11.77 | X |

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR

TABLE 1

SUMMARY OF IONIZATION POTENTIALS

| Chemical Name | Ionization Potential (eV) | Cannot be Read by 10.6 eV PID |
|----------------------------|---------------------------|-------------------------------|
| Trichloromethane | 11.42 | X |
| Triethylamine | 7.5 | |
| Trifluoromonobromo-methane | 11.4 | X |
| Trimethyl amine | 7.82 | |
| Tripropyl amine | 7.23 | |
| V | | |
| o-Vinyl toluene | 8.2 | |
| Valeraldehyde | 9.82 | |
| Valeric acid | 10.12 | |
| Vinyl acetate | 9.19 | |
| Vinyl bromide | 9.8 | |
| Vinyl chloride | 10 | |
| Vinyl methyl ether | 8.93 | |
| W | | |
| Water | 12.59 | X |
| X | | |
| 2,4-Xylidine | 7.65 | |
| m-Xylene | 8.56 | |
| o-Xylene | 8.56 | |
| p-Xylene | 8.45 | |

FOP 011.0

CALIBRATION AND MAINTENANCE OF PORTABLE PHOTOIONIZATION DETECTOR



EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: _____
 Project No.: _____
 Client: _____

Date: _____

Instrument Source: ☐ BM ☐ Rental

| METER TYPE | UNITS | TIME | MAKE/MODEL | SERIAL NUMBER | CAL. BY | STANDARD | POST CAL. READING | SETTINGS |
|--|-------------------|------|-----------------------------------|---------------|---------|-------------------------------------|-------------------|-------------------------------|
| <input type="checkbox"/> pH meter | units | | Myron L Company Ultra Meter 6P | 606987 | | 4.00 7.00 10.01 | | |
| <input type="checkbox"/> Turbidity meter | NTU | | Hach 2100P Turbidimeter | 97060001450 | | 0.4 100 800 | | |
| <input type="checkbox"/> Sp. Cond. meter | uS mS | | Myron L Company Ultra Meter 6P | | | _____ mS @ 25 °C | | |
| <input type="checkbox"/> PID | ppm | | MinRAE 20 | | | open air zero _____ ppm Iso. Gas | | MIBK response factor = 1.0 |
| <input type="checkbox"/> Dissolved Oxygen | ppm | | YSI Model 5 | | | | | |
| <input type="checkbox"/> Particulate meter | mg/m ³ | | | | | zero air | | |
| <input type="checkbox"/> Oxygen | % | | | | | open air | | |
| <input type="checkbox"/> Hydrogen sulfide | ppm | | | | | open air | | |
| <input type="checkbox"/> Carbon monoxide | ppm | | | | | open air | | |
| <input type="checkbox"/> LEL | % | | | | | open air | | |
| <input type="checkbox"/> Radiation Meter | uR/H | | | | | background area | | |
| <input type="checkbox"/> | | | | | | | | |

ADDITIONAL REMARKS:

PREPARED BY: _____ DATE: _____



FOP 012.0

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

PURPOSE

This guideline describes a method for calibration of a portable specific conductance meter. This meter measures the ability of a water sample to conduct electricity, which is largely a function of the dissolved solids within the water. The instrument has been calibrated by the manufacturer according to factory specifications. This guideline presents a method for checking the factory calibration of a portable specific conductance meter. A calibration check is performed to verify instrument accuracy and function. All field test equipment will be checked at the beginning of each sampling day. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the specific conductance meter will be within ± 1 percent of full-scale, with repeatability of ± 1 percent. The built-in cell will be automatically temperature compensated from at least 32° to 160° F (0° to 71°C).

PROCEDURE

Note: The information included below is equipment manufacturer- and model-specific, however, accuracy, calibration, and maintenance procedures for this type of portable equipment are typically similar. The information below pertains to the Myron L Company Ultrameter Model 6P. The actual equipment to be used in the field will be equivalent or similar.

FOP 012.0

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

1. Calibrate all field test equipment at the beginning of each sampling day. Check and recalibrate the specific conductance meter according to the manufacture's specifications.
2. Use a calibration solution of known specific conductivity and salinity. For maximum accuracy, use a Standard Solution Value closest to the samples to be tested.
3. Rinse conductivity cell three times with proper standard.
4. Re-fill conductivity cell with same standard.
5. Press **COND** or **TDS**, then press **CAL/MCLR**. The "CAL" icon will appear on the display.
6. Press the **↑/MS** or **MR/↓** key to step the displayed value toward the standard's value or hold a key down to cause rapid scrolling of the reading.
7. Press **CAL/MCLR** once to confirm new value and end the calibration sequence for this particular solution type.
8. Repeat steps 1 through 7 with additional new solutions, as necessary.
9. Document the calibration results and related information in the Project Field Book and on an **Equipment Calibration Log** (see attached sample), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish maintenance schedules and component replacement. Information will include, at a minimum:
 - Time, date and initials of the field team member performing the calibration
 - The unique identifier for the meter, including manufacturer, model, and serial number
 - The brand and expiration date of the calibration standards
 - The instrument readings: before and after calibration

FOP 012.0

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

- The instrument settings (if applicable)
- The overall adequacy of calibration including the Pass or fail designation in accordance with the accuracy specifications presented above.
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate.

MAINTENANCE

NOTE: Ultrameters should be rinsed with clean water after use. Solvents should be avoided. Shock damage from a fall may cause instrument failure.

Temperature Extremes

Solutions in excess of 160°F/71°C should not be placed in the cell cup area; this may cause damage. Care should be exercised not to exceed rated operating temperature. Leaving the Ultrameter in a vehicle or storage shed on a hot day can easily subject the instrument to over 150°F voiding the warranty.

Battery Replacement

Dry Instrument THOROUGHLY. Remove the four bottom screws. Open instrument carefully; it may be necessary to rock the bottom slightly side to side to release it from the RS-232 connector. Carefully detach battery from circuit board. Replace with 9-volt alkaline battery. Replace bottom, ensuring the sealing gasket is installed in the groove of the top half of case. Re-install screws, tighten evenly and securely.

FOP 012.0

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

NOTE: Because of nonvolatile EEPROM circuitry, all data stored in memory and all calibration settings are protected even during power loss or battery replacement.

Cleaning Sensors

The conductivity cell cup should be kept as clean as possible. Flushing with clean water following use will prevent buildup on electrodes. However, if very dirty samples — particularly scaling types — are allowed to dry in the cell cup, a film will form. This film reduces accuracy. When there are visible films of oil, dirt, or scale in the cell cup or on the electrodes, use a foaming non-abrasive household cleaner. Rinse out the cleaner and your Ultrameter is ready for accurate measurements.

NOTE: Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

ATTACHMENTS

Equipment Calibration Log (sample)

FOP 012.0

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER



EQUIPMENT CALIBRATION

PROJECT INFORMATION:

Project Name: _____

Date: _____

Project No.: _____

Client: _____

Instrument Source: ☐ BM ☐ Rental

| METER TYPE | UNITS | TIME | MAKE/MODEL | SERIAL NUMBER | CAL. BY | STANDARD | READING | SETTLE |
|--|-------------------|------|------------------------------------|---------------|---------|-----------------|---------|------------------|
| <input type="checkbox"/> pH meter | units | | Myron L. Company Ultra Meter 6P | 606987 | | 4.00 | | |
| | | | | | | 7.00 | | |
| | | | | | | 10.01 | | |
| | | | | | | < 0.4 | | |
| <input type="checkbox"/> Turbidity meter | NTU | | Hach 2100P Turbidimeter | 970600014560 | | 20 | | |
| | | | | | | 100 | | |
| | | | | | | 800 | | |
| <input type="checkbox"/> Sp. conductance meter | uS/mS | | Myron L. Company Ultra Meter 6P | 606987 | | uS @ 25 °C | | |
| <input type="checkbox"/> PID | ppm | | Photovac 2020 PID | | | open air zero | | MIBK re factor : |
| | | | | | | ppm Iso. Gas | | |
| <input type="checkbox"/> Particulate meter | mg/m ³ | | | | | zero air | | |
| <input type="checkbox"/> Oxygen | % | | | | | open air | | |
| <input type="checkbox"/> Hydrogen sulfide | ppm | | | | | open air | | |
| <input type="checkbox"/> Carbon monoxide | ppm | | | | | open air | | |
| <input type="checkbox"/> LEL | % | | | | | open air | | |
| <input type="checkbox"/> Radiation Meter | uR/h | | | | | background area | | |
| <input type="checkbox"/> | | | | | | | | |

ADDITIONAL REMARKS:

PREPARED BY: _____

DATE: _____



GROUNDWATER LEVEL MEASUREMENT

PURPOSE

This procedure describes the methods used to obtain accurate and consistent water level measurements in monitoring wells, piezometers and well points. Water levels will be measured at monitoring wells and, if practicable, in supply wells to estimate purge volumes associated with sampling, and to develop a potentiometric surface of the groundwater in order to estimate the direction and velocity of flow in the aquifer. Water levels in monitoring wells will be measured using an electronic water level indicator (e-line) that has been checked for operation prior to mobilization.

PROCEDURE

1. Decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Roux Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.
2. Unlock and remove the well protective cap or cover and place on clean plastic.
3. Lower the probe slowly into the monitoring well until the audible alarm sounds. This indicates the depth to water has been reached.
4. Move the cable up and down slowly to identify the depth at which the alarm just begins to sound. Measure this depth against the mark on the lip of the well riser used as a surveyed reference point (typically the north side of the riser).
5. Read depth from the graduated cable to the nearest 0.01 foot. Do not use inches. If the e-line is not graduated, use a rule or tape measure graduated in 0.01-foot increments to measure from the nearest reference mark on the e-line cable.

FOP 022.0

GROUNDWATER LEVEL MEASUREMENT

6. Record the water level on a Water Level Monitoring Record (sample attached).
7. Remove the probe from the well slowly, drying the cable and probe with a clean paper wipe. Be sure to repeat decontamination before use in another well.
8. Replace well plug and protective cap or cover. Lock in place as appropriate.

ATTACHMENTS

Water Level Monitoring Record (sample)

REFERENCES

Roux FOPs:

040 *Non-Disposable and Non-Dedicated Sampling Equipment Decontamination*

GROUNDWATER LEVEL MEASUREMENT



Client:

Location:

Date:

Weather:

PREAPRED BY:

DATE:

FOP 023.1

GROUNDWATER PURGING PROCEDURES PRIOR TO SAMPLE COLLECTION

PURPOSE

This procedure describes the methods for monitoring well/piezometer purging prior to groundwater sample collection in order to collect representative groundwater samples. The goal of purging is to remove stagnant, non-representative groundwater from the well and/or prevent stagnant water from entering collected samples. Purging involves the removal of at least three to five volumes of water in wells with moderate yields and at least one well volume from wells with low yields (slow water level recovery).

Purge and sample wells in order of least-to-most contaminated (this is not necessary if dedicated or disposable equipment is used). If you do not know this order, sample the upgradient wells first, then the furthest down-gradient or side-gradient wells, and finally the wells closest to, but down-gradient of the most contaminated area. Sampling should commence immediately following purging or as soon as the well has adequately recharged and not more than 24-hours following end time of evacuation.

PROCEDURE

1. Prepare the electronic water level indicator (e-line) in accordance with the procedures referenced in the Roux Field Operating Procedure for Groundwater Level Measurement and decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Roux Field Operating Procedure for Non-disposable and Non-dedicated Sampling Equipment Decontamination. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.
2. Inspect the interior and exterior of the well/piezometer for signs of vandalism or damage and record condition on the Groundwater Field Form and/or Groundwater Well Inspection Form (samples attached). Specifically, inspect

FOP 023.1

GROUNDWATER PURGING PROCEDURES PRIOR TO SAMPLE COLLECTION

the integrity of the following: concrete surface seal, lock, protective casing and well cover, well riser and J-plug/cap. Report any irregular findings to the Project Manager.

3. Unlock and remove the well protective cap or cover and place on clean plastic to avoid introducing foreign material into the well.
4. Calibrate the photoionization detector (PID) in accordance with the Roux Field Operating Procedure for Calibration and Maintenance of Portable Photoionization Detector.
5. Monitor the well for organic vapors using a PID, as per the Work Plan. If a reading of greater than 5 ppm is recorded, the well should be allowed to vent until levels drop below 5 ppm before proceeding with purging.
6. Lower the e-line probe slowly into the monitoring well and record the initial water level in accordance with the procedures referenced in the Roux Field Operating Procedure for Groundwater Level Measurement.
7. Following static water level determinations, slowly lower the e-line to the bottom of the well/piezometer. Record the total depth to the nearest 0.01-foot and compare to the previous total depth measurement. If a significant discrepancy exists, re-measure the total depth. Continue with purging activities observing purge water to determine whether the well/piezometer had become silted due to inactivity or damaged (i.e., well sand within purge water). Upon confirmation of the new total depth and determination of the cause (i.e., siltation or damage), notify the Project Manager following field activities.
8. Calculate the volume of water in the well based on the water level below the top of riser and the total depth of the well using the following equation:

$$V = 0.0408[(B)^2 \times \{(A) - (C)\}]$$

Where,

**GROUNDWATER PURGING PROCEDURES PRIOR
TO SAMPLE COLLECTION**

A = Total Depth of Well (feet below measuring point)

B = Casing diameter (inches)

C = Static Water Level (feet below measuring point)

9. **For wells where the water level is 20 feet or less below the top of riser**, a peristaltic pump may be used to purge the well. Measure the purged volume using a calibrated container (i.e., graduated 5-gallon bucket) and record measurements on the attached Groundwater Well Development and Purge Log. Use new and dedicated tubing for each well. During the evacuation of shallow wells, the intake opening of the pump tubing should be positioned just below the surface of the water. As the water level drops, lower the tubing as needed to maintain flow. For higher yielding wells, the intake level should not be lowered past the top of the screen. Pumping from the top of the water column will ensure proper flushing of the well. Continue pumping until the required volumes are removed (typically three well volumes). For higher yielding wells, adjust the purging rate to maintain the water level above the screen. For lower yielding wells or wells where the screen straddles the water table, maintain purging at a rate that matches the rate of recovery of the well (well yield). If the well purges to dryness and is slow to recharge (greater than 15 minutes), terminate evacuation. **A peristaltic pump and dedicated tubing cannot be used to collect VOC or SVOC project-required samples; only non-organic compounds may be collected using this type of pump.**
10. **For wells where the water level is initially below 20 feet**, or drawn down to this level because of slow recharge rate, conduct purging using one of three devices listed below:
- Bailer – A bottom filling dedicated polyethylene bailer attached to a length of dedicated hollow-braid polypropylene rope. Purging a well utilizing a bailer should be conducted smoothly and slowly as not to agitate the groundwater or damage the well.
 - Well Wizard Purge Pump (or similar) – This pneumatic bladder pump uses compressed air to push water to the surface. Groundwater is not in contact

**GROUNDWATER PURGING PROCEDURES PRIOR
TO SAMPLE COLLECTION**

with the drive air during the pumping process, therefore the pump may be used for sample collection.

- Submersible Pump (12 or 24 volt, or similar) – These submersible pumps are constructed of PVC or stainless steel and are capable of pumping up to 70 feet from ground surface using a 12 volt battery (standard pump) and standard low flow controller. For depths up to 200 feet from ground surface, a high performance power booster controller is used with a 12 volt battery. Unless these pumps are dedicated to the monitoring well location, decontamination between locations is necessary and an equipment blank may be required.
- Waterra™ Pump – This manually operated pump uses dedicated polyethylene tubing and a check valve that can be used as an optional method for purging deeper wells. The pump utilizes positive pressure to evacuate the well, therefore the pump may be used for sample collection, and however over-agitation groundwater should be avoided.

Prior to use in a well, non-dedicated bailers, exterior pump bodies and pump tubing should be cleaned in accordance with the Roux Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination. Dedicated and/or disposable equipment should be contained within the sealed original manufacturers packaging and certified pre-cleaned by the manufacturer with a non-phosphate laboratory detergent and rinsed using de-ionized water.

8. Purging will continue until a predetermined volume of water has been removed (typically three well volumes) or to dryness. Measurements for pH, temperature, specific conductance, dissolved oxygen (optional), Eh (optional), and turbidity will be recorded following removal of each well volume. Purge the well to dryness or until the readings for indicator parameters listed above (or well-specific indicator parameters) stabilize within the following limits for each parameter measured:

FOP 023.1

GROUNDWATER PURGING PROCEDURES PRIOR TO SAMPLE COLLECTION

| Field Parameter | Stabilization Criteria |
|----------------------|------------------------|
| Dissolved Oxygen | ± 0.3 mg/L |
| Turbidity | ± 10 % |
| Specific Conductance | ± 3 % |
| Eh | ± 10 mV |
| PH | ± 0.1 unit |

Stabilization criteria presented within the project Work Plan will take precedence.

DOCUMENTATION AND SAMPLE COLLECTION

This section pertains to the documentation of collected field data during and following purging activities and sample collection.

1. Record all data including the final three stable readings for each indicator parameter on the attached Groundwater Well Purge & Sample Log.
2. Record, at a minimum, the “volume purged,” “purging stop-time,” “purged dry (Y/N),” “purged below sand pack (Y/N),” and any problems purging on the attached Groundwater Well Purge & Sample Log.
3. Collect groundwater samples in accordance with the Roux Field Operating Procedure for Groundwater Sample Collection. Record “sample flow rate” as an average, “time sample collected,” and any other pertinent information related to the sampling event on the attached Groundwater Well Purge & Sample Log.
4. Restore the well to its capped/covered and locked condition.

FOP 023.1

GROUNDWATER PURGING PROCEDURES PRIOR TO SAMPLE COLLECTION

ALTERNATIVE METHODS

Alternative purging and sampling methods and equipment, other than those described herein are acceptable if they provide representative groundwater samples. The purging and sampling method and equipment must not adversely affect sample integrity, chemistry, temperature, and turbidity. In addition, alternative equipment must have minimal or no effect on groundwater geochemistry, aquifer permeability and well materials. Equipment materials must also minimize sorption and leaching. The field team is responsible for documenting and describing any alternative equipment and procedures used to purge a well and collect samples.

ATTACHMENTS

Groundwater Field Form
Groundwater Well Inspection Form

REFERENCES

Roux FOPs:

- 011 *Calibration and Maintenance of Portable Photoionization Detector*
- 022 *Groundwater Level Measurement*
- 024 *Groundwater Sample Collection Procedures*
- 040 *Non-disposable and Non-dedicated Sampling Equipment Decontamination*

FOP 023.1

GROUNDWATER PURGING PROCEDURES PRIOR TO SAMPLE COLLECTION



GROUNDWATER FIELD FORM

Project Name:

Date:

Location:

Project No.:

Field Team:

| Well No. | | | Diameter (inches): | | | Sample Time: | | | |
|----------------------------|---------------------|-----------------------|---------------------------------|----------------|---------|---|-----------|----------|-------------------|
| Product Depth (ftTOR): | | | Water Column (ft): | | | DTW when sampled: | | | |
| DTW (static) (ftTOR): | | | Casing Volume: | | | Purpose: <input type="checkbox"/> Development <input type="checkbox"/> Sample | | | |
| Total Depth (ftTOR): | | | Purge Volume (gal): | | | Purge Method: | | | |
| Time | Water Level (ftTOR) | Acc. Volume (gallons) | pH (units) | Temp. (deg. C) | SC (uS) | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Appearance & Odor |
| 0 | Initial | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| Sample Information: | | | Date: (if different from above) | | | | | | |
| S1 | | | | | | | | | |
| S2 | | | | | | | | | |

| Well No. | | | Diameter (inches): | | | Sample Time: | | | |
|----------------------------|---------------------|-----------------------|---------------------------------|----------------|---------|---|-----------|----------|-------------------|
| Product Depth (ftTOR): | | | Water Column (ft): | | | DTW when sampled: | | | |
| DTW (static) (ftTOR): | | | Casing Volume: | | | Purpose: <input type="checkbox"/> Development <input type="checkbox"/> Sample | | | |
| Total Depth (ftTOR): | | | Purge Volume (gal): | | | Purge Method: | | | |
| Time | Water Level (ftTOR) | Acc. Volume (gallons) | pH (units) | Temp. (deg. C) | SC (uS) | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Appearance & Odor |
| 0 | Initial | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| Sample Information: | | | Date: (if different from above) | | | | | | |
| S1 | | | | | | | | | |
| S2 | | | | | | | | | |

REMARKS:

Note: All water level measurements are in feet, distance from top of riser.

Volume Calculation

| Diam. | Vol. (g/ft) |
|-------|-------------|
| 1" | 0.041 |
| 2" | 0.163 |
| 4" | 0.653 |
| 6" | 1.469 |

Stabilization Criteria

| Parameter | Criteria |
|-----------|------------|
| pH | ± 0.1 unit |
| SC | ± 3% |
| Turbidity | ± 10% |
| DO | ± 0.3 mg/L |
| ORP | ± 10 mV |

PREPARED BY: _____

FOP 023.1

GROUNDWATER PURGING PROCEDURES PRIOR
TO SAMPLE COLLECTION



GROUNDWATER WELL INSPECTION FORM

| | |
|------------------------------|------------|
| Project: | WELL I.D.: |
| Client: | |
| Job No.: | |
| Date: | |
| Time: | |
| EXTERIOR INSPECTION | |
| Protective Casing: | |
| Lock: | |
| Hinge/Lid: | |
| Concrete Surface Seal: | |
| Bollards: | |
| Label/I.D.: | |
| Other: | |
| | |
| | |
| INTERIOR INSPECTION | |
| Well Riser: | |
| Annular Space: | |
| Well Cap: | |
| Water Level (fbTOR): | |
| Total Depth (fbTOR): | |
| Other: | |
| | |
| | |
| Comments/Corrective Actions: | |
| | |
| | |
| | |

PREPARED BY: _____

DATE: _____

GROUNDWATER SAMPLE COLLECTION PROCEDURES

PURPOSE

This procedure describes the methods for collecting groundwater samples from monitoring wells and domestic supply wells following purging and sufficient recovery. This procedure also includes the preferred collection order in which water samples are collected based on the volatilization sensitivity or suite of analytical parameters required.

PROCEDURE

Allow approximately 3 to 10 days following well development before performing purge and sample activities at any well location. Conversely, perform sampling as soon as practical after sample purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If the well does not yield sufficient volume for all required laboratory analytical testing (including quality control), a decision should be made to prioritize analyses based on contaminants of concern at the site. If the well takes longer than 24 hours to recharge, the Project Manager should be consulted. The following two procedures outline sample collection activities for monitoring and domestic type wells.

Monitoring Wells

1. Purge the monitoring well in accordance with the Roux FOPs for Groundwater Purging Procedures Prior to Sample Collection or Low Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedures. Perform sampling as soon as practical after purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If the well does not yield sufficient volume for all required laboratory analytical testing (including quality control), a decision should be made to prioritize analyses based on contaminants of concern at the site. Analyses will be prioritized in the order of the parameters volatilization sensitivity. After volatile organics have been collected, field parameters

GROUNDWATER SAMPLE COLLECTION PROCEDURES

must be measured from the next sample collected. If a well takes longer than 24 hours to recharge, the Project Manager should be consulted.

2. Sampling equipment that is not disposable or dedicated to the well will be decontaminated in accordance with the Roux Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination.
3. Calibrate all field meters (i.e., pH/Eh, turbidity, specific conductance, dissolved oxygen, PID etc.) in accordance with the Roux Field Operating Procedure for Calibration and Maintenance of the specific field meter.
4. Prepare the electronic water level indicator (e-line) in accordance with the procedures referenced in the Roux Field Operating Procedure for Groundwater Level Measurement and decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Roux Field Operating Procedure for Non-disposable and Non-dedicated Sampling Equipment Decontamination. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.
5. Inspect the well/piezometer for signs of vandalism or damage and record condition on the Groundwater Field Form (sample attached). Specifically, inspect the integrity of the following: concrete surface seal, lock, protective casing and well cover, well casing and J-plug/cap. Report any irregular findings to the Project Manager.
6. Unlock and remove the well protective cap or cover and place on clean plastic to avoid introducing foreign material into the well.
7. Calibrate the photoionization detector (PID) in accordance with the Roux Field Operating Procedure for Calibration and Maintenance of Portable Photoionization Detector.
8. Monitor the well for organic vapors using a PID, as per the Work Plan. If a reading of greater than 5 ppm is recorded, the well should be allowed to vent until levels drop below 5 ppm before proceeding with purging. Record PID measurements on a well-specific Groundwater Field Form (sample attached).

GROUNDWATER SAMPLE COLLECTION PROCEDURES

9. Lower the e-line probe slowly into the monitoring well and record the measurement on a well-specific Groundwater Field Form (sample attached).
10. Groundwater samples will be collected directly from the sampling valve on the flow through cell (low-flow), discharge port of a standard pump assembly (peristaltic, pneumatic, submersible, or Waterra™ pump) or bailer (stainless steel, PVC or polyethylene) into appropriate laboratory provided containers. In low-yielding wells at which the flow through cell is not used, the samples may be collected using a disposable bailer. **A peristaltic pump and dedicated tubing cannot be used to collect VOC or SVOC project-required samples; only non-organic compounds may be collected using this type of pump.**
11. If disposable polyethylene bailers are used, the bailer should be lowered *slowly* below the surface of the water to minimize agitation and volatilization. For wells that are known to produce turbid samples (values greater than 50 NTU), the bailer should be lowered and retrieved at a rate that limits surging of the well.
12. Sampling data will be recorded on a Groundwater Field Form (sample attached).
13. Pre-label all sample bottles in the field using a waterproof permanent marker in accordance with the Roux Sample Labeling, Storage, and Shipment FOP. The following information, at a minimum, should be included on the label:
 - Project Number;
 - Sample identification code (as per project specifications);
 - Date of sample collection (mm, dd, yy);
 - Time of sample collection (military time only) (hh:mm);
 - Specify “grab” or “composite” sample type;
 - Sampler initials;
 - Preservative(s) (if applicable); and
 - Analytes for analysis (if practicable).
14. Collect a separate sample of approximately 200 ml into an appropriate container prior to collecting the first and following the last groundwater sample collected to measure the following field parameters:

GROUNDWATER SAMPLE COLLECTION PROCEDURES

| Parameter | Units |
|------------------------------|--------------------------------|
| Dissolved Oxygen | parts per million (ppm) |
| Specific Conductance | μ mhos/cm or μ S or mS |
| pH | pH units |
| Temperature | °C or °F |
| Turbidity | NTU |
| Eh (<i>optional</i>) | mV |
| PID VOCs (<i>optional</i>) | ppm |

Record all field measurements on a Groundwater Field Form (sample attached).

15. Collect samples into pre-cleaned bottles provided by the analytical laboratory with the appropriate preservative(s) added based on the volatilization sensitivity or suite of analytical parameters required, as designated in the **Sample Collection Order** section below.
16. Lower the e-line probe slowly into the monitoring well and record the measurement on a well-specific Groundwater Field Form (sample attached).
17. The samples will be labeled, stored, and shipped in accordance with the Roux Field Operating Procedure for Sample Labeling, Storage, and Shipment Procedures.

Domestic Supply Wells

1. Calculate or estimate the volume of water in the well. It is desirable to purge at least one casing volume before sampling. This is controlled, to some extent, by the depth of the well, well yield and the rate of the existing pump. If the volume of water in the well cannot be calculated, the well should be purged continuously for no less than 15 minutes.
2. Connect a sampling tap to an accessible fitting between the well and the pressure tank where practicable. A hose will be connected to the device and the hose discharge located 25 to 50 feet away. The well will be allowed to pump until the lines and one

GROUNDWATER SAMPLE COLLECTION PROCEDURES

well volume is removed. Flow rate will be measured with a container of known volume and a stopwatch.

3. Place a clean piece of polyethylene or Teflon™ tubing on the sampling port and collect the samples in the order designated below and in the sample containers supplied by the laboratory for the specified analytes. **DO NOT** use standard garden hose to collect samples.
4. Sampling results and measurements will be recorded on a Groundwater Field Form (sample attached) as described in the previous section.
5. Collect samples into pre-cleaned bottles provided by the analytical laboratory with the appropriate preservative(s) added based on the volatilization sensitivity or suite of analytical parameters required, as designated in the **Sample Collection Order** section below.
6. The samples will be labeled, stored, and shipped in accordance with the Roux Field Operating Procedure for Sample Labeling, Storage, and Shipment Procedures.

SAMPLE COLLECTION ORDER

All groundwater samples, from monitoring wells and domestic supply wells, will be collected in accordance with the following.

1. Samples will be collected preferentially in recognition of volatilization sensitivity. The preferred order of sampling if no free product is present is:
 - Field parameters
 - Volatile Organic Compounds (VOCs)
 - Purgeable organic carbons (POC)
 - Purgeable organic halogens (POH)
 - Total Organic Halogens (TOX)
 - Total Organic Carbon (TOC)
 - Extractable Organic Compounds (i.e., BNAs, SVOCs, etc.)
 - Total petroleum hydrocarbons (TPH) and oil and grease

GROUNDWATER SAMPLE COLLECTION PROCEDURES

- PCBs and pesticides
 - Total metals (Dissolved Metals)
 - Total Phenolic Compounds
 - Cyanide
 - Sulfate and Chloride
 - Turbidity
 - Nitrate (as Nitrogen) and Ammonia
 - Preserved inorganics
 - Radionuclides
 - Unpreserved inorganics
 - Bacteria
 - Field parameters
2. Document the sampling procedures and related information in the Project Field Book and on a Groundwater Field Form (sample attached).
 3. 1,4-dioxane will be analyzed via the 8270 SIM method.

DOCUMENTATION

The three words used to ensure adequate documentation for groundwater sampling are accountability, controllability, and traceability. Accountability is undertaken in the sampling plan and answers the questions who, what, where, when, and why to assure that the sampling effort meets its goals. Controllability refers to checks (including QA/QC) used to ensure that the procedures used are those specified in the sampling plan. Traceability is documentation of what was done, when it was done, how it was done, and by whom it was done, and is found in the field forms, Project Field Book, and chain-of-custody forms. At a minimum, adequate documentation of the sampling conducted in the field consists of an entry in the Project Field Book (with sewn binding), field data sheets for each well, and a chain-of-custody form.

GROUNDWATER SAMPLE COLLECTION PROCEDURES

As a general rule, if one is not sure whether the information is necessary, it should nevertheless be recorded, as it is impossible to over-document one's fieldwork. Years may go by before the documentation comes under close scrutiny, so the documentation must be capable of defending the sampling effort without the assistance or translation of the sampling crew.

The minimum information to be recorded daily with an indelible pen in the Project Field Book and/or field data sheets includes date and time(s), name of the facility, name(s) of the sampling crew, site conditions, the wells sampled, a description of how the sample shipment was handled, and a QA/QC summary. After the last entry for the day in the Project Field Book, the Field Team Leader should sign the bottom of the page under the last entry and then draw a line across the page directly under the signature.

PRECAUTIONS/RECOMMENDATIONS

The following precautions should be adhered to prior to and during sample collection activities:

- Field vehicles should be parked downwind (to avoid potential sample contamination concerns) at a minimum of 15 feet from the well and the engine turned off prior to PID vapor analysis and VOC sample collection.
- Ambient odors, vehicle exhaust, precipitation, or windy/dusty conditions can potentially interfere with obtaining representative samples. These conditions should be minimized and should be recorded in the field notes. Shield sample bottles from strong winds, rain, and dust when being filled.
- The outlet from the sampling device should discharge below the top of the sample's air/water interface, when possible. The sampling plan should specify

GROUNDWATER SAMPLE COLLECTION PROCEDURES

how the samples will be transferred from the sample collection device to the sample container to minimize sample alterations.

- The order of sampling should be from the least contaminated to the most contaminated well to reduce the potential for cross contamination of sampling equipment (see the Sampling Plan or Work Plan).
- Samples should not be transferred from one sampling container to another.
- Sampling equipment must not be placed on the ground, because the ground may be contaminated and soil contains trace metals. Equipment and supplies should be removed from the field vehicle only when needed.
- Smoking and eating should not be allowed until the well is sampled and hands are washed with soap and water, due to safety and possibly sample contamination concerns. These activities should be conducted beyond a 15-foot radius of the well.
- No heat-producing or electrical instruments should be within 15 feet of the well, unless they are intrinsically safe, prior to PID vapor analysis.
- Minimize the amount of time that the sample containers remain open.
- Do not touch the inside of sample bottles or the groundwater sample as it enters the bottle. Disposable gloves may be a source of phthalates, which could be introduced into groundwater samples if the gloves contact the sample.
- Sampling personnel should use a new pair of disposable gloves for each well sampled to reduce the potential for exposure of the sampling personnel to contaminants and to reduce sample cross contamination. In addition, sampling personnel should change disposable gloves between purging and sampling operations at the same well.
- Sampling personnel should not use perfume, insect repellent, hand lotion, etc., when taking groundwater samples. If insect repellent must be used, then sampling personnel should not allow samples or sampling equipment to contact the

FOP 024.1

GROUNDWATER SAMPLE COLLECTION PROCEDURES

repellent, and it should be noted in the documentation that insect repellent was used.

- Complete the documentation of the well. A completed assemblage of paperwork for a sampling event includes the completed field forms, entries in the Project Field Book (with a sewn binding), transportation documentation (if required), and possibly chain-of-custody forms.

ATTACHMENTS

Groundwater Field Form (sample)

REFERENCES

1. Wilson, Neal. *Soil Water and Ground Water Sampling*, 1995

Roux FOPs:

- 007 *Calibration and Maintenance of Portable Dissolved Oxygen Meter*
- 008 *Calibration and Maintenance of Portable Field pH/Eh Meter*
- 009 *Calibration and Maintenance of Portable Field Turbidity Meter*
- 011 *Calibration and Maintenance of Portable Photoionization Detector*
- 012 *Calibration and Maintenance of Portable Specific Conductance Meter*
- 022 *Groundwater Level Measurement*
- 023 *Groundwater Purging Procedures Prior to Sample Collection (optional)*
- 031 *Low Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedures (optional)*
- 040 *Non-Disposable and Non-Dedicated Sampling Equipment Decontamination*
- 046 *Sample Labeling, Storage and Shipment Procedures*

GROUNDWATER SAMPLE COLLECTION PROCEDURES



GROUNDWATER FIELD FORM

Project Name:

Date:

Location:

Project No.:

Field Team:

| | | | | | | | | | |
|----------------------------|---------------------|-----------------------|---------------------------------|----------------|---------|---|-----------|----------|-------------------|
| Well No. | | | Diameter (inches): | | | Sample Time: | | | |
| Product Depth (ftTOR): | | | Water Column (ft): | | | DTW when sampled: | | | |
| DTW (static) (ftTOR): | | | Casing Volume: | | | Purpose: <input type="checkbox"/> Development <input type="checkbox"/> Sample | | | |
| Total Depth (ftTOR): | | | Purge Volume (gal): | | | Purge Method: | | | |
| Time | Water Level (ftTOR) | Acc. Volume (gallons) | pH (units) | Temp. (deg. C) | SC (uS) | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Appearance & Odor |
| 0 | Initial | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| Sample Information: | | | Date: (if different from above) | | | | | | |
| S1 | | | | | | | | | |
| S2 | | | | | | | | | |

| | | | | | | | | | |
|----------------------------|---------------------|-----------------------|---------------------------------|----------------|---------|---|-----------|----------|-------------------|
| Well No. | | | Diameter (inches): | | | Sample Time: | | | |
| Product Depth (ftTOR): | | | Water Column (ft): | | | DTW when sampled: | | | |
| DTW (static) (ftTOR): | | | Casing Volume: | | | Purpose: <input type="checkbox"/> Development <input type="checkbox"/> Sample | | | |
| Total Depth (ftTOR): | | | Purge Volume (gal): | | | Purge Method: | | | |
| Time | Water Level (ftTOR) | Acc. Volume (gallons) | pH (units) | Temp. (deg. C) | SC (uS) | Turbidity (NTU) | DO (mg/L) | ORP (mV) | Appearance & Odor |
| 0 | Initial | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| Sample Information: | | | Date: (if different from above) | | | | | | |
| S1 | | | | | | | | | |
| S2 | | | | | | | | | |

REMARKS:

Note: All water level measurements are in feet, distance from top of riser.

Volume Calculation

| Diam. | Vol. (g/ft) |
|-------|-------------|
| 1" | 0.041 |
| 2" | 0.163 |
| 4" | 0.653 |
| 6" | 1.469 |

Stabilization Criteria

| Parameter | Criteria |
|-----------|------------|
| pH | ± 0.1 unit |
| SC | ± 3% |
| Turbidity | ± 10% |
| DO | ± 0.3 mg/L |
| ORP | ± 10 mV |

PREPARED BY: _____

APPENDIX G

QUALITY ASSURANCE PROJECT PLAN (QAPP)



Quality Assurance Project Plan

Former Trico Plant
BCP Site No. C915281
Buffalo, New York

January 2025

Prepared for:
**847 Main Street, LLC and
791 Washington Street, LLC**

Prepared by:
**Roux Environmental Engineering
and Geology, D.P.C.**
2558 Hamburg Turnpike, Suite 300
Buffalo, New York 14218

Table of Contents

| | |
|--|---|
| 1.0 Introduction | 1 |
| 1.1 Site Location and Description..... | 1 |
| 1.2 Scope of the QAPP | 1 |
| 2.0 Project Organization and Responsibility | 1 |
| 2.1 NYSDEC and NYSDOH | 1 |
| 2.2 Property Owner | 1 |
| 2.3 Project Manager | 1 |
| 2.4 Field Team Leader:..... | 1 |
| 2.5 Quality Assurance (QA) Officer | 2 |
| 2.6 Laboratory Responsibilities | 2 |
| 3.0 Quality Assurance Objectives for Measurement Data | 4 |
| 3.1 Level of QC Effort for Sample Parameters..... | 4 |
| 4.0 Sample Custody Procedures | 5 |
| 4.1 Field Custody Procedures | 5 |
| 4.1.1 Sample Storage | 5 |
| 4.1.2 Sample Custody..... | 5 |
| 4.1.3 Sample Tracking | 6 |
| 5.0 Calibration Procedures And Frequency | 7 |
| 5.1 Field Instrument Calibration..... | 7 |
| 5.2 Preventative Maintenance | 7 |
| 6.0 Data Validation and Reporting | 8 |
| 6.1 Data Usability Evaluation..... | 8 |
| 6.1.1 Procedures Used to Evaluate Field Data Usability | 8 |
| 6.1.2 Procedures Used to Evaluate Laboratory Data Usability..... | 8 |
| 6.2 Data Reporting | 8 |
| 6.2.1 Field Data Reporting | 8 |
| 6.2.2 Laboratory Data Reporting..... | 8 |
| 7.0 Corrective Action | 9 |
| 7.1 Field Corrective Action..... | 9 |
| 7.2 Laboratory Corrective Action | 9 |
| 7.3 Data Validation & Assessment Corrective Action | 9 |

Tables

1. Sample Container, Volume, Preservative, and Holding Time Requirements

1.0 Introduction

This Quality Assurance Project Plan (QAPP) is an appendix to the Site Management Plan (SMP), which is required as an element of the remedial program at the Former Trico Plant (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP), administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreements (BCA) Index # C915281-10-13, Site No. C915281, which was executed in October 2013 and amended in February 2016 and July 2019.

1.1 Site Location and Description

The Site is located in the City of Buffalo, Erie County, New York and consists of one tax parcel addressed at 628 Ellicott Street (SBL No. 111.31-1-1.11), formerly addressed as 791 Washington Street (BCA Amendment 2). The site is an approximately 2.11-acre area and is bounded by the Buffalo Niagara Medical Campus Innovation Center (640 Ellicott Street) to the north, Goodell Street to the south, Ellicott Street to the east, and Washington Street to the west.

The Site consists of one redeveloped structure, a complex of five interconnected former industrial buildings, and former Burton Street to the north. The Site is zoned N-1C (Downtown Mixed-Use Core) which is defined as mixed-use, mid-rise developments at edges of downtown. The Site has been redeveloped for use primarily as residential apartments with some commercial space.

1.2 Scope of the QAPP

This QAPP was prepared to provide quality assurance (QA) guidelines to be implemented post-remedial activities. The QAPP will ensure the accuracy and precision of data collection during post-remedial Site redevelopment and data interpretation. The QAPP identifies procedures for sample collection to mitigate the potential for cross-contamination, as well as analytical requirements necessary to allow for independent data validation. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the EPA Region II CERCLA Quality Assurance Manual, and NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010). This document may be modified for subsequent phases of investigative work, as necessary.

The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when;
- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations);
- A document that can be used by the Project Manager's and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data;
- A plan to document and track project data and results; and,
- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports.

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples; field testing; record keeping; data management; chain-of-custody procedures; laboratory analyses; and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be defended.

task-specific activities includes the development of procedures, auditing, monitoring, and surveillance of the performance.

QC refers to the activity performed to determine if the work activities conform to the requirements. This includes activities such as inspections of the work activities in the field (e.g., verification that the items and materials installed conform to applicable codes and design specifications). QA is an overview monitoring of the performance of QC activities through audits rather than first time inspections.

2.0 Project Organization and Responsibility

The following section provides a generic organization for sampling activities, including roles, responsibilities, and required qualifications of these organizations.

2.1 NYSDEC and NYSDOH

The NYSDEC, in conjunction with the NYSDOH, will review the work plans and supporting documents for completeness and conformance with applicable BCP regulations, guidance and policy and will decide to accept or reject these documents based on this review. The NYSDEC also has the authority to review and approve QA documentation collected during BCP construction and to confirm that the QA Plan was followed.

2.2 Property Owner

The property owner (Owner), or holder of the certificate of completion (COC) will be responsible for complying with the QA requirements as specified herein and for monitoring and controlling the quality of the Brownfield cleanup activities either directly or through their designated environmental consultant and/or legal counsel. The Owner will also have the authority to select Contractor(s) to assist them in fulfilling these responsibilities. The Owner is responsible for implementing the project and has the authority to commit the resources necessary to meet project objectives and requirements.

2.3 Project Manager

The Project Manager has the responsibility for ensuring that the project meets the overall project objectives, reports directly to the Owner, coordinates with the NYSDEC/NYSDOH Project Coordinators, and is responsible for technical and project oversight. The PM will:

- Define project objectives and develop a detailed work plan schedule.
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.
- Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Review the work performed on each task to assure its quality, responsiveness, and timeliness.
- Review and analyze overall task performance with respect to planned requirements and authorizations.
- Review and approve all deliverables before their submission to NYSDEC.
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Ultimately be responsible for the preparation and quality of interim and final reports.
- Represent the project team at meetings.

2.4 Field Team Leader:

The Field Team Leader (FTL) has the responsibility for implementation of specific project tasks identified at the Site and is responsible for the supervision of project field personnel, subconsultants, and subcontractors. The FTL reports directly to the Project Manager. The FTL will:

- Define daily work activities.
- Orient field staff concerning the project's special considerations.
- Monitor and direct subcontractor personnel.
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness.
- Assure that field activities, including sample collection and handling, are carried out in accordance with this QAPP.

2.5 Quality Assurance (QA) Officer

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute, and is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations and policies, and NYSDEC requirements. Specific function and duties include:

- Performing QA audits on various phases of the field operations.
- Reviewing and approving QA plans and procedures.
- Providing QA technical assistance to project staff.
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager for technical operations.
- Responsible for assuring third party data review of all sample results from the analytical laboratory.

2.6 Laboratory Responsibilities

Any environmental laboratory utilized for sample analysis for this Site must be an independent, NY State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified facility approved to perform the analyses prescribed herein.

Laboratory Director:

The Laboratory Director is a technical advisor and is responsible for summarizing and reporting overall unit performance. Responsibilities of the Laboratory Director include:

- Provide technical, operational, and administrative leadership.
- Allocation and management of personnel and equipment resources.
- Quality performance of the facility.
- Certification and accreditation activities.
- Blind and reference sample analysis.

Quality Assurance Manager (QA Manager):

The QA Manager has the overall responsibility for data after it leaves the laboratory. The QA Manager will be independent of the laboratory but will communicate data issues through the Laboratory Director. In addition, the QA Manager will:

- Oversee laboratory QA.
- Oversee QA/QC documentation.
- Conduct detailed data review.

- Determine whether to implement laboratory corrective actions, if required.
- Define appropriate laboratory QA procedures.
- Prepare laboratory SOPs.

3.0 Quality Assurance Objectives for Measurement Data

The overall objectives and criteria for assuring quality for this effort are discussed below. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented. The objectives of this QAPP are to address the following:

- The procedures to be used to collect, preserve, package, and transport soil, groundwater and air samples.
- Field data collection.
- Record keeping.
- Data management.
- Chain-of-custody procedures.
- Precision, accuracy, completeness, representativeness, for sample analysis and data management under EPA analytical methods.

3.1 Level of QC Effort for Sample Parameters

Field blank, method blank, trip blank, field duplicate, laboratory duplicate, laboratory control, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. QC samples are discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents at the facility that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.
- Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures.
- Duplicate samples are analyzed to check for sampling and analytical reproducibility.
- MS/MSD and MS/Duplicate samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Depending on site-specific circumstances, one MS/MSD or MS/Duplicate should be collected for every 20 or fewer investigative samples to be analyzed for organic and inorganic chemicals of a given matrix.

The general level of QC effort will be one field (blind) duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD or MS/Duplicate for every 20 or fewer investigative samples of a given matrix. One trip blank consisting of distilled, deionized water will be included along with each sample delivery group of aqueous VOC samples.

4.0 Sample Custody Procedures

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person's custody if it is in the person's possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site.

4.1 Field Custody Procedures

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person's custody if it is in the person's possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site.

4.1.1 Sample Storage

Samples are stored in secure limited-access areas. Walk-in coolers or refrigerators are maintained at 4°C, $\pm 2^\circ\text{C}$, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded at a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location if necessary. Sample parameter lists, holding times and sample container requirements are summarized on Table 1.

4.1.2 Sample Custody

Sample custody is defined by this document as when any of the following occur:

- It is in someone's actual possession.
- It is in someone's view after being in his or her physical possession.
- It was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering.
- It is placed in a designated and secured area.

Samples are removed from storage areas by the sample custodian or analysts and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure. If required by the applicable regulatory program, internal chain-of-custody is documented in a log by the person moving the samples between laboratory and storage areas.

Laboratory documentation used to establish COC and sample identification may include the following:

- Field COC forms or other paperwork that arrives with the sample.
- The laboratory COC.
- Sample labels or tags are attached to each sample container.
- Sample custody seals.

- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.
- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.
- Sample storage log (same as the laboratory COC).
- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

4.1.3 Sample Tracking

All samples are maintained in the appropriate coolers prior to and after analysis. The analysts remove and return their samples as needed. Samples that require internal COC are relinquished to the analysts by the sample custodians. The analyst and sample custodian must sign the original COC relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original COC returning sample custody to the sample custodian. Sample extracts are relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department tracks internal COC through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the COC (e.g., sample breakage or depletion).

5.0 Calibration Procedures And Frequency

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

5.1 Field Instrument Calibration

Quantitative field data to be obtained during groundwater sampling include pH, turbidity, specific conductance, temperature, dissolved oxygen and depth to groundwater. Quantitative water level measurements will be obtained with an electronic sounder or steel tape, which require no calibration. Quantitative field data to be obtained during soil sampling include screening for the presence of volatile organic constituents using a photoionization detector (PID).

5.2 Preventative Maintenance

Each piece of field equipment is checked according to its routine maintenance schedule and before field activities begin. Field equipment that may be used at the Site includes:

- Photoionization detector (PID)
- Water quality meters (includes pH, turbidity, temperature, Eh, and specific conductance)
- Electric water level indicator

Field personnel will report all equipment maintenance and/or replacement needs to the Project QA Officer and will record the information on the daily field record.

6.0 Data Validation and Reporting

All data generated through field activities, or by the laboratory operation shall be reduced and validated (as required in the SMP) before reported.

6.1 Data Usability Evaluation

If requested by the NYSDEC, data evaluation will be performed by a third-party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, and Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review.

6.1.1 Procedures Used to Evaluate Field Data Usability

The performance of all field activities, calibration checks on all field instruments at the beginning of each day of use, manual checks of field calculations, checking for transcription errors and review of field log books is the responsibility of the Field Team Leader.

6.1.2 Procedures Used to Evaluate Laboratory Data Usability

Data evaluation will be performed by the third-party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, and Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review. The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. Also, results of blanks, surrogate spikes, MS/MSDs, and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix shall be evaluated. The third-party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

6.2 Data Reporting

6.2.1 Field Data Reporting

All field documents will be accounted for when they are completed. Accountable documents include items such as field notebooks, sample logs, field data records, photographs, data packages, computer disks, and reports.

6.2.2 Laboratory Data Reporting

Analytical data will be summarized in tabular format with such information as sample identification, sample matrix description, parameters analyzed and their corresponding detected concentrations, and the detection limit. Analytical results will be incorporated into reports as data tables, maps showing sampling locations and analytical results, and supporting text.

7.0 Corrective Action

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out of quality control performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. All corrective action proposed and implemented should be documented in the regular quality assurance reports to management. Corrective action should be implemented only after approval by the Project Manager, or their designee. If immediate corrective action is required, approvals secured by telephone from the Project Manager should be documented in an additional memorandum.

7.1 Field Corrective Action

If errors in field procedures are discovered during the observation or review of field activities by the Project QA Officer or his/her designee, corrective action will be initiated. Nonconformance to the QA/QC requirements of the field operating procedures will be identified by field audits or immediately by project staff who know or suspect that a procedure is not being performed in accordance with the requirements. The Project QA Officer or their designee will be informed immediately upon discovery of all deficiencies. Timely action will be taken if corrective action is necessary.

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Work Plan, etc.) or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. In general, the Project Manager and QA Officer may identify the need for corrective action. The Project Manager will approve the corrective measure that will be implemented by the field team. It will be the responsibility of the Project Manager to ensure that corrective action has been implemented.

If the corrective action will supplement the existing sampling using existing and approved procedures in the QAPP, corrective action approved by the Project Manager will be documented. If the corrective actions result in less samples (or analytical fractions), alternate locations, etc., which may result in non-achievement of project QA objectives, it will be necessary that all levels of project management, including the NYSDEC Project Coordinator, concur with the proposed action.

Corrective actions will be implemented and documented in the project field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by the NYSDEC Project Coordinator.

If at any time a corrective action issue is identified which directly impacts project data quality objectives, the NYSDEC Project Coordinator will be notified immediately.

7.2 Laboratory Corrective Action

Corrective actions may be initiated if the quality assurance goals are not achieved. The initial step in a corrective action is to instruct the analytical laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous result. If no error in laboratory procedures or sample collection and handling procedures can be identified, then the Project Manager will assess whether reanalysis or resampling is required or whether any protocol should be modified for future sampling events.

7.3 Data Validation & Assessment Corrective Action

The need for corrective action may be identified during the data validation or assessment processes. Potential types of corrective action may include resampling by the field team, or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the QA objectives (e.g., the holding time for samples is not exceeded, etc.). If the data validator identifies a corrective action situation, the Project Manager will be responsible for approving the corrective action implementation. All required corrective actions will be documented by the laboratory Quality Assurance Coordinator.



TABLE 1
SAMPLE CONTAINER, VOLUME, PRESERVATION & HOLDING TIME REQUIREMENTS
QUALITY ASSURANCE PLAN
FORMER TRICO PLANT
BUFFALO, NEW YORK

| Matrix | Parameter ¹ | Method ² | Container Type | Minimum Volume | Preservation (Cool to 2-4 °C for all samples) | Holding Time from Sample Date |
|--------------------|------------------------|---------------------|----------------|----------------|--|----------------------------------|
| Building Materials | PCBs | 8082 | WMG | 4 oz. | Cool to 2-4 °C | 14 days extrac./40 days |
| Groundwater | TCL + CP-51 VOCs | 8260B | glass vial | 3 - 4 oz. | HCl to pH<2, Zero Headspace, Cool to 2-4 °C | 14 days |

References:

1. Test Methods for Evaluating Solid Wastes, USEPA SW-846.

Notes:

2. EPA-approved methods published in Reference 1 above may be used.
3. Mercury sampling in soil via EPA methods 7471.

Acronyms:

VOCs = Volatile Organic Compounds
TCL = Target Compound List
WMG = Wide Mouth Glass
PCBs = Polychlorinated Biphenyls

APPENDIX H

HEALTH & SAFETY PLAN (HASP)

(PROVIDED ELECTRONICALLY)



Health & Safety Plan

Former Trico Plant
BCP Site No. C915281
Buffalo, New York

March 2025

Prepared for:

847 Main Street, LLC and

791 Washington Street, LLC

Prepared by:

**Roux Environmental Engineering
and Geology, D.P.C.**

2558 Hamburg Turnpike, Suite 300
Buffalo, New York 14218

Table of Contents

| | |
|--|----|
| Site-Specific Emergency Information | 1 |
| Emergency Phone Numbers | 1 |
| 1. Introduction | 3 |
| 1.1 Roles and Responsibilities..... | 3 |
| 2. Background | 6 |
| 2.1 Site Description..... | 6 |
| 2.2 Site History..... | 6 |
| 2.3 Known and Potential Releases of Hazardous Substances at the Site | 6 |
| 3. Scope of Work | 7 |
| 4. Site Control..... | 8 |
| 4.1 Site Map..... | 8 |
| 4.2 Site Access | 8 |
| 4.3 Buddy System | 8 |
| 4.4 Site Communications | 8 |
| 4.5 Site Work Zones | 9 |
| 5. Job Hazard Evaluation | 11 |
| 5.1 Hazard Communication and Overall Site Information Program | 12 |
| 5.2 Noise | 12 |
| 5.3 Slip, Trip, and Fall Hazards | 12 |
| 5.4 Biological Hazards..... | 12 |
| 6. Emergency Response Plan..... | 13 |
| 6.1 Emergency Response | 13 |
| 6.2 Emergency Alerting and Evacuation | 13 |
| 6.3 Emergency Medical Treatment and First Aid..... | 13 |
| 7. Environmental Conditions and Response | 15 |
| 7.1 Adverse Weather Conditions..... | 15 |
| 7.2 Electrical Storm Guidelines..... | 15 |
| 7.3 Environmental Stressors, Heat Stress, Heat Exhaustion, and Heat Stroke | 15 |
| 7.3.1 Heat Stress | 16 |
| 7.3.2 Heat Cramps..... | 17 |
| 7.3.3 Heat Exhaustion | 17 |
| 7.3.4 Heat Stroke..... | 17 |
| 7.4 Cold Stress | 18 |
| 8. Safety Procedures..... | 19 |
| 8.1 Training | 19 |
| 8.2 Site-Specific Safety Briefings for Visitors | 19 |
| 8.3 HASP Information and Site-Specific Briefings for Workers | 19 |
| 8.4 Medical Surveillance..... | 20 |
| 8.4.1 Site Medical Surveillance Program..... | 20 |
| 8.4.2 Medical Recordkeeping Procedures..... | 20 |

Table of Contents (Continued)

| | |
|---|----|
| 8.4.3 Program Review | 21 |
| 8.5 Personnel Protection | 21 |
| 8.5.1 Additional Personal Protection | 22 |
| 8.5.2 Hearing Conservation..... | 22 |
| 8.6 Monitoring..... | 22 |
| 8.6.1 Action Levels for Air Monitoring | 23 |
| 8.6.2 Air Monitoring Equipment and Calibration | 25 |
| 8.7 Tailgate Safety Meetings..... | 25 |
| 8.8 Spill Containment | 25 |
| 8.8.1 Initial Spill Notification and Response..... | 26 |
| 8.8.2 Spill Evaluation and Response..... | 26 |
| 8.9 Decontamination | 26 |
| 8.9.1 Decontamination Procedures for Personnel and PPE | 26 |
| 8.9.2 Decontamination Procedures for Equipment | 27 |
| 8.9.3 Monitoring the Effectiveness of Decontamination Procedures | 27 |
| 8.10 Confined Space Entry..... | 27 |
| 8.12 Unusual or Significant Risks | 28 |
| 8.13 Activity-Specific Hazards..... | 28 |
| 8.13.1 Electrical and Other Utility Assessment and Accommodations | 29 |
| 8.13.2 Subsurface Work | 29 |
| 8.13.3 Heavy Equipment | 29 |
| 8.14 Traffic Control | 29 |
| 8.15 Sanitation..... | 29 |
| 9. Field Team Review | 30 |
| 10. Approvals..... | 31 |

Tables

1. Toxicological Properties of Hazardous Substances Present at the Site

Figures

1. Site Location Map
2. Site Plan with Emergency Muster Area
3. Hospital Route Map

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

Table of Contents (Continued)

F. Heavy Equipment Exclusion Zone Management Program

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 below table. 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) | Thomas Forbes | (716) 856-0599 | |
| Project Principal (PP) | Christopher Boron | (716) 864-2726 | |
| Project Manager (PM) | Christopher Boron | (716) 864-2726 | |
| Site Supervisor (SS) | To Be Determined Based on Task | (716) 856-0599 | |
| Site Health and Site Safety Officer (SHSO) | To Be Determined Based on Task | (716) 856-0599 | |
| Office Health and Safety Manager (OHSM) | Paul Werthman | (716) 997-9584 | |
| Corporate Health and Safety Director (CHSD) | Brian Hobbs, CIH, CSP | 631-807-0193 | |
| WorkCare, Inc. | Occupational Health Care Management Provider | 888-449-7787 | |
| Client Emergency Contact | Peter Krog II | (716) 667-1234 | |
| Outside Assistance | | | |
| Agency | Contact | Telephone | Address/Location |
| Ambulance/emergency medical services (EMS) | Buffalo General Hospital | (716) 859-5600 | 100 High Street Buffalo, NY 14203 |
| Police | Buffalo Police | (716) 851-4403 | 695 Main Street |

| | | | |
|--------------|--|-----|--|
| | Department – B-District | | Buffalo, NY 14203 |
| Fire | Buffalo Fire Station Engine 2 | 911 | 376 Virginia Street Buffalo, NY 14201 |
| Site Address | 628 Ellicott Street (formerly 791 Washington Street) Buffalo, NY 14203 | | |

Route to Buffalo General Hospital

1. Travel Northeast on Washington Street,
2. Turn right onto High Street. Follow signs to Emergency Room at 100 High Street on the Left.

1. Introduction

This Site-specific Health and Safety Plan (HASP) has been prepared by Roux Environmental Engineering and Geology, D.P.C. (Roux) for use during the operation, monitoring, and maintenance activities at the Former Trico Plant, located at 628 Ellicott Street (formerly 791 Washington Street), Buffalo, New York (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 operation, maintenance, and monitoring 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 Christopher Boron. The Site Supervisor (SS) and Site Health and Safety Officer (SHSO) will be determined based on staff availability and task to be performed.

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 SS. Any changes will be announced to all workers at the next 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 Site supervisor(s) with work assignments and overseeing their performance; Coordinating safety and health efforts with the SHSO;
- 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 SS and others as necessary for safety and health efforts.

Site Supervisor (SS)

The Site Supervisor (SS) is responsible for field operations and reports to the Project Manager (PM). The SS ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Site Supervisor 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 SS 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 SS 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 SS 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. Background

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 located in Buffalo, Erie County, New York and consists of a single tax parcel addressed at 628 Ellicott Street (formerly 791 Washington Street (SBL No. 111.31-1-1.11)). The site is an approximately 2.1-acre area and is bounded by a parking lot and building associated with the Buffalo Niagara Medical Campus Innovation Center (640 Ellicott Street) to the north, Goodell Street to the south, Ellicott Street to the east, and Washington Street to the west.

The Site building has been redeveloped for residential and commercial uses and totals approximately 497,660 square feet.

2.2 Site History

The Site building consists of five (5) interconnected former industrial buildings which have been redeveloped, with the oldest constructed around 1890 as a portion of the Christian Weyand Brewery which operated at the Site until the enactment of prohibition. The building was purchased by the Trico Products Corporation for the manufacturing of windshield wipers for the automobile industry. The remaining buildings were constructed from 1920 to 1954 to expand operations. The Trico Products Corporation operated at the Site until circa 1990. Operations included electroplating, smelting, die-casting, rubber extrusion, and metal fabrication. Industrial manufacturing at the Site has resulted in chemical and/or petroleum impacts to the building interior and underlying soil and groundwater.

Remedial actions to obtain the Certificate of Completion were completed in 2019. Redevelopment activities were also started in 2019 but halted by the COVID pandemic. Redevelopment activities resumed in October 2022 and redevelopment activities involving subsurface activities were completed in April 2024.

2.3 Known and Potential Releases of Hazardous Substances at the Site

The Site was remediated to a Track 4 Restricted-Residential cleanup. Soil/fill with remaining contamination is present below the Site cover system (hardscape) which consists of concrete (building slab and exterior courtyard area) and asphalt (former Burton Street).

The remediated property is subject to a comprehensive, site-wide SMP which identifies requirements for monitoring and maintenance of engineering and institutional controls, post-remedial media (groundwater and building material) monitoring and sampling, and future subsurface related activities.

3. Scope of Work

Roux will be on-site to perform routine OM&M activities, including the following:

1. **Annual site inspections** – a site-wide inspection will be performed at a minimum of once per year and after all severe weather conditions that may affect engineering controls or monitoring devices.
2. **Annual groundwater monitoring** – groundwater sampling for VOCs and additional parameters as needed (i.e. dissolved oxygen, manganese, sulfate, nitrate-nitrite, methane, ethane, and/or ethene) will be completed at three (3) monitoring well locations on an annual basis. Static water levels will be measured and recorded for monitoring wells during groundwater sampling events.

Non-routine activities that may be performed by Roux personnel include the following:

- **Monitoring Well Decommissioning** – additional groundwater monitor wells may be decommissioned with NYSDEC approval. This would consist of tremie grouting the monitoring wells in place, similar to of decommissioned wells.

If there are any changes with the scope a revision of the HASP will be required to address any new potential hazards.

4. 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

If additional work is completed at the Site, access to the work areas at the Site would be restricted to reduce the potential for exposure to its safety and health hazards.

4.3 Buddy System

This section is not applicable for all components of the SOW described in Section 3. Site inspections and groundwater monitoring may be completed by a single Roux employee. Any time Roux is on-site, The Krog Group (Krog) is made aware and communications with Krog and Roux's PM is maintained via cellular phone.

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 SS 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

The SOW does not require the implementation of work zones; however, should the need arise, this section provides details for the proper execution of work zones at this Site.

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. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

5. 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/SS 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 insects (ticks, spiders, bees), animals (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. There is also potential for transmission and/or exposure to SARS-CoV-2, the virus that causes COVID-19. 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. 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.

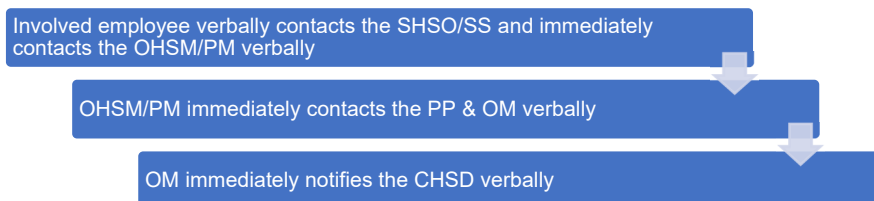
6.2 Emergency Alerting and Evacuation

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. 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.
- b. 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. A Hospital Route map with location to Buffalo General Hospital Emergency Room is included as **Figure 3**.
- c. Decontaminate to the extent possible prior to administration of first aid or movement to medical or emergency facilities.
- d. 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).
- e. 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. 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 lightning 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 47 to 52 degrees Fahrenheit during the year in Buffalo, 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;
- Abnormal behavior;
- Slowing;
- Weakness;
- Stumbling or repeated falling;
- Inability to walk;
- Collapse; 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. 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 1910.120(e) 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. 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.

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. If Site conditions warrant upgrade beyond modified Level D PPE, a separate HASP will be prepared based on scope of work and potential exposure.

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 \geq 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.

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 can remain at Level D if breathing zone VOC concentrations are less than 5 ppm and specific compounds, such as benzene and vinyl chloride are 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 and vinyl chloride. The colorimetric tubes are used to confirm the presence or absence of specific constituents, and they do not provide a measured concentration.

| Air Monitoring Summary and Action Levels | |
|--|---|
| Organic Vapors | |
| PID Reading in Breathing Zone (ppm) | Action |
| 0-1 ppm above background | Continue monitoring |
| >1-5 ppm sustained 60 seconds | Continue monitoring, if applicable initiate additional collection of benzene/vinyl chloride using colorimetric tubes. |
| <5 ppm and no presence of benzene/vinyl chloride | Continue Monitoring, ventilate space |
| ≥ 5 ppm - ≤ 25 ppm and no presence of benzene/vinyl chloride | 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. 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.

2

| Air Monitoring Summary and Action Levels Oxygen | |
|---|--|
| O ₂ Reading in Breathing Zone (%) ¹ | Action |
| 20.9% O ₂ | Oxygen level normal |
| < 19.5% O ₂ | Oxygen deficient Interrupt task/Evacuate area |
| >23.5% O ₂ | Oxygen enriched Interrupt task/Evacuate area |

1. Action levels based on USEPA Standard Operating Safety Guides; Table 5-1

| Air Monitoring Summary and Action Levels 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 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 Hydrogen Sulfide | |
|--|---|
| Hydrogen Sulfide (H ₂ S) 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

A designated Site worker 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.

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 meet 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 shall meet applicable local, State, and Federal regulations.

The following items may be used to decontaminate equipment:

- Fresh water rinse;
- Non-phosphorus detergent wash;
- Acetone rinse;
- 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

Confined space entry will not be performed for OM&M activities.

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.

8.12 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 in the event that subsurface activities are completed at the Site. All applicable guidelines will be followed in the vicinity of overhead power and utility lines (see Section 8.13.3 below).

8.13.2 Subsurface Work

Subsurface work activities will require adherence to Roux's Corporate Subsurface Utility Clearance Management program found within **Appendix E**.

8.13.3 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. 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: Former Trico Plant

[illegible]

10. Approvals

By their signature, the undersigned certify that this HASP is approved and will be utilized at the Former Trico Plant Site.

Paul Werthman - Office Health and Safety Manager

Date

Christopher Boron – Project Principal/Project Manager

Date

Thomas Forbes – Office Manager

Date

1. Toxicology Properties of Hazardous Substances Present at 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 |
|--|----------|---|---|---|---------------|---|---|---|--|
| VOLATILE ORGANIC COMPOUNDS (VOCs) | | | | | | | | | |
| 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 BP: 89°F Fl.Pt. = -2°F LEL: 6.5% UEL: 15.5% Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F |
| Benzene | 71-43-2 | TWA 0.5 ppm STEL 2.5 ppm | Ca TWA 0.1 ppm ST 1 ppm | TWA 1 ppm 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] BP: 176°F Fl.Pt. = 12°F LEL: 1.2% UEL: 7.8% Class IB Flammable liquid. Fl.P. below 73°F and BP at or above 100°F |
| 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. BP: 118-140°F Fl.Pt. = 36-39°F LEL: 5.6% UEL: 12.8% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F |
| Tetrachloroethene | 127-18-4 | TWA 25 ppm STEL 100 ppm | Ca Minimize workplace exposure concentrations | TWA 100 ppm 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 BP: 250°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene |
| Trichloroethene (TCE) | 79-01-6 | TWA 10 ppm STEL 25 ppm | Ca | TWA 100 ppm C 200 ppm 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. BP: 189°F Fl.Pt. = NA LEL(77°F): 8.0% UEL(77°F): 10.5% Combustible Liquid, but burns with difficulty |
| Vinyl Chloride (chloroethylene) | 75-01-4 | TWA 1 ppm | Ca | TWA 1 ppm 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.] BP: 7°F Fl.Pt. = NA (Gas) LEL: 3.6% UEL: 33.0% Flammable Gas |
| SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs) | | | | | | | | | |
| Benzo[a]anthracene | 56-55-3 | https://cameochemicals.noaa.gov/chemical/16171 | | | | Inhalation, injection, 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. BP: 815° F at 760 mm Hg Fl.Pt. = NA LEL: NA 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 BP: NA Fl.Pt. = NA LEL: NA UEL: NA Combustible Solids |
| Benzo[b]fluoranthene | 205-99-2 | None listed | https://cameochemicals.noaa.gov/chemical/16172 | | | Inhalation, injection, skin and/or eye contact | | | Needles or yellow fluffy powder BP: NA Fl.Pt. = NA LEL: NA UEL: NA |
| Benzo[k]fluoranthene | 207-08-9 | https://cameochemicals.noaa.gov/chemical/16173 | | | | Inhalation, injection, skin and/or eye contact | When heated to decomposition this compound emits acrid smoke and irritating fumes. | | Pale yellow needles or yellow crystalline solid BP: 896° F Fl.Pt. = NA LEL: NA 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 BP: NA Fl.Pt. = NA LEL: NA UEL: NA 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, injection, 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 BP: 975° F Fl.Pt. = NA LEL: NA UEL: NA |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | https://cameochemicals.noaa.gov/chemical/16218 | | | | Inhalation, injection, skin and/or eye contact | | | Yellow crystals BP: 997° F Fl.Pt. = NA LEL: NA UEL: NA |
| METALS | | | | | | | | | |
| 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 BP: Sublimes Fl.Pt. = NA LEL: NA UEL: NA 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 BP: 1337°F Fl.Pt. = NA LEL: NA UEL: NA |
| Cadmium | 7440-43-9 | TWA 0.01 mg/m ³ total dust 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. BP: 1409°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible - will burn in powder form |
| Chromium | 7440-47-3 | TWA 0.5 mg/m ³ (metal) TWA 0.003 mg/m ³ (water-soluble Cr III compounds) TWA 0.0002 mg/m ³ (water-soluble Cr VI compounds) 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. BP: 4788°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible - will burn in dust form if heated in a flame |
| 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 BP: 3164°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solid in bulk form |
| Mercury | 7439-97-6 | TWA 0.1 mg/m3, as Hg Aryl compounds TWA 0.025 mg/m3 as Hg, inorganic forms including metallic mercury | Hg Vapor: TWA 0.05 mg/m3 [skin] 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.] BP: 674°F Fl.Pt. = NA LEL: NA UEL: NA Metal: Noncombustible Liquid |
| PCBs | | | | | | | | | |
| PCBs (total) | 11097-69-1, 53469-21-9 | TWA 0.5 mg/m3 [skin] TWA 1 mg/m3 [skin] | Ca TWA 0.001 mg/m3 Ca TWA 0.001 mg/m3 | TWA 0.5 mg/m3 [skin] TWA 1 mg/m3 [skin] | Ca [5 mg/m3] 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 BP: 689-734°F, 617-691°F Fl.Pt. = NA, NA LEL: NA UEL: NA Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins. |

References
Centers for Disease Control and Prevention, 2018. *NIOSH Pocket Guide to Chemical Hazards*. The National Institute for Occupational Safety and Health.
American Conference of Governmental Industrial Hygienists (ACGIH), 2017. *2017 TLVs® and BEIs®*. Cincinnati, OH.
National Oceanic and Atmospheric Administration (NOAA) and Environmental Protection Agency (EPA), 2019. *CAMEO Chemicals Database* . <https://cameochemicals.noaa.gov/>
U.S. Department of Labor, 1990. *OSHA Regulated Hazardous Substances*. Industrial Exposure and Control Technologies Government Institutes, Inc.
Sax, N. Van Nostrand and Reinhold Company, 1987. *Hawley's Condensed Chemical Dictionary, 11th Edition*.
Proctor, N.H., J.P. Hughes and M.L. Fischman, 1989. *Chemical Hazards of the Workplace* . Van Nostrand Reinhold. New York.
Sax, N.I. and R.J. Lewis, 1989. *Dangerous Properties of Industrial Materials, 7th Edition*. Van Nostrand Reinhold. New York.

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.

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 |
|----------|-------|-----------|-----------|----------|------|--------------------|------------------|---------------|------------------------------|
|----------|-------|-----------|-----------|----------|------|--------------------|------------------|---------------|------------------------------|

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/m³ – 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

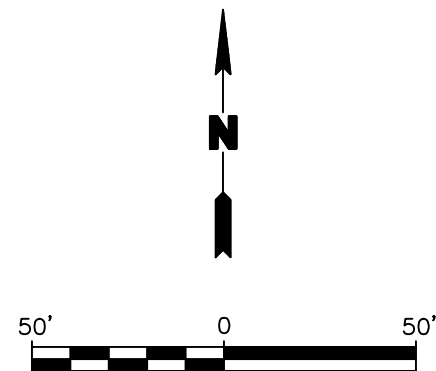
1. Site Location Map
2. Site Plan with Emergency Muster Plan
3. Route to Hospital

F:\CAD\TURNKEY\KROG\FORMER TRICO BUILDING BCP\SMPI\REVISED SMP\HASPI\FIGURE 2: SITE PLAN WITH EMERGENCY MUSTER AREA.DWG



LEGEND:

BCP SITE BOUNDARY
GOOGLE IMAGE DECEMBER 2024




Title:

SITE PLAN WITH EMERGENCY MUSTER AREA
HEALTH AND SAFETY PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)
628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:

847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC



Compiled by: RFL

Date: DECEMBER 2024

Prepared by: CNK

Scale: AS SHOWN

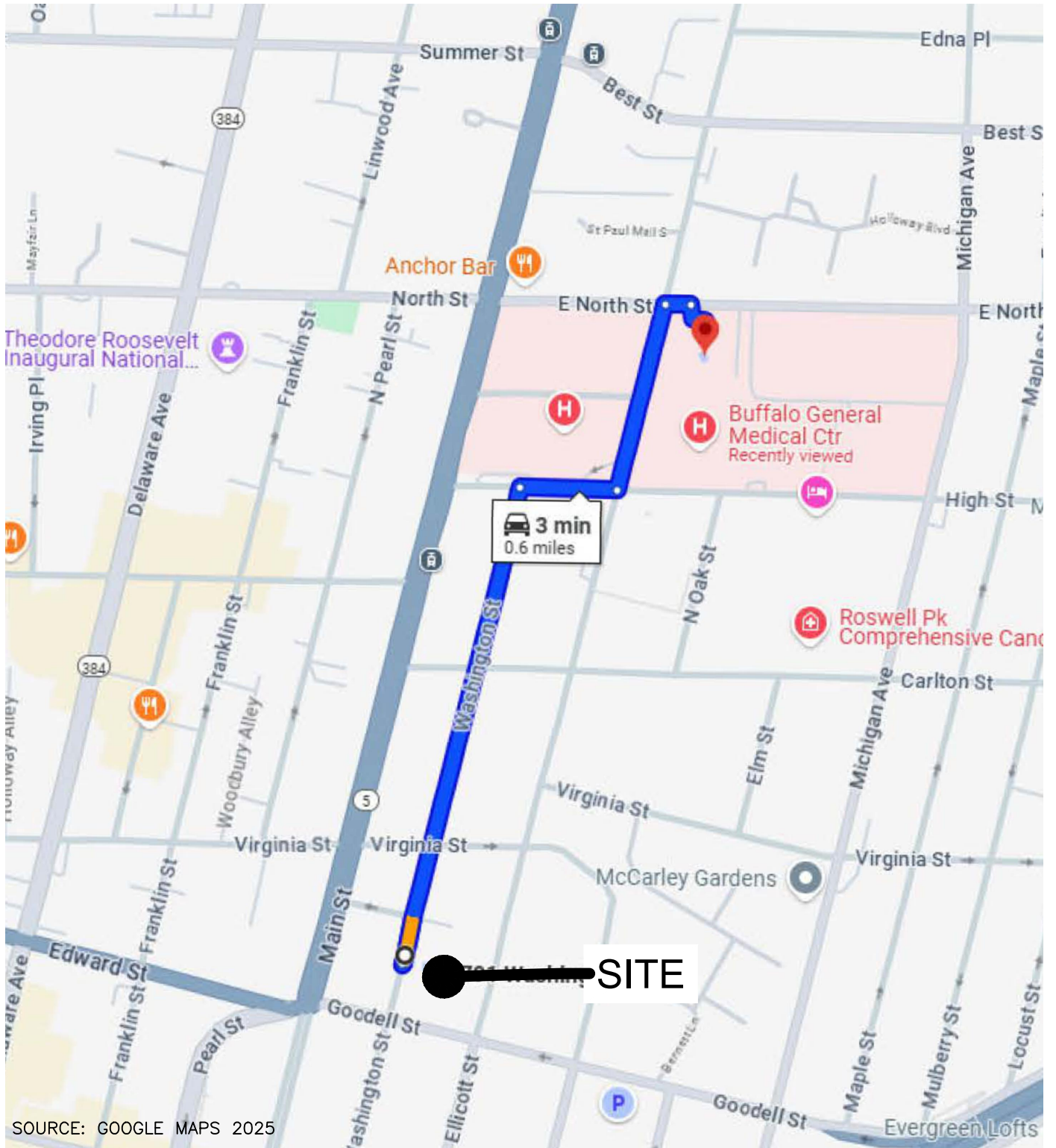
Project Mgr: CZB

Project: 4398.0001B000

File: FIGURE 2: SITE PLAN WITH EMERGENCY MUSTER AREA.DWG

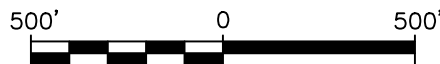
FIGURE

2



ROUTE TO BUFFALO GENERAL HOSPITAL:

1. TRAVEL NORTHEAST ON WASHINGTON STREET
2. TURN RIGHT ONTO HIGH STREET. FOLLOW SIGNS TO EMERGENCY ROOM AT 100 HIGH STREET ON THE LEFT



Title:

**HOSPITAL ROUTE MAP
HEALTH AND SAFETY PLAN
FORMER TRICO PLANT (BCP SITE NO. C915281)**

628 ELLICOTT STREET (FORMERLY 791 WASHINGTON STREET)
BUFFALO, NEW YORK

Prepared for:

847 MAIN STREET, LLC &
791 WASHINGTON STREET, LLC



| | |
|--|------------------------|
| Compiled by: RFL | Date: JANUARY 2025 |
| Prepared by: CNK | Scale: AS SHOWN |
| Project Mgr: CZB | Project: 4398.0001B000 |
| File: FIGURE 3: HOSPITAL ROUTE MAP.DWG | |

FIGURE

3

APPENDICES

- A. Job Safety Analysis (JSA) Forms
- B. SDSs for Chemical Used
- C. Heat Illness Prevention Program
- D. Personal Protective Equipment Management Program
- E. Subsurface Utility Clearance Management Program
- F. Heavy Equipment Exclusion Zone Management Program

APPENDIX A

JSA Forms

| | | | | | |
|---|--|--|--|---|-------------|
| JOB SAFETY ANALYSIS Ctrl. No. CVD-19 | | DATE: 04/10/2023 | | <input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED | PAGE 1 of 2 |
| JSA TYPE CATEGORY Generic | | WORK TYPE Fieldwork | | WORK ACTIVITY (Description) Working in Areas Affected by Coronavirus | |
| DEVELOPMENT TEAM | | POSITION / TITLE | | REVIEWED BY: | |
| Kristina DeLuca | | Health and Safety Specialist | | Brian Hobbs | |
| | | | | Ray Greenidge | |
| | | | | Sr. Compliance Mgr. | |
| REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT | | | | | |
| <input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT – In field <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES – In field | | <input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES – Steel/composite toe in field | | <input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING – High visibility vest in field <input checked="" type="checkbox"/> GLOVES – Leather/cut-resistant in field and nitrile as needed <input checked="" type="checkbox"/> Face Covering | |
| REQUIRED AND / OR RECOMMENDED EQUIPMENT | | | | | |
| Cloth face covering, nitrile gloves, hand soap, water source, hand sanitizer, disinfectant spray and disinfectant wipes. | | | | | |
| Commitment to Safety – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day. | | | | | |
| SOCIAL DISTANCING: Maintain 6' of distance between yourself and all other people at all times. If you do not believe the scope of work can be conducted while maintaining this distance, contact your Project Manager immediately. | | | | | |
| Assess 1JOB STEPS | | Analyze 2POTENTIAL HAZARDS | | Act 3CRITICAL ACTIONS | |
| 1. Project Preplanning | | N/A | | <ul style="list-style-type: none"> Review and follow COVID-19 CDC, Roux, Client and local orders/protocols. Ensure all workers are fit for duty - anyone feeling sick should remain at home even if symptoms do not align with COVID-19. If a worker has been in contact with someone potentially positive or positive for COVID-19, contact your Office Manager. Determine PPE needs and ensure adequate supply of disinfectant wipes/spray, soap and water or hand sanitizer at Site. Due to high demands and limited supply, plan ahead. Use the minimum number of employees necessary to safely complete the work. | |
| 2. Mobilization | | Exposure: Becoming infected or infecting co-workers | | Personal/Rental/Roux Owned Vehicle <ul style="list-style-type: none"> Do not carpool, unless all individuals are fully vaccinated. Verify workers/other people are not approaching vehicle prior to exiting the vehicle. Maintain 6' of distance from general public, as appropriate. Public Transportation <ul style="list-style-type: none"> Public transit should not be used unless absolutely necessary. Consider renting a car rather than taking public transit. If public transit is required, wear appropriate face covering/mask and apply social distancing (6 ft). Wash hands or use hand sanitizer immediately after. Hotel Stay (Refer to COVID-19 H&S Guidance for more info) <ul style="list-style-type: none"> If a hotel stay is deemed necessary for the given field work, ensure that you clean your room upon initial arrival. Place the "Do Not Disturb" placard on the room while away and limit housekeeping services to the extent feasible during your stay to minimize the reintroduction and spread of the virus from others. Wash hands or use hand sanitizer often. | |
| 3. Tailgate Meeting | | Exposure: Becoming infected or infecting co-workers | | <ul style="list-style-type: none"> Perform outside or indoors in areas with ample ventilation. If unvaccinated, maintain at least a 6+ ft distance between you and others. Discuss primary infection prevention measures listed below. Discuss COVID-19 symptoms with coworkers and subcontractors to ensure fitness for duty. Anyone exhibiting signs or symptoms should be instructed to leave the Site, contact your Project Manager. | |

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; 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".

| | | |
|--------------------|---|--|
| 4. Site Activities | Exposure: Becoming infected or infecting co-workers | <ul style="list-style-type: none"> • Coordinate field activities at the beginning of the day (i.e. Tailgate meeting) to minimize time spent in crowded spaces or overlap while completing job tasks. • Don cloth face coverings as appropriate. • Apply social distancing (6+ ft) when interacting with others if unvaccinated. If anyone comes within 6 ft of you while conducting work and your work prevents you from moving away, politely ask them to move back. If others are unable to move from your space, stop work and leave area. • Minimize shaking hands or touching others. • Minimize sharing of equipment or other items with co-workers and subcontractors unless wearing appropriate PPE (e.g. nitrile gloves), as appropriate. • If anyone is experiencing COVID-19 signs or symptoms in your vicinity, stop work and leave the area. • Do not work in areas with limited ventilation with others. • Cover your mouth and nose with tissue or paper towel or with your elbow when coughing or sneezing and wash hands or use hand sanitizer immediately after. If sick contact SHSO/PM and leave Site immediately. • Clean work surfaces/areas with approved cleaners you're responsible for (ex: desk, office doorknob, computer, etc.) at least daily. • Avoid public spaces and going out to eat by bringing your own lunch to the Site. If performing work in high density urban areas, it is recommended all food must be consumed at or in your vehicle or within designated work trailer. Wash hands or use hand sanitizer before eating and immediately after. |
|--------------------|---|--|

Primary Infection Prevention Measures

- Wash your hands often with soap and water for at least 20 seconds.
 - If soap and water are not available, use an alcohol-based sanitizer that contains at least 60% alcohol. Key times to wash hands include after blowing your nose, coughing or sneezing, after using the restroom, and before eating or preparing food.
- Do not touch your eyes, face, nose and mouth with unwashed hands.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw potentially contaminated items (e.g. used tissues) in the trash.
- Avoid close contact/secondary contact with people and potentially contaminated surfaces.
 - Apply appropriate social distance (6+ feet).
 - Minimize handshaking/touching others and use caution when accessing public spaces.
- Clean frequently touched surfaces daily. Commonly touched items can include but are not limited to tables, doorknobs, light switches, countertops, handles, desks, phones, keyboard, toilets, sinks and field equipment. If surfaces are dirty, they should be cleaned with soap and water prior to disinfection. If surface cannot be cleaned/disinfected, then wash hands or use sanitizer as soon as possible.

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".

| | | | | | |
|--|--|--|---|---|-------------|
| JOB SAFETY ANALYSIS | | Ctrl. No. GEN-007 | DATE 4/10/2023 | <input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED | PAGE 1 of 2 |
| JSA TYPE CATEGORY GENERIC | | WORK TYPE General Site Activity | WORK ACTIVITY (Description) Driving | | |
| DEVELOPMENT TEAM | | POSITION / TITLE | REVIEWED BY: | POSITION / TITLE | |
| Valerie Sabatasso | | Project Scientist | Brian Hobbs | CHSD | |
| REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT | | | | | |
| <input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT: <u>when outside vehicle</u> <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES: <u>when outside vehicle</u> | | <input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY TOE BOOTS: <u>when outside vehicle</u> | <input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>high visibility vest, when outside vehicle</u> | <input checked="" type="checkbox"/> GLOVES: <u>Leather/ cut-resistant level 2</u> <input type="checkbox"/> OTHER _____ | |
| 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 *JOB STEPS | | Analyze *POTENTIAL HAZARDS | Act *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. *Common factors that may lead to CONTACT incident, but not limited to: <ul style="list-style-type: none"> distracted driving (cell phone, GPS, radio, billboards, "rubber necking") lack of situational awareness unfamiliarity with traffic patterns/road layout weather conditions (wet/icy roads, hydroplaning, black ice) weariness high speeds obstructed vision (solar glare, debris on windshield, blind spots, large vehicle at the front) changes in travel pathway (construction, snow banks, non-operational signals, potholes, detours, special events) improper vehicle maintenance (non-operational signal light, worn tires, cracked windshield, ineffective wipers) 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. 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. 1a. Do not hang items in car that can obstruct your view or become projectiles in a collision. 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. 1a. Follow posted speed limits and obey traffic signals and roadway signs. 1a. Always wear your seat belt and shoulder harness when driving. 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. 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. 1a. Apply the Smith Five Keys® of safe driving <ul style="list-style-type: none"> Aim High in Steering® <ul style="list-style-type: none"> Expand eye lead time to a minimum of 15 seconds Get the Big Picture® <ul style="list-style-type: none"> Maintain proper a 4 second minimum following distance at all times Scan mirrors every 5-8 seconds to achieve a circle of awareness Position your vehicle so you can see relevant/non-relevant objects Keep Your Eyes Moving® <ul style="list-style-type: none"> Try to maintain about 180 degrees of visibility Avoid blank and fixed stares. Avoid focusing on one object for more than 2 seconds Leave Yourself an Out® <ul style="list-style-type: none"> Avoid traveling in traffic clusters Surround yourself with space Anticipate the actions of others | | |

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 ¹ JOB STEPS | Analyze ² POTENTIAL HAZARDS | Act ³ CRITICAL ACTIONS |
|-------------------------------------|--|--|
| 1. Driving to/leaving Site (cont'd) | 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. | <ul style="list-style-type: none"> Make Sure They See You® <ul style="list-style-type: none"> Maintain eye contact with on-coming vehicles/pedestrians Use warning devices (e.g., hand signals, high-lights, horns etc.) Proper timing is essential <p>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</p> <p>1a. Avoid sudden turns and stops. Don't drive recklessly – be in control of vehicle at all times.</p> <p>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)</p> <p>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.</p> <p>1a. Never operate a vehicle under the influence of alcohol or illegal substances or medications affecting your performance.</p> <p>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.</p> <p>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.</p> |
| 2. Entering/Exiting Vehicle. | 2a. CAUGHT: Personal injury (broken fingers/hand) while entering or exiting vehicles 2b. FALL: 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 2c. 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. | <p>2a. Open and close doors slowly. Never put hands or feet in between door and vehicle to avoid pinch points.</p> <p>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.</p> <p>2c. Check both directions for traffic before opening door. Do not exit vehicle if traffic does not permit you to exit safely</p> <p>2c. Check anticipated path of door prior to opening, do not open door into any obstructions (e.g., bollards, high curbing)</p> |

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".

| | | | | | |
|---|--|--|-----------------|--|-------------------------|
| JOB SAFETY ANALYSIS | | Ctrl. No. GEN-009 | DATE: 4/10/2023 | <input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED | PAGE 1 of 1 |
| JSA TYPE CATEGORY Generic | | WORK TYPE O&M | | WORK ACTIVITY (Description) Movement of 55-Gallon Drums/Drum Handling with Mobile Carrier | |
| DEVELOPMENT TEAM | | POSITION / TITLE | | REVIEWED BY: | POSITION / TITLE |
| Michael Sarni | | Technician | | Brian Hobbs | CHSD |
| REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT | | | | | |
| <input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES | | <input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or composite toe</u> | | <input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent long sleeve shirt or long sleeve shirt and reflective safety vest.</u> <input checked="" type="checkbox"/> GLOVES: <u>Cut-resistant gloves</u> <input type="checkbox"/> OTHER: | |
| REQUIRED AND / OR RECOMMENDED EQUIPMENT | | | | | |
| Mobile Drum Carrier, over-pack drum container, safety cones, and caution tape | | | | | |
| 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 (i.e. forklift) 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 1¹ JOB STEPS | | Analyze 2²POTENTIAL HAZARDS | | Act 3³CRITICAL ACTIONS | |
| 1. Preparing for and Inspection of Drum | | 1a. FALL: Tripping/falling due to uneven surface. Loose debris/garbage in work area. 1b. CONTACT/EXPOSURE: Drums could potentially be damaged or contain hazardous material. Mobile drum carrier could potentially be in poor working condition causing malfunctioning during operation. 1c. EXERTION/CAUGHT: Potential pinching/exertion hazards while securing ring/tightening bolts | | 1a. Clear area of loose garbage and debris. Inspect 55-gal drums for proper condition, labeling, check drum ring and bolts for tightness, inspect mobile drum carrier. 1a. Do a Test Lift to get a general sense of the weight of the drum. 1a. Inspect and use established pathways to avoid uneven terrain, weather-related hazards (i.e., debris, puddles, ice, etc.), and other obstructions. 1a. Secure work area and coordinate and communicate the planned work activities with other personnel working in the area. 1a. Delineate work area with 42" safety cones. 1b. Prior to inspecting drums don cut-resistant gloves. If drum is not properly labeled, do not open and cease all drum transport activities. Immediately contact project manager and inform him/her of drum situation. 1b. Do not continue drum transport activities until further actions are determined by the project manager. 1b. If the drum is properly labeled, but leaking, improperly sealed or in poor condition, place drum in an over-pack drum. 1b. Inspect mobile drum carrier to ensure its overall integrity. Look for rust marks or potential weak points where the drum carrier could malfunction. Inspect the wheels to ensure that they easily turn and nothing is impeding their movement. 1c. Keep back straight and knees slightly bent while securing drum ring/tightening bolt. Wear cut-resistant gloves. | |
| 2. Position drum clamp tightly in between drum ribs, securing drum clamp to drum with chain | | 2a. CAUGHT: Pinching fingers between drum clamp and handle/chain. | | 2a. Attach drum clamp with chain and tighten until snug. Do not place hands between drum clamp and drum as the chain is tightened; wear cut resistant gloves. Keep face away from drum when handling in case of escaping vapors. | |

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 ¹ JOB STEPS | Analyze ² POTENTIAL HAZARDS | Act ³ CRITICAL ACTIONS |
|--|---|--|
| 3. Disengage safety latches on handle, pull handle down until drum is lifted off ground and safety latches are reengaged; slightly suspending drum off the ground | 3a. EXERTION/ CONTACT: Potential muscle strain associated with lifting/engaging drum/handle. Drum could shift/slip downward and crush toes. 3b. CAUGHT: Fingers could be pinched while engaging/disengaging safety latches on handle | 3a. Ascertain whether the drum is overweight; if it is, then two people are needed to lower handle while drum is secured with clamp so that safety latches can be engaged. Keep body out of the line-of-fire of the handle (do not position head above handle) as it is being pushed down. Do not allow feet/toes to be positioned under the drum as it is being lifted; wear steel/composite-toed boots. 3b. Wear cut-resistant gloves while disengaging/reengaging safety latches. 3b. Avoid placing hands in pinch points. |
| 4. Transport drums to designated location and disengage drum clamp (repeat Step 3 in reverse order) | 4a. FALL: Tripping/ falling due to obstructions and uneven terrain. Potential for drum to fall during transport. | 4a. Ensure transport path is free of potential obstructions that may cause the drum/carrier to become unstable. Position drum clamp between the ribs on the drum to prevent possible slipping. |

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."

| | | | | |
|--|--|--|---|---|
| JOB SAFETY ANALYSIS Ctrl. No. GEN-013 | | DATE 4/10/2023 | <input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED | PAGE 1 of 2 |
| JSA TYPE CATEGORY Generic | | WORK TYPE: Gauging and Sampling | | WORK ACTIVITY (Description): Gauging and Sampling |
| DEVELOPMENT TEAM | | POSITION / TITLE | | REVIEWED BY: |
| Tim Unalp | | SHSO | | Brian Hobbs |
| | | | | CHSD |
| REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT | | | | |
| <input checked="" type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES | | <input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Composite-toed or steel-toed boots</u> | | <input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u> |
| <input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Knee pads, Insect Repellant, sunscreen (as needed)</u> | | | | |
| 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 1JOB STEPS | | Analyze 2POTENTIAL HAZARDS | | Act 3CRITICAL ACTIONS |
| 1. Mobilization to monitoring well(s). | | 1a. FALL: Personal injury from slip/trip/fall due to uneven terrain and/or obstructions. 1b. CONTACT: With traffic/third parties. 1c. EXERTION: Muscle strain from lifting equipment 1d. EXPOSURE: To biological hazards. | | 1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization. 1a. Use established pathways, walk and/or drive on stable, secure ground and avoid steep hills or uneven terrain. 1a. If working near open water with an unguarded edge, wear life vest. 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. 1b. Wear appropriate PPE including high visibility clothing or reflective vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. 1c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight. 4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier. 4c. Make multiple trips to carry equipment. 1d. Inspect work area for bees and insects. 1d. Use insect/tick repellent as necessary. |
| 2. Open/close well. | | 2a. EXERTION: Muscle strain. 2b. CAUGHT: Pinch/crush points associated with removing/replacing manholes and working with hand tools. 2c. CAUGHT: Pinch points associated with placing J-plug back onto PVC pipe. 2d. EXPOSURE: To potential hazardous vapors. | | 2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well. 2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and pry bar or magnet for well cover) and inspect before use. 2b. Do not put fingers under well cover. 2c. See 2b. 2c. Keep fingers out of line-of-fire when securing cap. 2d. No open flames/heat sources. 2d. To minimize exposure to vapors, allow well to vent after opening it and before sampling activities begin. 2d. Stand up-wind if possible, to avoid inhaling vapors. |
| 3. Gauge well. | | 3a. CONTACT: With contamination (e.g. contaminated groundwater). 3b. CONTACT: With traffic. 3c. Exposure: To static electricity, fire or explosion. | | 3a. Wear chemical-resistant disposable gloves (over cut-resistant gloves) and safety glasses when gauging well. 3a. Insert and remove probe slowly to avoid splashing. 3a. Use an absorbent pad to clean probe. 3b. See 1b. 3c. Ground interface probe to a designated grounding point/rod, well casing or suitably electrically conductive surface to dissipate static electricity. |

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 ¹ JOB STEPS | Analyze ² POTENTIAL HAZARDS | Act ³ CRITICAL ACTIONS |
|----------------------------------|--|---|
| 4. Purge and sample well | <p>4a. EXPOSURE/CONTACT: To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives.</p> <p>4b. CONTACT: Personal injury from cuts, abrasions, or punctures by glassware or sharp objects.</p> <p>4c. EXERTION: Muscle strain while carrying equipment.</p> <p>4d. CONTACT: With traffic.</p> <p>4e. CONTACT: Pinch points with groundwater pump components (i.e., wheel, line, clamps).</p> <p>4f. EXERTION: Muscle strain from repetitive motion of bailing and sampling a well.</p> | <p>4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives.</p> <p>4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling.</p> <p>4a. Fill sample containers over purge container to avoid spilling water onto the ground.</p> <p>4a. Use an absorbent pad to clean spills.</p> <p>4a. When using a bailer to purge a well, pull the bailer slowly from the well to avoid splash hazards.</p> <p>4a. When sampling or purging the water using a bailer, pour out water slowly to reduce the potential for splash hazards with groundwater.</p> <p>4a. When using a tubing valve always remove the valve slowly after sample collection to release any pressure and avoid pressurized splash hazards.</p> <p>4a. When collecting a groundwater sample always point sampling apparatus (tubing, bailer, etc.) away from face and body.</p> <p>4b. To avoid spills or breakage, place sample ware on even surface.</p> <p>4b. Do not over tighten caps on glass sample ware.</p> <p>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.</p> <p>4c. Use proper lifting techniques when handling/moving equipment, bend knees and keep back straight.</p> <p>4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier.</p> <p>4c. Make multiple trips to carry equipment.</p> <p>4d. See 1b.</p> <p>4e. Wear leather/cut-resistant gloves when working with groundwater pumps.</p> <p>4e. Never place hands on or near pinch points such as the wheel, clamps or other moving parts during pump operations.</p> <p>4e. Use the correct mechanisms, such as a pump reel, to lower pump into well.</p> <p>4e. Never attempt to manually stop any moving part of equipment including hose reels and/or tubing.</p> <p>4f. See 4c.</p> <p>4f. Include a stretch break when repetitive motions are part of the task.</p> |
| 5. Management of purge water. | <p>5a. EXPOSURE/CONTACT: To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>5b. EXERTION: Muscle strain from lifting/carrying and moving containers.</p> | <p>5a. Do not overfill container and pour liquids slowly so that they do not splash.</p> <p>5a. Properly dispose of used materials/PPE in appropriate container in designated storage area.</p> <p>5b. Use proper lifting techniques when lifting / carrying or moving container(s) (see 4c.).</p> <p>5b. Do not overfill container(s).</p> |
| 6. Decontaminate equipment. | <p>6a. EXPOSURE/CONTACT: To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>6b. CAUGHT: Pinch points associated with handling hand tools</p> | <p>6a. Work on the upwind side, where possible, of decon area.</p> <p>6a. Wear chemical-resistant disposable gloves and safety glasses.</p> <p>6a. Use an absorbent pad to clean spills.</p> <p>6b. See 2b.</p> <p>6b. Inspect hand tools for sharp edges before decontaminating.</p> |

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".

| | | | | | |
|---|--|---|-----------------|---|-------------|
| JOB SAFETY ANALYSIS | | Ctrl. No. GEN-016 | DATE: 4/10/2023 | <input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED | PAGE 1 of 2 |
| JSA TYPE CATEGORY GENERIC | | WORK TYPE Construction – Concrete & Asphalt | | WORK ACTIVITY (Description) Concrete Sidewalk Flag / Well Pad Replacement | |
| DEVELOPMENT TEAM | | POSITION / TITLE | | REVIEWED BY: | |
| Ron Lombino | | Senior Hydrogeologist | | Brian Hobbs | |
| | | | | CHSD | |
| REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT | | | | | |
| <input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES | | <input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD: <u>(When Jackhammering)</u> <input checked="" type="checkbox"/> HEARING PROTECTION: <u>(While Jackhammering or when Compressor is Running)</u> <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or Composite toe</u> | | <input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>High visibility long sleeved shirt/ Safety vest</u> <input checked="" type="checkbox"/> GLOVES: <u>Cut Resistant and/or Leather</u> <input checked="" type="checkbox"/> 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 | | | | | |
| 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 1JOB STEPS | | Analyze 2POTENTIAL HAZARDS | | Act 3CRITICAL ACTIONS | |
| 1. Verify pre-clearance protocol and mobilize/demobilize. | | 1a. CONTACT: Property damage, personal injury, or underground utilities. 1b. CONTACT: With traffic (including any unintended movement of the work truck), contact / interference with other site activities. | | 1a. Confirm that local utility companies were contacted prior to sidewalk flag / concrete pad replacement. Obtain One Call Tickets 1a. Walk the Site to evaluate utility markings and review maps and complete subsurface clearance form. 1b. Identify potential traffic hazards. 1b. Use a spotter while moving work vehicles; plan ahead to avoid backing up when unnecessary. Use additional spotters if necessary. 1b. Ensure that truck has wheel chocks in place when parked and compressor is chocked if detached from truck. 1b. Delineate work area with cones, flags, caution tape, and/or other barriers. Construct pedestrian walkway, if needed. Use truck to barricade if possible. 1b. Maintain a minimum exclusion zone based on equipment. 1b. Position "Men at Work" signs at site entrances or on either side of exclusion zone. 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. 2b. EXPOSURE: Inhalation/exposure to hazardous vapors and/or concrete dust, noise. 2c. EXERTION: Poor body positioning and/or from handling equipment and materials. | | 2a. Wear PPE (especially hand, eye, ear and face shield). 2a. Use anti-whip devices on compressor hoses. 2a. Maintain a minimum exclusion zone based on equipment. 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. 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. 2b. Wet concrete while using saw to minimize dust. If possible, use Vactron as dust suppression in freezing weather conditions. 2b. Stand upwind and keep body behind saw. 2b. No open flames/heat sources. 2b. Wear hearing protection when saw, jackhammer or air compressor is in operation. 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. | |

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 ¹ JOB STEPS | Analyze ² POTENTIAL HAZARDS | Act ³ CRITICAL ACTIONS |
|--|---|--|
| 2. Concrete saw cutting and jackhammering (Continued). | <p>2d. FALL: Tripping/falling due to uneven terrain, weather conditions, and materials /equipment stored at the Site, broken up concrete.</p> <p>2e. CAUGHT: Pinch points associated with the equipment and vacuum hose.</p> | <p>2d. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.</p> <p>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.</p> <p>2d. Ensure power cords and water lines are grouped when used within the work area.</p> <p>2d. Concrete flag and flush-mounted curb box will be finished flush to grade so as not to present a slip/trip hazard.</p> <p>2d. Place concrete chunks into an appropriate disposal container (drum, roll-off, dump truck, etc.).</p> <p>2e. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools.</p> <p>2e. Inspect the equipment prior to use for potential pinch points.</p> <p>2e. Test all emergency shutdown devices prior to performing task.</p> <p>2e. Inspect saw blade for worn surface or missing teeth; switch blade if damaged or blunt.</p> <p>2e. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.</p> <p>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.</p> <p>2e. Use the "Show Me Your Hands" Policy.</p> |
| 3. Mixing/Pouring concrete and installing manhole. | <p>3a. CONTACT: Burn from handling/pouring concrete.</p> <p>3b. EXERTION: Poor body positioning and use or from handling equipment and materials.</p> <p>3c. FALL: Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the site.</p> <p>3d. EXPOSURE: Concrete silicates pose dermal and inhalation hazard.</p> | <p>3a. Wear required PPE (including Nitrile gloves, long sleeved shirts, safety glasses) when handling dry/wet concrete and forming concrete flags.</p> <p>3a. Inspect all transfer equipment (Concrete Truck, wheel barrel, etc.) prior to pouring concrete.</p> <p>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.</p> <p>3b. See 2c.</p> <p>3c. See 2d.</p> <p>3d. Wear nitrile {inner} gloves and long sleeve shirt to mitigate dermal contact.</p> <p>3d. Dust mask must be worn for personnel mixing concrete.</p> |
| 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 | <p>5a. EXPOSURE: Wet concrete and dust.</p> <p>5b. EXPOSURE: Chemicals in cleaning solution including ammonia.</p> | <p>5a. Wear chemical-resistant disposable gloves and safety glasses.</p> <p>5a. Use an absorbent pad to clean spills.</p> <p>5b. See 3a.</p> |

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".

| | | | | | |
|---|--|--|-----------------|---|-------------|
| JOB SAFETY ANALYSIS | | Ctrl. No. GEN-019 | DATE: 4/10/2023 | <input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED | PAGE 1 of 2 |
| JSA TYPE CATEGORY GENERIC | | WORK TYPE Site Reconnaissance | | WORK ACTIVITY (Description) Site Walk and Inspection | |
| DEVELOPMENT TEAM | | POSITION / TITLE | | REVIEWED BY: | |
| Sara Barrientos | | Project Geologist | | Brian Hobbs | |
| Tim Unalp | | SHSO | | Joe Duminuco | |
| REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT | | | | | |
| <input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES | | <input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION: ear plugs as necessary <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or</u> <u>composite toed</u> | | <input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>High-</u> <u>visibility vest or high-vis</u> <u>outerwear</u> <input checked="" type="checkbox"/> GLOVES: <u>Leather/cut-</u> <u>resistant/chemical resistant</u> <input checked="" type="checkbox"/> 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 ¹JOB STEPS | | Analyze ²POTENTIAL HAZARDS | | Act ³CRITICAL 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. 1a. Inform Site contact of work scope, timeline and location(s). 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. 2b. FALL: Uneven terrain and weather conditions. Overgrown shrubs and vines. Equipment in the work zone. 2c. OVEREXERTION: Muscle strain while carrying 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.) | | 2a. All equipment must be stowed and secured prior to moving. 2a. Maintain speed limit as posted on-site. 2a. When possible, drive on established roadways. 2a. Yield to all pedestrians. 2a. Use pull-through spots or back into parking spots. 2a. Don high visibility clothing/safety vest. If working at remote Site, add orange accessories during hunting season. 2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 2b. When possible, use established pathways and walk on stable, secure ground. 2b. Communicate traversing hazards with others. 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. Inspect area to avoid contact with biological hazards. 2d. Ticks: <ul style="list-style-type: none"> • Treat outer clothing including pants, shirts, socks, boots and hats the evening before with Permethrin (allowing at least two hours before use). • Apply DEET to exposed skin before travelling to the Site and reapply after two hours. • Check for ticks during and after work. 2d. Bees: <ul style="list-style-type: none"> • Use bee spray as appropriate to deter/eliminate bees. | |

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".

| | | |
|---|---|---|
| | <p>2e. EXPOSURE: Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.</p> | <ul style="list-style-type: none"> • Protect exposed skin with insect repellent. <p>2d. Poison Ivy:</p> <ul style="list-style-type: none"> • Identify areas of poison ivy and spray with weed killer. Don Tyvek and rubber boots while traversing poison ivy areas. • If skin contacts poison ivy, wash skin thoroughly with soap and water. <p>2e. Wear sunscreen with SPF 15 or greater on exposed skin whenever 30 minutes or more of sun exposure is expected.</p> <p>2e. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.</p> <p>2e. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.</p> <p>2e. Wear appropriate rain gear as needed.</p> <p>2e. Take frequent breaks if tired, wet, or cold/hot. Drink water.</p> <p>2e. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.</p> |
| <p>3. Walking near heavy equipment and machinery.</p> | <p>3a. CONTACT: Personal injury from Site and roadway traffic. Personal injury from flying debris</p> <p>3b. OVEREXERTION: Personal injury from lifting/moving/rotating equipment.</p> <p>3c. EXPOSURE: Hearing damage from noise generating equipment/processes. Inhalation/exposure to hazardous vapors and or dust.</p> <p>3d. EXPOSURE: Working in a remote area.</p> | <p>3a. See 2a.</p> <p>3a. Maintain an exclusion zone of at least 10'-25' feet from all engaged equipment.</p> <p>3a. Keep body parts out of the line-of-fire of pinch points.</p> <p>3a. Wear appropriate PPE always.</p> <p>3b. See 2c.</p> <p>3c. Wear hearing protection if >85 dBA. (i.e. noise levels which require you to raise your voice to communicate)</p> <p>3c. Always wear leather gloves when handling any tools or equipment.</p> <p>3c. Always wear appropriate PPE based off chemicals present.</p> <p>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.</p> <p>3d. Always carry a communication device (i.e., cell phone, walkie-talkie) or directional (i.e., map, compass, etc.) when traversing remote areas.</p> <p>3d. If available, follow Lone Worker Protocol/Procedure.</p> |
| <p>4. Working in adverse weather conditions.</p> | <p>4a. EXPOSURE: Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.</p> | <p>4a. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.</p> <p>4a. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.</p> <p>4a. Wear appropriate rain gear as needed.</p> <p>4a. Take frequent breaks if tired, wet, or cold/hot. Drink water.</p> <p>4a. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.</p> |
| <p>5. Departing Site.</p> | <p>5a. EXPOSURE: Exposure to unnecessary hazards should personnel believe Roux is on-Site during an emergency and conduct a search.</p> | <p>5a. Sign out or notify Site contact and Roux Project Manager of your departure.</p> |

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".

APPENDIX B

SDSs for Chemicals Used



SAFETY DATA SHEET

US OSHA Hazard Communication Standard (29 CFR 1910.1200) and Canada WHMIS 2015 which includes the amended Hazardous Products Act (HPA) and the Hazardous Products Regulation (HPR)

Issuing Date 15-Aug-2023

Revision Date 15-Aug-2023

Revision Number 1

1. Identification

Product identifier

Product Name Alconox

Other means of identification

Product Code(s) 1101, 1103, 1104, 1104-1, 1112, 1112-1, 1125, 1150

Synonyms None

Recommended use of the chemical and restrictions on use

Recommended use Cleaning agent; Detergent

Restrictions on use Do not mix with other detergents unless otherwise specified

Details of the supplier of the safety data sheet

Supplier Address

Alconox Inc.
30 Glenn St., Suite 309
White Plains, NY 10603 USA
914-948-4040

E-mail cleaning@alconox.com

Emergency telephone number

Emergency telephone ChemTel Inc.: North America: 1-888-255-3924
International: +1-813-248-0573

2. Hazard(s) identification

Classification

| | |
|-----------------------------------|-------------|
| Acute toxicity - Oral | Category 4 |
| Skin corrosion/irritation | Category 2 |
| Serious eye damage/eye irritation | Category 2A |

Label elements

Warning

Hazard statements

Harmful if swallowed.
Causes skin irritation.
Causes serious eye irritation.

**Precautionary Statements - Prevention**

Wash face, hands and any exposed skin thoroughly after handling.

Do not eat, drink or smoke when using this product.

Wear protective gloves, eye protection and face protection.

Precautionary Statements - Response

Specific treatment (see information on this label).

Eyes

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 and attention.

Skin

IF ON SKIN: Wash with plenty of water and soap.

If skin irritation occurs: Get medical advice and attention.

Take off contaminated clothing and wash it before reuse.

Ingestion

IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell.

Rinse mouth.

Precautionary Statements - Disposal

Dispose of contents and container to an approved waste disposal plant.

Unknown acute toxicity**Other information**

May be harmful in contact with skin. Harmful to aquatic life with long lasting effects.

3. Composition/information on ingredients

Substance

Not applicable.

Mixture

| Chemical name | CAS No. | Weight-% | Hazardous Material Information Review Act registry number (HMIRA registry #) | Date HMIRA filed and date exemption granted (if applicable) |
|--|------------|----------|---|---|
| Benzenesulfonic acid, mono-C10-16-alkyl derivs., sodium salts | 68081-81-2 | 10-30 | - | - |
| Sodium carbonate | 497-19-8 | 7-13 | - | - |
| Sodium Dodecyl Sulphate | 151-21-3 | 0.5-1.5 | - | - |
| Tetrasodium EDTA | 64-02-8 | 0.1-1 | - | - |

*The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First-aid measures

Description of first aid measures**General advice**

Show this safety data sheet to the doctor in attendance.

Inhalation

Remove to fresh air. Get medical attention immediately if symptoms occur.

Eye contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

(M)SDS Number UL-NOX-003

| | |
|---|--|
| | 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 if irritation develops and persists. |
| Skin contact | Wash off immediately with soap and plenty of water for at least 15 minutes. Get medical attention if irritation develops and persists. |
| Ingestion | Do NOT induce vomiting. Rinse mouth. Never give anything by mouth to an unconscious person. Call a physician. |
| Self-protection of the first aider | Avoid contact with skin, eyes or clothing. Wear personal protective clothing (see section 8). |

Most important symptoms and effects, both acute and delayed

| | |
|----------------------------|---|
| Symptoms | May cause redness and tearing of the eyes. Burning sensation. |
| Effects of Exposure | No information available. |

Indication of any immediate medical attention and special treatment needed

| | |
|---------------------------|------------------------|
| Note to physicians | 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 | No information available. |
| Hazardous combustion products | Sodium oxides, Carbon oxides, Sulfur oxides, Phosphorus oxides, Nitrogen oxides (NOx). |
| Explosion data | |
| Sensitivity to mechanical impact | None. |
| Sensitivity to static discharge | None. |
| Special protective equipment and precautions for fire-fighters | Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment. |

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

| | |
|-----------------------------|--|
| Personal precautions | Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. |
| Other information | Refer to protective measures listed in Sections 7 and 8. |

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 | Pick up and transfer to properly labeled containers. |
| Prevention of secondary hazards | Clean contaminated objects and areas thoroughly observing environmental regulations. |

7. Handling and storage

Precautions for safe handling

| | |
|--------------------------------|--|
| Advice on safe handling | Avoid breathing dust. Handle in accordance with good industrial hygiene and safety |
|--------------------------------|--|

(M)SDS Number UL-NOX-003

practice. Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a dry, cool and well-ventilated place. Keep out of the reach of children.

8. Exposure controls/personal protection

Control parameters

Exposure Limits This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Appropriate engineering controls

Engineering controls 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.

Hand protection Wear nitrile or rubber gloves. Wear suitable gloves. Impervious gloves.

Skin and body protection Wear suitable protective clothing. Long sleeved clothing.

Respiratory protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

General hygiene considerations Avoid breathing dust. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Avoid contact with skin, eyes or clothing.

9. Physical and chemical properties

Information on basic physical and chemical properties

| | |
|-----------------------|--------------------------|
| Appearance | Off-white powder |
| Physical state | Solid |
| Color | Off-white |
| Odor | No information available |
| Odor threshold | No information available |

| <u>Property</u> | <u>Values</u> | <u>Remarks • Method</u> |
|--|----------------------|--------------------------------|
| pH | 9.5 (1% Solution) | No data available |
| Melting point / freezing point | | No data available |
| Initial boiling point and boiling range | | No data available |
| Flash point | | No data available |
| Evaporation rate | | No data available |
| Flammability | | No data available |
| Flammability Limit in Air | | |
| Upper flammability or explosive limits | | No data available |
| Lower flammability or explosive limits | | No data available |
| Vapor pressure | | No data available |
| Relative vapor density | | No data available |
| Relative density | | No data available |
| Water solubility | | No data available |

(M)SDS Number UL-NOX-003

| | |
|---------------------------|-------------------|
| Solubility(ies) | No data available |
| Partition coefficient | No data available |
| Autoignition temperature | No data available |
| Decomposition temperature | No data available |
| Kinematic viscosity | No data available |
| Dynamic viscosity | No data available |

Other information

| | |
|----------------------|---------------------------|
| Explosive properties | No information available. |
| Oxidizing properties | No information available. |
| Softening point | No information available |
| Molecular weight | No information available |
| VOC content | 0 % |
| Liquid Density | No information available |
| Bulk density | No information available |

10. Stability and reactivity

| | |
|------------------------------------|--|
| Reactivity | None under normal use conditions. |
| Chemical stability | Stable under normal conditions. |
| Possibility of hazardous reactions | None under normal processing. |
| Conditions to avoid | None known based on information supplied. |
| Incompatible materials | Strong acids, Strong bases, Strong oxidizing agents. |
| Hazardous decomposition products | None known based on information supplied. |

11. Toxicological information

Information on likely routes of exposure

Product Information

| | |
|--------------|--|
| Inhalation | Specific test data for the substance or mixture is not available. May cause irritation of respiratory tract. |
| Eye contact | Specific test data for the substance or mixture is not available. Causes serious eye irritation. (based on components). May cause redness, itching, and pain. |
| Skin contact | Specific test data for the substance or mixture is not available. Causes skin irritation. (based on components). |
| Ingestion | Specific test data for the substance or mixture is not available. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Harmful if swallowed. (based on components). |

Symptoms related to the physical, chemical and toxicological characteristics

| | |
|----------|---|
| Symptoms | Redness. May cause redness and tearing of the eyes. |
|----------|---|

| | |
|-----------------------|-----------------------|
| <u>Acute toxicity</u> | Harmful if swallowed. |
|-----------------------|-----------------------|

Numerical measures of toxicity

The following values are calculated based on chapter 3.1 of the GHS document:

| | |
|-------------------------------|----------------|
| ATEmix (oral) | 1,962.10 mg/kg |
| ATEmix (dermal) | 2,660.40 mg/kg |
| ATEmix (inhalation-dust/mist) | 6.95 mg/l |

Unknown acute toxicity

(M)SDS Number UL-NOX-003

Component Information

| Chemical name | Oral LD50 | Dermal LD50 | Inhalation LC50 |
|-------------------------|----------------------|-------------------------|--------------------------------------|
| Sodium carbonate | = 4090 mg/kg (Rat) | > 2000 mg/kg (Rabbit) | = 2300 mg/m ³ (Rat) 2 h |
| Sodium Dodecyl Sulphate | = 1288 mg/kg (Rat) | = 200 mg/kg (Rabbit) | > 3900 mg/m ³ (Rat) 1 h |
| Tetrasodium EDTA | = 1658 mg/kg (Rat) | - | - |

Delayed and immediate effects as well as chronic effects from short and long-term exposure

| | |
|--|--|
| Skin corrosion/irritation | Classification based on data available for ingredients. Causes skin irritation. |
| Serious eye damage/eye irritation | Classification based on data available for ingredients. Causes serious eye irritation. |
| Respiratory or skin sensitization | No information available. |
| Germ cell mutagenicity | No information available. |
| Carcinogenicity | No information available. |
| Reproductive toxicity | No information available. |
| STOT - single exposure | No information available. |
| STOT - repeated exposure | No information available. |
| Aspiration hazard | No information available. |

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

| Chemical name | Algae/aquatic plants | Fish | Toxicity to microorganisms | Crustacea |
|-------------------------------------|--|--|----------------------------|---|
| Sodium carbonate 497-19-8 | - | LC50: =300mg/L (96h, <i>Lepomis macrochirus</i>) LC50: 310 - 1220mg/L (96h, <i>Pimephales promelas</i>) | - | EC50: =265mg/L (48h, <i>Daphnia magna</i>) |
| Sodium Dodecyl Sulphate 151-21-3 | EC50: =53mg/L (72h, <i>Desmodesmus subspicatus</i>) EC50: 30 - 100mg/L (96h, <i>Desmodesmus subspicatus</i>) EC50: =117mg/L (96h, <i>Pseudokirchneriella subcapitata</i>) EC50: 3.59 - 15.6mg/L (96h, <i>Pseudokirchneriella subcapitata</i>) | LC50: 15 - 18.9mg/L (96h, <i>Pimephales promelas</i>) LC50: 8 - 12.5mg/L (96h, <i>Pimephales promelas</i>) LC50: 22.1 - 22.8mg/L (96h, <i>Pimephales promelas</i>) LC50: 4.3 - 8.5mg/L (96h, <i>Oncorhynchus mykiss</i>) LC50: =4.62mg/L (96h, <i>Oncorhynchus mykiss</i>) LC50: =4.2mg/L (96h, <i>Oncorhynchus mykiss</i>) LC50: =7.97mg/L (96h, <i>Brachydanio rerio</i>) LC50: 9.9 - 20.1mg/L (96h, <i>Brachydanio rerio</i>) LC50: 4.06 - 5.75mg/L | - | EC50: =1.8mg/L (48h, <i>Daphnia magna</i>) |

| | | | | |
|-----------------------------|---|---|---|---|
| | | (96h, Lepomis macrochirus) LC50: 4.2 - 4.8mg/L (96h, Lepomis macrochirus) LC50: =4.5mg/L (96h, Lepomis macrochirus) LC50: 5.8 - 7.5mg/L (96h, Pimephales promelas) LC50: 10.2 - 22.5mg/L (96h, Pimephales promelas) LC50: 6.2 - 9.6mg/L (96h, Pimephales promelas) LC50: 13.5 - 18.3mg/L (96h, Poecilia reticulata) LC50: 10.8 - 16.6mg/L (96h, Poecilia reticulata) LC50: =1.31mg/L (96h, Cyprinus carpio) | | |
| Tetrasodium EDTA 64-02-8 | - | LC50: =41mg/L (96h, Lepomis macrochirus) LC50: =59.8mg/L (96h, Pimephales promelas) | - | - |

Persistence and degradability No information available.

Bioaccumulation

Component Information

| Chemical name | Partition coefficient |
|-------------------------------------|-----------------------|
| Sodium Dodecyl Sulphate 151-21-3 | 1.6 |

Other adverse effects No information available.

13. Disposal considerations

Disposal methods

| | |
|--|---|
| Waste from residues/unused products | Dispose of in accordance with local regulations, Dispose of waste in accordance with environmental legislation. |
| Contaminated packaging | Do not reuse empty containers. |
| California waste information | This product contains one or more substances that are listed with the State of California as a hazardous waste. |

14. Transport information

| | |
|-------------|---------------|
| DOT | Not regulated |
| TDG | Not regulated |
| IATA | Not regulated |
| IMDG | Not regulated |

15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

International Regulations

The Montreal Protocol on Substances that Deplete the Ozone Layer Not applicable

The Stockholm Convention on Persistent Organic Pollutants Not applicable

The Rotterdam Convention Not applicable

International Inventories

Contact supplier for inventory compliance status

US 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

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (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.

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 |
|--|------------|---------------|--------------|
| Pentasodium Triphosphate 7758-29-4 | - | X | X |
| Tetrasodium pyrophosphate 7722-88-5 | X | X | X |

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. Other information

| | | | | |
|-------------|-------------------------|-----------------------|---------------------------|------------------------------|
| NFPA | Health hazards 2 | Flammability 0 | Instability 0 | Special hazards - |
| HMIS | Health hazards 2 | Flammability 0 | Physical hazards 0 | Personal protection X |

(M)SDS Number UL-NOX-003

Key or legend to abbreviations and acronyms used in the safety data sheet

Legend

SVHC: Substances of Very High Concern for Authorization:
PBT: Persistent, Bioaccumulative, and Toxic (PBT) Substances
vPvB: Very Persistent and very Bioaccumulative (vPvB) Substances
STOT: Specific Target Organ Toxicity
ATE: Acute Toxicity Estimate
LC50: 50% Lethal Concentration
LD50: 50% Lethal Dose

Legend Section 8: Exposure controls/personal protection

| | | | |
|---------|-----------------------------|------|----------------------------------|
| TWA | TWA (time-weighted average) | STEL | STEL (Short Term Exposure Limit) |
| Ceiling | Maximum limit value | Sk* | Skin designation |
| + | Sensitizers | | |

Key literature references and sources for data used to compile the SDS

U.S. Environmental Protection Agency ChemView Database
European Food Safety Authority (EFSA)
Environmental Protection Agency
Acute Exposure Guideline Level(s) (AEGl(s))
U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act
U.S. Environmental Protection Agency High Production Volume Chemicals
Food Research Journal
Hazardous Substance Database
International Uniform Chemical Information Database (IUCLID)
Japan GHS Classification
Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH (National Institute for Occupational Safety and Health)
National Library of Medicine's ChemID Plus (NLM CIP)
U.S. National Toxicology Program (NTP)
New Zealand's Chemical Classification and Information Database (CCID)
Organization for Economic Co-operation and Development Environment, Health, and Safety Publications
Organization for Economic Co-operation and Development High Production Volume Chemicals Program
Organization for Economic Co-operation and Development Screening Information Data Set
World Health Organization

Issuing Date 15-Aug-2023

Revision Date 15-Aug-2023

Revision Note Initial Release.

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

SAFETY DATA SHEET

Creation Date 24-Aug-2009

Revision Date 13-Oct-2023

Revision Number 8

1. Identification

Product Name Hydrochloric acid

Cat No. : A481-212; A481-212LC; S71942SC; S71943; S71943ND; S80036; S80038; SA49

CAS No 7647-01-0
Synonyms Muriatic acid; Hydrogen chloride; HCl (Technical/Certified ACS Plus/Optima/NF/FCC)

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet**Company**

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number

CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification**Classification**

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

| | |
|--|--------------|
| Corrosive to metals | Category 1 |
| Skin Corrosion/Irritation | Category 1 B |
| Serious Eye Damage/Eye Irritation | Category 1 |
| Specific target organ toxicity (single exposure) | Category 3 |
| Target Organs - Respiratory system. | |

Label Elements**Signal Word**

Danger

Hazard Statements

May be corrosive to metals

Causes severe skin burns and eye damage
May cause respiratory irritation

**Precautionary Statements****Prevention**

Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Keep only in original container

Response

Immediately call a POISON CENTER or doctor/physician

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Ingestion

IF SWALLOWED: Rinse mouth. DO NOT induce vomiting

Spills

Absorb spillage to prevent material damage

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed
Store in corrosive resistant polypropylene container with a resistant inliner
Store in a dry place

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

3. Composition/Information on Ingredients

| Component | CAS No | Weight % |
|-------------------|-----------|----------|
| Water | 7732-18-5 | 62-65 |
| Hydrochloric acid | 7647-01-0 | 35-38 |

4. First-aid measures

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Immediate medical attention is required.

Skin Contact

Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation

Remove to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a

pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion

Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects

Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Notes to Physician

Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Unsuitable Extinguishing Media

No information available

Flash Point

No information available

Method -

No information available

Autoignition Temperature

No information available

Explosion Limits**Upper**

No data available

Lower

No data available

Sensitivity to Mechanical Impact

No information available

Sensitivity to Static Discharge

No information available

Specific Hazards Arising from the Chemical

Corrosive material. Causes burns by all exposure routes. Thermal decomposition can lead to release of irritating gases and vapors.

Hazardous Combustion Products

Hydrogen chloride gas.

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.

NFPA

Health
3

Flammability
0

Instability
0

Physical hazards
N/A

6. Accidental release measures

Personal Precautions

Use personal protective equipment as required. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Do not get in eyes, on skin, or on clothing.

Environmental Precautions

Should not be released into the environment. See Section 12 for additional Ecological Information.

Methods for Containment and Clean Up

Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling

Wear personal protective equipment/face protection. Do not breathe mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not ingest. If swallowed then seek immediate medical assistance.

Storage.

Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area. Incompatible Materials. Metals. Strong oxidizing agents. Bases. sodium hypochlorite. Amines. Fluorine. Cyanides. Alkaline.

8. Exposure controls / personal protection

Exposure Guidelines

| Component | ACGIH TLV | OSHA PEL | NIOSH | Mexico OEL (TWA) |
|-------------------|----------------|--|--|------------------|
| Hydrochloric acid | Ceiling: 2 ppm | Ceiling: 5 ppm Ceiling: 7 mg/m ³ (Vacated) Ceiling: 5 ppm (Vacated) Ceiling: 7 mg/m ³ | IDLH: 50 ppm Ceiling: 5 ppm Ceiling: 7 mg/m ³ | Ceiling: 2 ppm |

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures

Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection

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 and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

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.

Recommended Filter type:

Particulates filter conforming to EN 143. or. Acid gases filter: Type E, Yellow.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

| | |
|--|---------------------------|
| Physical State | Liquid |
| Appearance | Colorless |
| Odor | pungent |
| Odor Threshold | No information available |
| pH | < 1 |
| Melting Point/Range | -35 °C / -31 °F |
| Boiling Point/Range | 57 °C / 135 °F @ 760 mmHg |
| Flash Point | No information available |
| Evaporation Rate | No information available |
| Flammability (solid,gas) | Not applicable |
| Flammability or explosive limits | |
| Upper | No data available |
| Lower | No data available |
| Vapor Pressure | 125 mbar @ 20 °C |
| Vapor Density | 1.27 |
| Specific Gravity | 1.18 |
| Solubility | Soluble in water |
| Partition coefficient; n-octanol/water | No data available |
| Autoignition Temperature | No information available |
| Decomposition Temperature | No information available |
| Viscosity | 1.8 mPa.s @ 15°C |
| Molecular Formula | HCl |

Molecular Weight 55.55

10. Stability and reactivity

| | |
|----------------------------------|---|
| Reactive Hazard | None known, based on information available |
| Stability | Stable under normal conditions. |
| Conditions to Avoid | Incompatible products. Excess heat. |
| Incompatible Materials | Metals, Strong oxidizing agents, Bases, sodium hypochlorite, Amines, Fluorine, Cyanides, Alkaline |
| Hazardous Decomposition Products | Hydrogen chloride gas |
| Hazardous Polymerization | Hazardous polymerization does not occur. |
| Hazardous Reactions | Contact with metals may evolve flammable hydrogen gas. |

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50

Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Dermal LD50

Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Vapor LC50

Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

| Component | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|-------------------|-------------------------|-------------------------|-----------------------|
| Water | - | - | - |
| Hydrochloric acid | 238 - 277 mg/kg (Rat) | > 5010 mg/kg (Rabbit) | 1.68 mg/L (Rat) 1 h |

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Causes burns by all exposure routes

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

| Component | CAS No | IARC | NTP | ACGIH | OSHA | Mexico |
|-------------------|-----------|------------|------------|------------|------------|------------|
| Water | 7732-18-5 | Not listed | Not listed | Not listed | Not listed | Not listed |
| Hydrochloric acid | 7647-01-0 | Not listed | Not listed | Not listed | Not listed | Not listed |

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)

Group 1 - Carcinogenic to Humans

Group 2A - Probably Carcinogenic to Humans

Group 2B - Possibly Carcinogenic to Humans

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects, both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. Large amounts will affect pH and harm aquatic organisms.

| Component | Freshwater Algae | Freshwater Fish | Microtox | Water Flea |
|-------------------|------------------|--|----------|-------------------------|
| Hydrochloric acid | - | 282 mg/L LC50 96 h Gambusia affinis mg/L LC50 48 h Leuciscus idus | - | 56mg/L EC50 72h Daphnia |

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

13. Disposal considerations

Waste Disposal Methods 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 to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN1789
 Proper Shipping Name HYDROCHLORIC ACID
 Hazard Class 8
 Packing Group II

TDG

UN-No UN1789
 Proper Shipping Name HYDROCHLORIC ACID
 Hazard Class 8
 Packing Group II

IATA

UN-No UN1789
 Proper Shipping Name Hydrochloric acid
 Hazard Class 8
 Packing Group II

IMDG/IMO

UN-No UN1789
 Proper Shipping Name Hydrochloric acid
 Hazard Class 8
 Packing Group II

15. Regulatory information

United States of America Inventory

| Component | CAS No | TSCA | TSCA Inventory notification - Active-Inactive | TSCA - EPA Regulatory Flags |
|-------------------|-----------|------|--|--------------------------------|
| Water | 7732-18-5 | X | ACTIVE | - |
| Hydrochloric acid | 7647-01-0 | X | ACTIVE | - |

Legend:

TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)

X - Listed

- - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT)

Not applicable

TSCA 12(b) - Notices of Export

Not applicable

International Inventories

Canada (DSL/NDL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

| Component | CAS No | DSL | NDL | EINECS | PICCS | ENCS | ISHL | AICS | IECSC | KECL |
|-------------------|-----------|-----|-----|-----------|-------|------|------|------|-------|----------|
| Water | 7732-18-5 | X | - | 231-791-2 | X | X | | X | X | KE-35400 |
| Hydrochloric acid | 7647-01-0 | X | - | 231-595-7 | X | X | X | X | X | KE-20189 |

KECL - NIER number or KE number (<http://ncis.nier.go.kr/en/main.do>)**U.S. Federal Regulations****SARA 313**

| Component | CAS No | Weight % | SARA 313 - Threshold Values % |
|-------------------|-----------|----------|-------------------------------|
| Hydrochloric acid | 7647-01-0 | 35-38 | 1.0 |

SARA 311/312 Hazard Categories See section 2 for more information**CWA (Clean Water Act)**

| Component | CWA - Hazardous Substances | CWA - Reportable Quantities | CWA - Toxic Pollutants | CWA - Priority Pollutants |
|-------------------|----------------------------|-----------------------------|------------------------|---------------------------|
| Hydrochloric acid | X | 5000 lb | - | - |

Clean Air Act

| Component | HAPS Data | Class 1 Ozone Depletors | Class 2 Ozone Depletors |
|-------------------|-----------|-------------------------|-------------------------|
| Hydrochloric acid | X | | - |

OSHA - Occupational Safety and Health Administration

Not applicable

| Component | Specifically Regulated Chemicals | Highly Hazardous Chemicals |
|-------------------|----------------------------------|----------------------------|
| Hydrochloric acid | - | TQ: 5000 lb |

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)

| Component | Hazardous Substances RQs | CERCLA EHS RQs |
|-------------------|--------------------------|----------------|
| Hydrochloric acid | 5000 lb | 5000 lb |

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

| Component | Massachusetts | New Jersey | Pennsylvania | Illinois | Rhode Island |
|-------------------|---------------|------------|--------------|----------|--------------|
| Water | - | - | X | - | - |
| Hydrochloric acid | X | X | X | X | X |

U.S. Department of Transportation

Reportable Quantity (RQ): Y
 DOT Marine Pollutant N
 DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

| Component | DHS Chemical Facility Anti-Terrorism Standard |
|-------------------|--|
| Hydrochloric acid | Release STQs - 15000lb (concentration $\geq 37\%$) Release STQs - 5000lb (anhydrous) Theft STQs - 500lb (anhydrous) |

Other International Regulations**Mexico - Grade**

No information available

Authorisation/Restrictions according to EU REACH

| Component | CAS No | REACH (1907/2006) - Annex XIV - Substances Subject to Authorization | REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances | REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC) |
|-------------------|-----------|---|---|---|
| Water | 7732-18-5 | - | - | - |
| Hydrochloric acid | 7647-01-0 | - | Use restricted. See item 75. (see link for restriction details) | - |

REACH links

<https://echa.europa.eu/substances-restricted-under-reach>

Safety, health and environmental regulations/legislation specific for the substance or mixture

| Component | CAS No | OECD HPV | Persistent Organic Pollutant | Ozone Depletion Potential | Restriction of Hazardous Substances (RoHS) |
|-------------------|-----------|----------|------------------------------|---------------------------|--|
| Water | 7732-18-5 | Listed | Not applicable | Not applicable | Not applicable |
| Hydrochloric acid | 7647-01-0 | Listed | Not applicable | Not applicable | Not applicable |

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?

Not applicable

Other International Regulations

| Component | CAS No | Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification | Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements | Rotterdam Convention (PIC) | Basel Convention (Hazardous Waste) |
|-------------------|-----------|---|--|----------------------------|------------------------------------|
| Water | 7732-18-5 | Not applicable | Not applicable | Not applicable | Not applicable |
| Hydrochloric acid | 7647-01-0 | 25 tonne | 250 tonne | Not applicable | Annex I - Y34 |

16. Other information

Prepared By

Regulatory Affairs

Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

| | |
|------------------|---------------------------------|
| Creation Date | 24-Aug-2009 |
| Revision Date | 13-Oct-2023 |
| Print Date | 13-Oct-2023 |
| Revision Summary | SDS sections updated. 2. 3. 11. |

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

SAFETY DATA SHEET

Isobutylene

Airgas
an Air Liquide company

Section 1. Identification

| | |
|--------------------------------------|---|
| GHS product identifier | : Isobutylene |
| Chemical name | : 2-methylpropene |
| Other means of identification | : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene |
| Product type | : Gas. |
| Product use | : Synthetic/Analytical chemistry. |
| Synonym | : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene |
| SDS # | : 001031 |
| 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 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.

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 | : 2-methylpropene |
| Other means of identification | : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene |
| Product code | : 001031 |

CAS number/other identifiers

CAS number : 115-11-7

| Ingredient name | % | CAS number |
|------------------------|----------|-------------------|
| Isobutylene | 100 | 115-11-7 |

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. 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. 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 | : No known significant effects or critical hazards. |
| Inhalation | : No known significant effects or critical hazards. |
| Skin contact | : No known significant effects or critical hazards. |
| 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. 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.

- 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.

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. 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.
- 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. 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. 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. Avoid contact with eyes, skin and clothing. 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 |
|-----------------|--|
| Isobutylene | ACGIH TLV (United States, 3/2017). TWA: 250 ppm 8 hours. |

- 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

Section 8. Exposure controls/personal 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** : 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** : Characteristic.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : -140.7°C (-221.3°F)
- Boiling point** : -6.9°C (19.6°F)
- Critical temperature** : 144.75°C (292.6°F)
- Flash point** : Closed cup: -76.1°C (-105°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%
Upper: 9.6%
- Vapor pressure** : 24.3 (psig)
- Vapor density** : 1.94 (Air = 1)
- Specific Volume (ft³/lb)** : 6.6845
- Gas Density (lb/ft³)** : 0.1496 (25°C / 77 to °F)
- Relative density** : Not applicable.
- Solubility** : Not available.
- Solubility in water** : 0.26 g/l
- Partition coefficient: n-octanol/water** : 2.34
- Auto-ignition temperature** : 465°C (869°F)
- Decomposition temperature** : Not available.
- Viscosity** : Not applicable.
- Flow time (ISO 2431)** : Not available.
- Molecular weight** : 56.12 g/mole
- Aerosol product**
- Heat of combustion** : -45029034 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.
- 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

| Product/ingredient name | Result | Species | Dose | Exposure |
|-------------------------|-----------------------|---------|--------------------------|----------|
| Isobutylene | LC50 Inhalation Vapor | Rat | 550000 mg/m ³ | 4 hours |

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 : No known significant effects or critical hazards.

Section 11. Toxicological information

- Inhalation** : No known significant effects or critical hazards.
Skin contact : No known significant effects or critical hazards.
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

- 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 |
|-------------------------|--------------------|-----|-----------|
| Isobutylene | 2.34 | - | low |

Mobility in soil

- Soil/water partition coefficient (K_{oc})** : Not available.






Section 12. Ecological information

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 | UN1055 | UN1055 | UN1055 | UN1055 | UN1055 |
| UN proper shipping name | ISOBUTYLENE | ISOBUTYLENE | ISOBUTYLENE | ISOBUTYLENE | ISOBUTYLENE |
| 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.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions 19, T50

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 Forbidden
Passenger Carrying Road or Rail Index Forbidden
Special provisions 29

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: Isobutylene

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): 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.

Section 15. Regulatory information

| | |
|----------------------|--|
| 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.)

| | | |
|------------------|---|---|
| Health | / | 1 |
| Flammability | | 4 |
| Physical hazards | | 3 |
| | | |

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 | Expert judgment |
| GASES UNDER PRESSURE - Liquefied gas | Expert judgment |

History

Date of printing : 5/10/2018

Date of issue/Date of revision : 5/10/2018

Date of previous issue : 7/11/2016

Version : 0.02

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.

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.

Safety Data Sheet

Nitric Acid 20% w/w

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Nitric Acid 20% w/w

Synonyms/Generic Names: None

Product Number: 3800

Product Use: Industrial, Manufacturing or Laboratory use

Manufacturer: Columbus Chemical Industries, Inc.
N4335 Temkin Rd.
Columbus, WI. 53925

For More Information: 920-623-2140 (Monday-Friday 8:00-4:30)
www.columbuschemical.com

In Case of Emergency Call: CHEMTREC - 800-424-9300 or 703-527-3887 (24 Hours/Day, 7 Days/Week)

2. HAZARDS IDENTIFICATION

Hazard Not Otherwise Classified (HNO): None

Signal Words: Danger

Pictograms:



GHS Classification:

| | |
|--------------------|-------------|
| Skin corrosion | Category 1A |
| Serious eye damage | Category 1 |

GHS Label Elements, including precautionary statements:

Hazard Statements:

| | |
|------|--|
| H314 | Causes severe skin burns and eye damage. |
|------|--|

Precautionary Statements:

| | |
|----------------|---|
| P260 | Do not breathe dusts or mists. |
| P264 | Wash hands thoroughly after handling. |
| P280 | Wear protective gloves/protective clothing/eye protection/face protection. |
| 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/shower. |

| | |
|----------------|--|
| 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 do. Continue rinsing. |
| P310 | Immediately call a POISON CENTER/doctor/physician. |
| P363 | Wash contaminated clothing before reuse. |
| P405 | Store locked up. |
| P501 | Dispose of contents/container in accordance with local regulations. |

Potential Health Effects

| | |
|-------------------|--|
| Eyes | Causes eye irritation. |
| Inhalation | May be harmful if inhaled. Causes respiratory tract irritation. |
| Skin | May be harmful if absorbed through skin. Causes skin irritation. |
| Ingestion | May be harmful if swallowed. |

NFPA Ratings

| | |
|------------------------|---------------|
| Health | 3 |
| Flammability | 0 |
| Reactivity | 1 |
| Specific hazard | Not Available |

HMIS Ratings

| | |
|-------------------|---|
| Health | 3 |
| Fire | 0 |
| Reactivity | 1 |

3. COMPOSITION/INFORMATION ON INGREDIENTS

| Component | Weight % | CAS # | EINECS# / ELINCS# | Formula | Molecular Weight |
|-------------|----------|-----------|-------------------|------------------|------------------|
| Nitric Acid | 19-21 | 7697-37-2 | 231-714-2 | HNO ₃ | 63.01 g/mol |
| Water | Balance | 7732-18-5 | 231-791-2 | H ₂ O | 18.00 g/mol |

4. FIRST-AID MEASURES

| | |
|-------------------|--|
| Eyes | Rinse with plenty of water for at least 15 minutes and seek medical attention immediately. |
| Inhalation | Move casualty to fresh air and keep at rest. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention immediately. |
| Skin | Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and wash using soap. Get medical attention immediately. |
| Ingestion | Do Not Induce Vomiting! Never give anything by mouth to an unconscious person. If conscious, wash out mouth with water. Get medical attention immediately. |

5. FIRE-FIGHTING MEASURES

| | |
|--|---|
| Suitable (and unsuitable) extinguishing media | Product is not flammable. Use appropriate media for adjacent fire. Cool containers with water. |
| Special protective equipment and precautions for firefighters | Wear self-contained, approved breathing apparatus and full protective clothing, including eye protection and boots. |
| Specific hazards arising from the chemical | Emits toxic fumes (nitrogen oxides) under fire conditions. (See also Stability and Reactivity section). |

6. ACCIDENTAL RELEASE MEASURES

| | |
|--|---|
| Personal precautions, protective equipment and emergency procedures | See section 8 for recommendations on the use of personal protective equipment. |
| Environmental precautions | Prevent spillage from entering drains. Any release to the environment may be subject to federal/national or local reporting requirements. |
| Methods and materials for containment and cleaning up | Neutralize spill with sodium bicarbonate or lime. Absorb spill with noncombustible absorbent material, then place in a suitable container for disposal. Clean surfaces thoroughly with water to remove residual contamination. Dispose of all waste and cleanup materials in accordance with regulations. |

7. HANDLING AND STORAGE

Precautions for safe handling

See section 8 for recommendations on the use of personal protective equipment. Use with adequate ventilation. Wash thoroughly after using. Keep container closed when not in use. Avoid formation of aerosols.

Conditions for safe storage, including any incompatibilities

Store in a cool, dry, well ventilated area. Keep away from incompatible materials (see section 10 for incompatibilities).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure controls:

| Component | Exposure Limits | Basis | Entity |
|-------------|--------------------------------|-------|--------|
| Nitric Acid | 2 ppm 5.2 mg/m ³ | TLV | ACGIH |
| | 4 ppm 10 mg/m ³ | STEL | ACGIH |
| | 2 ppm 5 mg/m ³ | PEL | OSHA |
| | 2 ppm 5 mg/m ³ | REL | NIOSH |
| | 4 ppm 10 mg/m ³ | STEL | NIOSH |
| | 25 ppm | IDLH | NIOSH |

TWA: Time Weighted Average over 8 hours of work.

TLV: Threshold Limit Value over 8 hours of work.

REL: Recommended Exposure Limit

PEL: Permissible Exposure Limit

STEL: Short Term Exposure Limit during x minutes.

IDLH: Immediately Dangerous to Life or Health

WEEL: Workplace Environmental Exposure Levels

CEIL: Ceiling

Personal Protection

| | |
|-------------------|---|
| Eyes | Wear chemical safety glasses or goggles and face shield if splashing is likely to occur. |
| Inhalation | Provide local exhaust, preferably mechanical. If exposure levels are excessive, use an approved respirator. |
| Skin | Wear nitrile or rubber gloves and a full body suit. |

| | |
|--------------|---------------|
| Other | Not Available |
|--------------|---------------|

Other Recommendations

Provide eyewash stations, quick-drench showers and washing facilities accessible to areas of use and handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Appearance (physical state, color, etc.) | Colorless liquid. |
| Odor | Not Available |
| Odor threshold | Not Available |
| pH | Not Available |
| Melting point/freezing point | Not Available |
| Initial boiling point and boiling range | Not Available |
| Flash point | Not Flammable |
| Evaporation rate | Not Available |
| Flammability (solid, gas) | Not Flammable |
| Upper/lower flammability or explosive limit | Not Explosive |
| Vapor pressure | Not Available |
| Vapor density | Not Available |
| Specific gravity | 1.13 – 1.14g/cm ³ at 20°C (68°F) |
| Solubility (ies) | Soluble in water. |
| Partition coefficient: n-octanol/water | Not Available |
| Auto-ignition temperature | Not Available |
| Decomposition temperature | Not Available |

10. STABILITY AND REACTIVITY

| | |
|---|--|
| Chemical Stability | Stable |
| Possibility of Hazardous Reactions | Will not occur. |
| Conditions to Avoid | May discolor on exposure to air and light. |
| Incompatible Materials | Alkali metals, organic materials, acetic anhydride, acetonitrile, alcohols, acrylonitrile. |
| Hazardous Decomposition Products | Nitrogen oxides. |

11. TOXICOLOGICAL INFORMATION**Acute Toxicity**

| | |
|--------------------|---------------|
| Skin | Not Available |
| Eyes | Not Available |
| Respiratory | Not Available |
| Ingestion | Not Available |

Carcinogenicity

| | |
|--------------|--|
| IARC | No components 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 components of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP | No components 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 components of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

Signs & Symptoms of Exposure

| | |
|--------------------|---|
| Skin | Itching, swelling, redness, burning. |
| Eyes | Itching, redness, burning, watering eyes. |
| Respiratory | Burning, choking, shortness of breath, coughing, wheezing, dizziness. |
| Ingestion | Burning, choking, nausea, vomiting, pain. |

| | |
|---------------------------------------|-------------------------------------|
| Chronic Toxicity | Not Available |
| Teratogenicity | Not Available |
| Mutagenicity | Not Available |
| Embryotoxicity | Not Available |
| Target Organ(s) | Lungs, Teeth, Cardiovascular system |
| Reproductive Toxicity | Not Available |
| Respiratory/Skin Sensitization | Not Available |

12. ECOLOGICAL INFORMATION

Ecotoxicity

| | |
|-----------------------------|---------------|
| Aquatic Vertebrate | Not Available |
| Aquatic Invertebrate | Not Available |
| Terrestrial | Not Available |

| | |
|--------------------------------------|---------------|
| Persistence and Degradability | Not Available |
| Bioaccumulative Potential | Not Available |
| Mobility in Soil | Not Available |
| PBT and vPvB Assessment | Not Available |
| Other Adverse Effects | Not Available |

13. DISPOSAL CONSIDERATIONS

| | |
|----------------------------------|---|
| Waste Product or Residues | Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies if necessary before disposing of waste product or residue. |
| Product Containers | Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies if necessary before disposing of waste product container. |

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product may significantly change the characteristics of the material and alter the waste classification and proper disposal methods.

14. TRANSPORTATION INFORMATION

| | |
|------------------|-------------------------------|
| US DOT | UN2031, Nitric acid, 8, pg II |
| TDG | UN2031, NITRIC ACID, 8, PG II |
| IMDG | UN2031, NITRIC ACID, 8, PG II |
| Marine Pollutant | No |
| IATA/ICAO | UN2031, Nitric acid, 8, pg II |

15. REGULATORY INFORMATION

| | |
|---|--|
| TSCA Inventory Status | All ingredients are listed on the TSCA Active inventory. |
| DSL / NDSL | All ingredients are listed on the DSL inventory. |
| California Proposition 65 | Not Listed |
| Rhode Island: Hazardous Substance List | Listed: Nitric Acid |
| Massachusetts: Toxic or Hazardous Substance List, Right to Know | Listed: Nitric Acid |
| Pennsylvania: Hazardous Substance List | Listed: Nitric Acid |
| New Jersey: Right to Know Hazardous Substance List | Listed: Nitric Acid |
| SARA 302 | Listed: Nitric Acid |
| SARA 304 | Listed: Nitric Acid |
| SARA 311 | Acute Health Hazard. |
| SARA 312 | Acute Health Hazard. |
| SARA 313 | Listed: Nitric Acid |
| WHMIS Canada | Class C: Oxidizing material. Class E: Corrosive material. |

16. OTHER INFORMATION

| Revision | Date |
|------------|------------|
| Original | 10/11/2017 |
| Revision 1 | 01/03/2022 |
| | |

Disclaimer: The information provided in this Safety Data Sheet ("SDS") is correct to the best of our knowledge, information, and belief at the date of publication. The information in this SDS relates only to the specific Product identified under Section 1, and does not relate to its use in combination with other materials or products, or its use as to any particular process. Those handling, storing, or using the Product should satisfy themselves that they have current information regarding the particular way the Product is handled, stored or used and that the same is done in accordance with federal, state and local law. WE DO NOT MAKE ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING (WITHOUT LIMITATION) WARRANTIES WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN OR WITH RESPECT TO FITNESS FOR ANY PARTICULAR USE. WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, INJURY, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THIS PRODUCT.



SAFETY DATA SHEET

1. Identification

| | |
|--|---|
| Product identifier | UNLEADED GASOLINE |
| Other means of identification | |
| SDS number | 002-GHS |
| Synonyms | Regular/Premium/Midgrade - Unleaded Gasoline, RFG - Reformulated Unleaded Gasoline, Conventional Unleaded Gasoline, Oxygenated Unleaded Gasoline, Non-Oxygenated Unleaded Gasoline, CARB (California Air Resource Board) Unleaded Gasoline, RBOB - Reformulated Blendstock for Oxygenate Blending, CBOB - Conventional Blendstock for Oxygenate Blending, Petrol, Motor Fuel. See section 16 for complete information. |
| Recommended use | Motor Fuel Motor fuels. |
| Recommended restrictions | None known. |
| Manufacturer/Importer/Supplier/Distributor information | |
| Manufacturer/Supplier | Valero Marketing & Supply Company and Affiliates One Valero Way San Antonio, TX 78269-6000 210-345-4593 CorpHSE@valero.com |
| General Assistance | Industrial Hygienist |
| E-Mail | 24 Hour Emergency 866-565-5220 |
| Contact Person | 1-800-424-9300 (CHEMTREC USA) |
| Emergency Telephone | |

2. Hazard(s) identification

| | | |
|-----------------------|--|-----------------------------|
| Physical hazards | Flammable liquids | Category 1 |
| Health hazards | Skin corrosion/irritation | Category 2 |
| | Germ cell mutagenicity | Category 1B |
| | Carcinogenicity | Category 1B |
| | Reproductive toxicity | Category 2 |
| | Specific target organ toxicity, single exposure | Category 3 narcotic effects |
| | Specific target organ toxicity, repeated exposure | Category 2 |
| Environmental hazards | Aspiration hazard | Category 1 |
| | Hazardous to the aquatic environment, long-term hazard | Category 2 |
| OSHA defined hazards | Not classified. | |
| Label elements | | |



Signal word

Danger

Hazard statement

Extremely flammable liquid and vapor. Causes skin irritation. May cause genetic defects. May cause cancer. Suspected of damaging fertility or the unborn child. May cause drowsiness or dizziness. May cause damage to organs (blood, liver, kidney) through prolonged or repeated exposure. May be fatal if swallowed and enters airways. Toxic to aquatic life with long lasting effects.

Precautionary statement**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. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting// equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe gas/mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Avoid release to the environment.

Response

If exposed or concerned: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. If swallowed: Immediately call a poison center/doctor. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. In case of fire: Use alcohol-resistant foam, carbon dioxide, dry powder or water fog for extinction. Collect spillage.

Storage

Store locked up. Store in a well-ventilated place. Keep container tightly closed. Keep cool.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)

None known.

3. Composition/information on ingredients**Mixtures**

| Chemical name | CAS number | % |
|--------------------------|------------|--------|
| Gasoline | 86290-81-5 | 80-100 |
| Toluene | 108-88-3 | 0-30 |
| Hexane (Other Isomers) | 96-14-0 | 5-25 |
| Xylene (o, m, p isomers) | 1330-20-7 | 0-25 |
| Octane (All isomers) | 111-65-9 | 0-18.5 |
| Ethanol | 64-17-5 | 0-10 |
| 1,2,4, Trimethylbenzene | 95-63-6 | 0-6 |
| n-Heptane | 142-82-5 | 1-5 |
| Pentane | 109-66-0 | 1-5 |
| Cumene | 98-82-8 | 0-5 |
| Ethylbenzene | 100-41-4 | 0-5 |
| Benzene | 71-43-2 | 0-4.9 |
| n-Hexane | 110-54-3 | 0-3 |
| Cyclohexane | 110-82-7 | 0-3 |

4. First-aid measures**Inhalation**

Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Skin contact

Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, always seek medical attention.

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.

Ingestion

Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not give mouth-to-mouth resuscitation. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Never give anything by mouth to a victim who is unconscious or is having convulsions. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Cyanosis (blue tissue condition, nails, lips, and/or skin). Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash.

UNLEADED GASOLINE

913457 Version #: 03 Revision date: 23-May-2014 Print date: 23-May-2014

Prepared by 3E Company

Indication of immediate medical attention and special treatment needed

In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information

If exposed or concerned: get medical attention/advice. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before re-use.

5. Fire-fighting measures

Suitable extinguishing media

Water spray. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO₂).

Unsuitable extinguishing media

Do not use a solid water stream as it may scatter and spread fire.

Specific hazards arising from the chemical

Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

Special protective equipment and precautions for firefighters

Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

Fire-fighting equipment/instructions

Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Vapors may form explosive air mixtures even at room temperature. Prevent buildup of vapors or gases to explosive concentrations. Some of these materials, if spilled, may evaporate leaving a flammable residue. Water runoff can cause environmental damage. Use compatible foam to minimize vapor generation as needed.

Specific methods

Use water spray to cool unopened containers.

General fire hazards

Extremely flammable liquid and vapor. Containers may explode when heated.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Local authorities should be advised if significant spills cannot be contained. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 of the SDS for Personal Protective Equipment.

Methods and materials for containment and cleaning up

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Stop leak if you can do so without risk. This material is a water pollutant and should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas.

Use non-sparking tools and explosion-proof equipment.

Small Spills: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste.

Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment.

Environmental precautions

Gasoline may contain oxygenated blend products (Ethanol, etc.) that are soluble in water and therefore precautions should be taken to protect surface and groundwater sources from contamination. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Firefighting Measures, Section 5, before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g. by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Use compatible foam to minimize vapor generation as needed. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 1-800-424-8802.

7. Handling and storage

Precautions for safe handling

Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Wear personal protective equipment. Do not breathe dust/fume/gas/mist/vapors/spray. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. The product is extremely flammable, and explosive vapor/air mixtures may be formed even at normal room temperatures. DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. When using, do not eat, drink or smoke. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Flammable liquid storage. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. The pressure in sealed containers can increase under the influence of heat. Keep container tightly closed in a cool, well-ventilated place. Keep away from food, drink and animal feedings. Keep out of the reach of children.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

| Components | Type | Value |
|-----------------------|------|-------|
| Benzene (CAS 71-43-2) | STEL | 5 ppm |
| | TWA | 1 ppm |

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

| Components | Type | Value |
|--|------|------------------------|
| Cumene (CAS 98-82-8) | PEL | 245 mg/m3 50 ppm |
| Cyclohexane (CAS 110-82-7) | PEL | 1050 mg/m3 300 ppm |
| Ethanol (CAS 64-17-5) | PEL | 1900 mg/m3 1000 ppm |
| Ethylbenzene (CAS 100-41-4) | PEL | 435 mg/m3 100 ppm |
| n-Heptane (CAS 142-82-5) | PEL | 2000 mg/m3 500 ppm |
| n-Hexane (CAS 110-54-3) | PEL | 1800 mg/m3 500 ppm |
| Octane (All isomers) (CAS 111-65-9) | PEL | 2350 mg/m3 500 ppm |
| Pentane (CAS 109-66-0) | PEL | 2950 mg/m3 1000 ppm |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | PEL | 435 mg/m3 100 ppm |

US. OSHA Table Z-2 (29 CFR 1910.1000)

| Components | Type | Value |
|------------------------|---------|---------|
| Benzene (CAS 71-43-2) | Ceiling | 25 ppm |
| | TWA | 10 ppm |
| Toluene (CAS 108-88-3) | Ceiling | 300 ppm |
| | TWA | 200 ppm |

US. ACGIH Threshold Limit Values

| Components | Type | Value |
|---------------------------------------|------|---------|
| 1,2,4, Trimethylbenzene (CAS 95-63-6) | TWA | 25 ppm |
| Benzene (CAS 71-43-2) | STEL | 2.5 ppm |

US. ACGIH Threshold Limit Values

| Components | Type | Value |
|--|------|----------|
| | TWA | 0.5 ppm |
| Cumene (CAS 98-82-8) | TWA | 50 ppm |
| Cyclohexane (CAS 110-82-7) | TWA | 100 ppm |
| Ethanol (CAS 64-17-5) | STEL | 1000 ppm |
| Ethylbenzene (CAS 100-41-4) | TWA | 20 ppm |
| Gasoline (CAS 86290-81-5) | STEL | 500 ppm |
| | TWA | 300 ppm |
| Hexane (Other Isomers) (CAS 96-14-0) | STEL | 1000 ppm |
| | TWA | 500 ppm |
| n-Heptane (CAS 142-82-5) | STEL | 500 ppm |
| | TWA | 400 ppm |
| n-Hexane (CAS 110-54-3) | TWA | 50 ppm |
| Octane (All isomers) (CAS 111-65-9) | TWA | 300 ppm |
| Pentane (CAS 109-66-0) | TWA | 600 ppm |
| Toluene (CAS 108-88-3) | TWA | 20 ppm |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | STEL | 150 ppm |
| | TWA | 100 ppm |

US. NIOSH: Pocket Guide to Chemical Hazards

| Components | Type | Value |
|---------------------------------------|---------|------------|
| 1,2,4, Trimethylbenzene (CAS 95-63-6) | TWA | 125 mg/m3 |
| | | 25 ppm |
| Benzene (CAS 71-43-2) | STEL | 1 ppm |
| | TWA | 0.1 ppm |
| Cumene (CAS 98-82-8) | TWA | 245 mg/m3 |
| | | 50 ppm |
| Cyclohexane (CAS 110-82-7) | TWA | 1050 mg/m3 |
| | | 300 ppm |
| Ethanol (CAS 64-17-5) | TWA | 1900 mg/m3 |
| | | 1000 ppm |
| Ethylbenzene (CAS 100-41-4) | STEL | 545 mg/m3 |
| | | 125 ppm |
| | TWA | 435 mg/m3 |
| | | 100 ppm |
| Hexane (Other Isomers) (CAS 96-14-0) | Ceiling | 1800 mg/m3 |
| | | 510 ppm |
| | TWA | 350 mg/m3 |
| | | 100 ppm |
| n-Heptane (CAS 142-82-5) | Ceiling | 1800 mg/m3 |
| | | 440 ppm |
| | TWA | 350 mg/m3 |
| | | 85 ppm |
| n-Hexane (CAS 110-54-3) | TWA | 180 mg/m3 |
| | | 50 ppm |
| Octane (All isomers) (CAS 111-65-9) | Ceiling | 1800 mg/m3 |
| | | 385 ppm |
| | TWA | 350 mg/m3 |
| | | 75 ppm |
| Pentane (CAS 109-66-0) | Ceiling | 1800 mg/m3 |

UNLEADED GASOLINE

913457 Version #: 03 Revision date: 23-May-2014 Print date: 23-May-2014

Prepared by 3E Company

US. NIOSH: Pocket Guide to Chemical Hazards

| Components | Type | Value |
|---|------|-----------------------|
| Toluene (CAS 108-88-3) | TWA | 610 ppm |
| | | 350 mg/m ³ |
| | STEL | 120 ppm |
| | | 560 mg/m ³ |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | TWA | 150 ppm |
| | | 375 mg/m ³ |
| | STEL | 100 ppm |
| | | 655 mg/m ³ |
| | TWA | 150 ppm |
| | | 435 mg/m ³ |
| | | 100 ppm |

Biological limit values

ACGIH Biological Exposure Indices

| Components | Value | Determinant | Specimen | Sampling Time |
|---|-----------|---|---------------------|---------------|
| Benzene (CAS 71-43-2) | 25 µg/g | S-Phenylmercapturic acid | Creatinine in urine | * |
| Ethylbenzene (CAS 100-41-4) | 0.7 g/g | Sum of mandelic acid and phenylglyoxylic acid | Creatinine in urine | * |
| n-Hexane (CAS 110-54-3) | 0.4 mg/l | 2,5-Hexanedione, without hydrolysis | | * |
| | 0.4 mg/l | 2,5-Hexanedione, without hydrolysis | Urine | * |
| Toluene (CAS 108-88-3) | 0.3 mg/g | o-Cresol, with hydrolysis | Creatinine in urine | * |
| | 0.03 mg/l | Toluene | Urine | * |
| | 0.02 mg/l | Toluene | Blood | * |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | 1.5 g/g | Methylhippuric acids | Creatinine in urine | * |

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

| | |
|-------------------------|-----------------------------------|
| Benzene (CAS 71-43-2) | Can be absorbed through the skin. |
| Cumene (CAS 98-82-8) | Can be absorbed through the skin. |
| n-Hexane (CAS 110-54-3) | Can be absorbed through the skin. |
| Toluene (CAS 108-88-3) | Can be absorbed through the skin. |

US - Minnesota Haz Subs: Skin designation applies

| | |
|------------------------|---------------------------|
| Cumene (CAS 98-82-8) | Skin designation applies. |
| Toluene (CAS 108-88-3) | Skin designation applies. |

US - Tennessee OELs: Skin designation

| | |
|----------------------|-----------------------------------|
| Cumene (CAS 98-82-8) | Can be absorbed through the skin. |
|----------------------|-----------------------------------|

US ACGIH Threshold Limit Values: Skin designation

| | |
|-------------------------|-----------------------------------|
| Benzene (CAS 71-43-2) | Can be absorbed through the skin. |
| n-Hexane (CAS 110-54-3) | Can be absorbed through the skin. |

US. NIOSH: Pocket Guide to Chemical Hazards

| | |
|----------------------|-----------------------------------|
| Cumene (CAS 98-82-8) | Can be absorbed through the skin. |
|----------------------|-----------------------------------|

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

| | |
|----------------------|-----------------------------------|
| Cumene (CAS 98-82-8) | Can be absorbed through the skin. |
|----------------------|-----------------------------------|

Appropriate engineering controls

Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

| | |
|---------------------------------------|--|
| Eye/face protection | Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles. |
| Skin protection | |
| Hand protection | Avoid exposure - obtain special instructions before use. Wear protective gloves. Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Suitable gloves can be recommended by the glove supplier. |
| Other | Wear chemical-resistant, impervious gloves. Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended. |
| 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. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use. |
| Thermal hazards | Wear appropriate thermal protective clothing, when necessary. |
| General hygiene considerations | Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Keep away from food and drink. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practice. |

9. Physical and chemical properties

| | |
|---|---|
| Appearance | Light straw to red clear liquid with characteristic strong odor of gasoline. |
| Physical state | Liquid. |
| Form | Liquid. |
| Color | Light straw to red clear. |
| Odor | Characteristic Gasoline Odor (Strong). |
| Odor threshold | Not available. |
| pH | Not available. |
| Melting point/freezing point | 44.01 °F (6.67 °C) May start to solidify at this temperature. This is based on data for the following ingredient: Cyclohexane. Weighted average: -91.9 deg C (-133.4 deg F) |
| Initial boiling point and boiling range | 80.06 - 440.06 °F (26.7 - 226.7 °C) |
| Flash point | -40.0 °F (-40.0 °C) (closed cup) |
| Evaporation rate | 10 - 11 BuAc |
| Flammability (solid, gas) | Not available. |
| Upper/lower flammability or explosive limits | |
| Flammability limit - lower (%) | 1.3 % |
| Flammability limit - upper (%) | 7.1 % |
| Explosive limit - lower (%) | Not available. |
| Explosive limit - upper (%) | Not available. |
| Vapor pressure | 60.8 - 101.3 kPa (20°C) |
| Vapor density | 3 - 4 (Air=1) |
| Relative density | Not available. |
| Solubility(ies) | |
| Solubility (water) | Very slightly soluble. |
| Partition coefficient (n-octanol/water) | Not available. |
| Auto-ignition temperature | > 500 °F (> 260 °C) |
| Decomposition temperature | Not available. |
| Viscosity | Not available. |

Other information

| | |
|--------------------------|--------------|
| Flash point class | Flammable IA |
| VOC (Weight %) | 100 % |

10. Stability and reactivity

| | |
|---|--|
| Reactivity | None known. |
| Chemical stability | Stable under normal temperature conditions and recommended use. |
| Possibility of hazardous reactions | Hazardous polymerization does not occur. |
| Conditions to avoid | Heat, flames and sparks. Ignition sources. Contact with incompatible materials. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. |
| Incompatible materials | Strong oxidizing agents. |
| Hazardous decomposition products | No hazardous decomposition products are known. |

11. Toxicological information**Information on likely routes of exposure**

| | |
|---------------------|--|
| Ingestion | Swallowing or vomiting of the liquid may result in aspiration into the lungs. |
| Inhalation | In high concentrations, mists/vapors may irritate throat and respiratory system and cause coughing. May cause drowsiness or dizziness. |
| Skin contact | Causes skin irritation. Prolonged contact may cause dryness of the skin. |
| Eye contact | May cause eye irritation. |

| | |
|---|--|
| Symptoms related to the physical, chemical and toxicological characteristics | Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Cyanosis (blue tissue condition, nails, lips, and/or skin). Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash. |
|---|--|

Information on toxicological effects

| | |
|-----------------------|---|
| Acute toxicity | Based on available data, the classification criteria are not met. |
|-----------------------|---|

| Components | Species | Test Results |
|---------------------------------------|----------------|-----------------------|
| 1,2,4, Trimethylbenzene (CAS 95-63-6) | | |
| Acute | | |
| <i>Dermal</i> | | |
| LD50 | Rabbit | > 3160 mg/kg |
| <i>Inhalation</i> | | |
| LC50 | Rat | > 2000 mg/l, 48 Hours |
| <i>Oral</i> | | |
| LD50 | Rat | 6 g/kg |
| Benzene (CAS 71-43-2) | | |
| Acute | | |
| <i>Oral</i> | | |
| LD50 | Rat | 3306 mg/kg |
| Cumene (CAS 98-82-8) | | |
| Acute | | |
| <i>Inhalation</i> | | |
| LC50 | Mouse | 2000 mg/l, 7 Hours |
| | Rat | 8000 mg/l, 4 Hours |
| <i>Oral</i> | | |
| LD50 | Rat | 1400 mg/kg |
| Cyclohexane (CAS 110-82-7) | | |
| Acute | | |
| <i>Oral</i> | | |
| LD50 | Rat | 12705 mg/kg |

| Components | Species | Test Results |
|--|---|--------------------|
| Ethanol (CAS 64-17-5) | | |
| Acute | | |
| <i>Inhalation</i> | | |
| LC50 | Rat | 30000 mg/m3 |
| Ethylbenzene (CAS 100-41-4) | | |
| Acute | | |
| <i>Dermal</i> | | |
| LD50 | Rabbit | > 5000 mg/kg |
| <i>Oral</i> | | |
| LD50 | Rat | 5.46 g/kg |
| n-Heptane (CAS 142-82-5) | | |
| Acute | | |
| <i>Inhalation</i> | | |
| LC50 | Rat | 103 mg/l, 4 Hours |
| n-Hexane (CAS 110-54-3) | | |
| Acute | | |
| <i>Oral</i> | | |
| LD50 | Rat | 28710 mg/kg |
| Octane (All isomers) (CAS 111-65-9) | | |
| Acute | | |
| <i>Inhalation</i> | | |
| LC50 | Rat | 118 mg/l, 4 Hours |
| Pentane (CAS 109-66-0) | | |
| Acute | | |
| <i>Inhalation</i> | | |
| LC50 | Rat | 364 mg/l, 4 Hours |
| Toluene (CAS 108-88-3) | | |
| Acute | | |
| <i>Dermal</i> | | |
| LD50 | Rabbit | 14.1 ml/kg |
| <i>Inhalation</i> | | |
| LC50 | Rat | 8000 mg/l, 4 Hours |
| <i>Oral</i> | | |
| LD50 | Rat | 2.6 g/kg |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | | |
| Acute | | |
| <i>Oral</i> | | |
| LD50 | Rat | 4300 mg/kg |
| Skin corrosion/irritation | Causes skin irritation. | |
| Serious eye damage/eye irritation | Based on available data, the classification criteria are not met. | |
| Respiratory or skin sensitization | | |
| Respiratory sensitization | Based on available data, the classification criteria are not met. | |
| Skin sensitization | Based on available data, the classification criteria are not met. This substance may have a potential for sensitization which may provoke an allergic reaction among sensitive individuals. | |
| Germ cell mutagenicity | May cause genetic defects. In in-vitro experiments, neither benzene, toluene nor xylene changed the number of sister-chromatid exchanges (SCEs) or the number of chromosomal aberrations in human lymphocytes. However, toluene and xylene caused a significant cell growth inhibition which was not observed with benzene in the same concentrations. In in-vivo experiments, toluene changed the number of sister-chromatid exchanges (SCEs) in human lymphocytes. Toluene may cause heritable genetic damage. | |

Carcinogenicity May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

| | |
|--|---|
| Benzene (CAS 71-43-2) | 1 Carcinogenic to humans. |
| Cumene (CAS 98-82-8) | 2B Possibly carcinogenic to humans. |
| Ethylbenzene (CAS 100-41-4) | 2B Possibly carcinogenic to humans. |
| Gasoline (CAS 86290-81-5) | 2B Possibly carcinogenic to humans. |
| Toluene (CAS 108-88-3) | 3 Not classifiable as to carcinogenicity to humans. |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | 3 Not classifiable as to carcinogenicity to humans. |

NTP Report on Carcinogens

| | |
|-----------------------|-------------------------------|
| Benzene (CAS 71-43-2) | Known To Be Human Carcinogen. |
|-----------------------|-------------------------------|

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

| | |
|-----------------------|--------|
| Benzene (CAS 71-43-2) | Cancer |
|-----------------------|--------|

| | |
|---|---|
| Reproductive toxicity | Suspected of damaging fertility or the unborn child. Benzene, xylene and toluene have demonstrated animal effects of reproductive toxicity. Animal studies of benzene have shown testicular effects, alterations in reproductive cycles, chromosomal aberrations and embryo/fetotoxicity. Ethanol has demonstrated human effects of reproductive toxicity. Can cause adverse reproductive effects - such as birth defects, miscarriages, or infertility. Avoid exposure to women during early pregnancy. Avoid contact during pregnancy/while nursing. |
| Specific target organ toxicity - single exposure | May cause drowsiness or dizziness. |
| Specific target organ toxicity - repeated exposure | May cause damage to the following organs through prolonged or repeated exposure: Blood. Kidneys. Liver. |
| Aspiration hazard | May be fatal if swallowed and enters airways. |
| Chronic effects | Repeated exposure of laboratory animals to high concentrations of gasoline vapors has caused kidney damage and cancer in rats and cancer in mice. Gasoline was evaluated for genetic activity in assays using microbial cells, cultured mammalian cells and rat bone marrow cells. The results were all negative so gasoline was considered nonmutagenic under these conditions. Overexposure to this product or its components has been suggested as a cause of liver abnormalities in laboratory animals and humans. Lifetime studies by the American Petroleum Institute have shown that kidney damage and kidney cancer can occur in male rats after prolonged inhalation exposures at elevated concentrations of total gasoline. Kidneys of mice and female rats were unaffected. The U.S. EPA Risk Assessment Forum has concluded that the male rat kidney tumor results are not relevant for humans. Total gasoline exposure also produced liver tumors in female mice only. The implication of these data for humans has not been determined. |
| Further information | Symptoms may be delayed. |

12. Ecological information

Ecotoxicity Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

| Components | | Species | Test Results |
|---------------------------------------|------|---|------------------------------|
| 1,2,4, Trimethylbenzene (CAS 95-63-6) | | | |
| Aquatic | | | |
| Fish | LC50 | Fathead minnow (Pimephales promelas) | 7.19 - 8.28 mg/l, 96 hours |
| Benzene (CAS 71-43-2) | | | |
| Aquatic | | | |
| Crustacea | EC50 | Water flea (Daphnia magna) | 8.76 - 15.6 mg/l, 48 hours |
| Fish | LC50 | Rainbow trout,donaldson trout (Oncorhynchus mykiss) | 7.2 - 11.7 mg/l, 96 hours |
| Cumene (CAS 98-82-8) | | | |
| Aquatic | | | |
| Crustacea | EC50 | Brine shrimp (Artemia sp.) | 3.55 - 11.29 mg/l, 48 hours |
| Fish | LC50 | Rainbow trout,donaldson trout (Oncorhynchus mykiss) | 2.7 mg/l, 96 hours |
| Cyclohexane (CAS 110-82-7) | | | |
| Aquatic | | | |
| Fish | LC50 | Fathead minnow (Pimephales promelas) | 3.961 - 5.181 mg/l, 96 hours |
| | | Striped bass (Morone saxatilis) | 8.3 mg/l, 96 hours |

| Components | Species | | Test Results |
|---|---|---|------------------------------|
| Ethanol (CAS 64-17-5) | | | |
| Aquatic | | | |
| Algae | EC50 | Freshwater algae | 275 mg/l, 72 Hours |
| | | Marine water algae | 1970 mg/l |
| Fish | LC50 | Fathead minnow (Pimephales promelas) | > 100 mg/l, 96 hours |
| | | Freshwater fish | 11200 mg/l, 96 Hours |
| Invertebrate | EC50 | Freshwater invertebrate | 5012 mg/l, 48 Hours |
| | | Marine water invertebrate | 857 mg/l, 48 Hours |
| Ethylbenzene (CAS 100-41-4) | | | |
| Aquatic | | | |
| Crustacea | EC50 | Water flea (Daphnia magna) | 1 - 4 mg/l, 48 hours |
| Fish | LC50 | Rainbow trout,donaldson trout (Oncorhynchus mykiss) | 4 mg/l, 96 hours |
| n-Heptane (CAS 142-82-5) | | | |
| Aquatic | | | |
| Fish | LC50 | Western mosquitofish (Gambusia affinis) | 4924 mg/l, 96 hours |
| n-Hexane (CAS 110-54-3) | | | |
| Aquatic | | | |
| Fish | LC50 | Fathead minnow (Pimephales promelas) | 2.101 - 2.981 mg/l, 96 hours |
| Toluene (CAS 108-88-3) | | | |
| Aquatic | | | |
| Crustacea | EC50 | Water flea (Daphnia magna) | 5.46 - 9.83 mg/l, 48 hours |
| Fish | LC50 | Pink salmon (Oncorhynchus gorbuscha) | 6.86 - 8.48 mg/l, 96 hours |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | | | |
| Aquatic | | | |
| Fish | LC50 | Rainbow trout,donaldson trout (Oncorhynchus mykiss) | 8 mg/l, 96 Hours |
| Persistence and degradability | Not available. | | |
| Bioaccumulative potential | Not available. | | |
| Partition coefficient n-octanol / water (log Kow) | | | |
| Benzene (CAS 71-43-2) | 2.13 | | |
| Cumene (CAS 98-82-8) | 3.66 | | |
| Cyclohexane (CAS 110-82-7) | 3.44 | | |
| Ethanol (CAS 64-17-5) | -0.31 | | |
| Ethylbenzene (CAS 100-41-4) | 3.15 | | |
| Hexane (Other Isomers) (CAS 96-14-0) | 3.6 | | |
| Octane (All isomers) (CAS 111-65-9) | 5.18 | | |
| Pentane (CAS 109-66-0) | 3.39 | | |
| Toluene (CAS 108-88-3) | 2.73 | | |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | 3.2 | | |
| n-Heptane (CAS 142-82-5) | 4.66 | | |
| n-Hexane (CAS 110-54-3) | 3.9 | | |
| Mobility in soil | Not available. | | |
| Other adverse effects | Not available. | | |
| 13. Disposal considerations | | | |
| Disposal instructions | Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. | | |
| Hazardous waste code | D001: Waste Flammable material with a flash point <140 °F D018: Waste Benzene | | |

US RCRA Hazardous Waste U List: Reference

| | |
|--|------|
| Benzene (CAS 71-43-2) | U019 |
| Cumene (CAS 98-82-8) | U055 |
| Cyclohexane (CAS 110-82-7) | U056 |
| Toluene (CAS 108-88-3) | U220 |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | U239 |

Waste from residues / unused products Dispose of in accordance with local regulations.

Contaminated packaging Offer rinsed packaging material to local recycling facilities.

14. Transport information

DOT

| | |
|-------------------------------------|---|
| UN number | UN1203 |
| UN proper shipping name | Gasoline |
| Transport hazard class(es) | |
| Class | 3 |
| Subsidiary risk | - |
| Packing group | II |
| Environmental hazards | |
| Marine pollutant | Yes |
| Special precautions for user | Read safety instructions, SDS and emergency procedures before handling. |
| Special provisions | 139, B33, B101, T8 |
| Packaging exceptions | 150 |
| Packaging non bulk | 202 |
| Packaging bulk | 242 |

IATA

| | |
|-------------------------------------|---|
| UN number | UN1203 |
| UN proper shipping name | Gasoline |
| Transport hazard class(es) | |
| Class | 3 |
| Subsidiary risk | - |
| Label(s) | 3 |
| Packing group | II |
| Environmental hazards | Yes |
| ERG Code | 3H |
| Special precautions for user | Read safety instructions, SDS and emergency procedures before handling. |

IMDG

| | |
|-------------------------------------|---|
| UN number | UN1203 |
| UN proper shipping name | Gasoline |
| Transport hazard class(es) | |
| Class | 3 |
| Subsidiary risk | - |
| Label(s) | 3 |
| Packing group | II |
| Environmental hazards | |
| Marine pollutant | Yes |
| EmS | F-E, S-E |
| 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 applicable. However, this product is a liquid and if transported in bulk covered under MARPOL 73/78, Annex I.

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.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

| | |
|-----------------------|--------|
| Benzene (CAS 71-43-2) | Cancer |
|-----------------------|--------|

Central nervous system
Blood
Aspiration
Skin
Eye
Respiratory tract irritation
Flammability

CERCLA Hazardous Substance List (40 CFR 302.4)

| | |
|--|--------|
| Benzene (CAS 71-43-2) | LISTED |
| Cumene (CAS 98-82-8) | LISTED |
| Cyclohexane (CAS 110-82-7) | LISTED |
| Ethanol (CAS 64-17-5) | LISTED |
| Ethylbenzene (CAS 100-41-4) | LISTED |
| Gasoline (CAS 86290-81-5) | LISTED |
| Hexane (Other Isomers) (CAS 96-14-0) | LISTED |
| n-Heptane (CAS 142-82-5) | LISTED |
| n-Hexane (CAS 110-54-3) | LISTED |
| Octane (All isomers) (CAS 111-65-9) | LISTED |
| Pentane (CAS 109-66-0) | LISTED |
| Toluene (CAS 108-88-3) | LISTED |
| Xylene (o, m, p isomers) (CAS 1330-20-7) | LISTED |

Superfund Amendments and Reauthorization Act of 1986 (SARA)

| | |
|--------------------------|------------------------|
| Hazard categories | Immediate Hazard - No |
| | Delayed Hazard - No |
| | Fire Hazard - No |
| | Pressure Hazard - No |
| | Reactivity Hazard - No |

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

| Chemical name | CAS number | % by wt. |
|--------------------------|------------|----------|
| Toluene | 108-88-3 | 0-30 |
| Xylene (o, m, p isomers) | 1330-20-7 | 0-25 |
| 1,2,4, Trimethylbenzene | 95-63-6 | 0-6 |
| Cumene | 98-82-8 | 0-5 |
| Ethylbenzene | 100-41-4 | 0-5 |
| Benzene | 71-43-2 | 0-4.9 |
| n-Hexane | 110-54-3 | 0-3 |
| Cyclohexane | 110-82-7 | 0-3 |

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Ethylbenzene (CAS 100-41-4)
n-Hexane (CAS 110-54-3)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Pentane (CAS 109-66-0)

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Toluene (CAS 108-88-3) 6594

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Toluene (CAS 108-88-3) 35 % weight/volumn

DEA Exempt Chemical Mixtures Code Number

Toluene (CAS 108-88-3) 594

US. Massachusetts RTK - Substance List

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethanol (CAS 64-17-5)
Ethylbenzene (CAS 100-41-4)
Hexane (Other Isomers) (CAS 96-14-0)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
Octane (All isomers) (CAS 111-65-9)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

US. New Jersey Worker and Community Right-to-Know Act

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethanol (CAS 64-17-5)
Ethylbenzene (CAS 100-41-4)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
Octane (All isomers) (CAS 111-65-9)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

US. Pennsylvania Worker and Community Right-to-Know Law

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethanol (CAS 64-17-5)
Ethylbenzene (CAS 100-41-4)
Gasoline (CAS 86290-81-5)
Hexane (Other Isomers) (CAS 96-14-0)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
Octane (All isomers) (CAS 111-65-9)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

US. Rhode Island RTK

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethylbenzene (CAS 100-41-4)
n-Hexane (CAS 110-54-3)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

US. California Proposition 65**US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance**

Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Ethylbenzene (CAS 100-41-4)
Toluene (CAS 108-88-3)

International Inventories

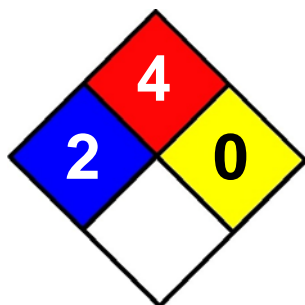
| Country(s) or region | Inventory name | On inventory (yes/no)* |
|-----------------------------|--|------------------------|
| Australia | Australian Inventory of Chemical Substances (AICS) | Yes |
| Canada | Domestic Substances List (DSL) | Yes |
| Canada | Non-Domestic Substances List (NDSL) | No |
| China | Inventory of Existing Chemical Substances in China (IECSC) | No |
| 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 this product complies 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, including date of preparation or last revision

| | |
|---------------------|---|
| Issue date | 13-May-2013 |
| Revision date | 23-May-2014 |
| Version # | 03 |
| Further information | HMIS® is a registered trade and service mark of the NPCA. |
| NFPA Ratings | |



| | |
|------------|--|
| References | ACGIH EPA: AQUIRE database NLM: Hazardous Substances Data Base US. IARC Monographs on Occupational Exposures to Chemical Agents HSDB® - Hazardous Substances Data Bank IARC Monographs. Overall Evaluation of Carcinogenicity National Toxicology Program (NTP) Report on Carcinogens ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices |
|------------|--|

| | |
|------------|--|
| Disclaimer | This material Safety Data Sheet (SDS) was prepared in accordance with 29 CFR 1910.1200 by Valero Marketing & Supply Co., ("VALERO"). VALERO does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations. |
|------------|--|

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 : 03/2023

REVISION NUMBER : 2

TABLE OF CONTENTS

| | |
|---|---|
| 1. PURPOSE | 1 |
| 2. SCOPE AND APPLICABILITY | 1 |
| 3. ROLES AND RESPONSIBILITIES..... | 1 |
| 4. HAZARD IDENTIFICATION AND ASSESSMENT | 2 |
| 5. TRAINING..... | 2 |
| 6. DRINKING WATER | 3 |
| 7. ACCESS TO SHADE | 4 |
| 8. MONITORING AND SCHEDULING | 5 |
| 9. ACCLIMATIZATION AND NEW EMPLOYEE PROCEDURES..... | 5 |
| 10. HEAT WAVE AND EXTREME HEAT PROCEDURES | 5 |
| 11. EMERGENCY RESPONSE PROCEDURES..... | 6 |
| 12. HEAT-RELATED ILLNESSES..... | 6 |
| 13. OTHER HEAT CONTROLS | 8 |

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 regards 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 field work, 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 can 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 assure 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.
- Heat wave 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 receptacle. Accessible sanitation facilities shall also be maintained at work Sites as appropriate.

SS/SHSO are 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 choosing 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

Shade shall be strong enough to cool employees down and other shadows should not be visible in the shade. 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 setup 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 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. HEAT WAVE 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 are 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, work trailers). Supervisors, prior to supervising personnel in the field as well as all personnel involved with the field work 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 include, 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 one's 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 Management Program

**PERSONAL PROTECTIVE EQUIPMENT
MANAGEMENT PROGRAM**

| | | |
|---|----------|------------------------------|
| CORPORATE HEALTH AND SAFETY DIRECTOR | : | Brian Hobbs, CIH, CSP |
| EFFECTIVE DATE | : | 01/2019 |
| REVIEW DATE | : | 03/2023 |
| REVISION NUMBER | : | 4 |

TABLE OF CONTENTS

| | |
|--|---|
| 1. PURPOSE..... | 1 |
| 2. SCOPE AND APPLICABILITY | 1 |
| 3. PROCEDURES | 1 |
| 3.1 Introduction | 1 |
| 3.1.1 Training | 1 |
| 3.2 Types of PPE..... | 2 |
| 3.3 Protective Clothing Selection Criteria | 2 |
| 3.3.1 Chemicals Present..... | 2 |
| 3.3.2 Concentration of the Chemical(s) | 3 |
| 3.3.3 Physical State | 3 |
| 3.3.4 Length of Exposure | 3 |
| 3.3.5 Abrasion | 3 |
| 3.3.6 Dexterity | 3 |
| 3.3.7 Ability to Decontaminate | 4 |
| 3.3.8 Climactic Conditions | 4 |
| 3.3.9 Work Load..... | 4 |
| 3.4 Types of Protective Materials | 4 |
| 3.5 Protection Levels | 5 |
| 3.5.1 Level A Protection | 5 |
| 3.5.2 Level B Protection | 5 |
| 3.5.3 Level C Protection..... | 6 |
| 3.5.4 Level D Protection..... | 6 |
| 3.5.5 Level E Protection | 7 |
| 3.5.6 Additional Considerations | 7 |

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.

The proper selection of equipment is important in preventing exposures. The Project Manager (PM) or health and safety personnel making the selection will have to take several factors into consideration. 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. An accurate assessment of all these factors must be made before work can be safely carried out.

3.1.1 Training

Training shall be provided to all field-based employees in the proper use and care of PPE. Training shall include, but is not 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 necessary; how to don, doff, adjust and wear PPE; the limitations of PPE; the proper care, maintenance, useful life 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. Training certifications are provided to employees that include the date of training and certification subject.

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/or size shall be evaluated to ensure adequate protection for all employees. 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 - Not specifically regulated.
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) - Not specifically regulated.

3.3 Protective Clothing Selection Criteria

3.3.1 Chemicals Present

The most important factor in selecting PPE is the determination of what chemicals the employee may be exposed to. On field investigations, the number of chemicals 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 samples of the air, soil, water, or other site media. 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 taken into consideration 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, be permeated by, or otherwise fail to protect under given circumstances. Fortunately, most manufacturers make guides to the use of 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 in conjunction 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 of time; 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 different layers of protective materials) affords the best protection.

3.3.2 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/or solid state. Airborne and liquid chemical concentrations should be compared to the OSHA standards and/or 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 it is 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 both the OSHA and ACGIH exposure limit tables.

3.3.3 Physical State

The characteristics of a chemical may range from nontoxic to extremely 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 is dependent 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 some type of lightweight gloves.

3.3.4 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 different materials can be used that would be considered inadequate under long-term exposures. It should be kept in mind that during manufacturer's permeation testing, a pure (100% composition) liquid is usually placed in direct contact with the material producing a worst-case situation.

3.3.5 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. The use of leather gloves and a heavy apron over other normal protective clothing will help prevent damage to the normal PPE, and thus reduce worker exposures.

3.3.6 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 a thick glove. Therefore, the PPE selection process must consider the task being performed and provide PPE alternatives or techniques that allow dexterity to be maintained while still protecting the worker (e.g., wearing tight latex gloves over more bulky hand protection to increase dexterity).

3.3.7 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 it can be reused. If the chemical has completely permeated the material, the clothing cannot be adequately decontaminated, and the material should be discarded.

3.3.8 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 very cold temperatures. If there are any questions about the stability of the protective materials under different conditions, the manufacturer should be contacted prior to using PPE in the field.

3.3.9 Work Load

Like climactic conditions, the type of work activity may affect work duration and the ability of personnel 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 both 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 field work.

3.4 Types of Protective Materials

1. Cellulose or Paper: suitable for nuisance dusts and coarse fibers.
2. Natural and Synthetic Fibers
 - a. Tyvek™: suitable small sized hazardous particles, including lead, asbestos, and mold.
 - b. Tychem™: suitable for a variety of hazards from light liquid splashes to heavy exposures of industrial chemicals and agents.
 - c. Nomex™: 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.

3.5 Protection Levels

3.5.1 Level A Protection

Level A protection (a fully encapsulated suit) is used when skin hazards exist or when there is no known data that 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 the use of 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 suggest a need for Level A protection:

- Confined facilities where probability of skin contact is high;
- Sites containing known skin hazards;
- Sites with no established history to rule out skin and other absorption hazards;
- Atmosphere immediately dangerous to life and health (IDLH) through the skin absorption route;
- Site exhibiting signs of acute mammalian toxicity (e.g., dead animals, illnesses associated with past entry into site by humans);
- Sites at which sealed drums of unknown materials must be opened;
- 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
- 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.

The following items constitute Level A protection:

- Open circuit, pressure-demand self-contained breathing apparatus (SCBA);
- Totally encapsulated suit;
- Gloves, inner (surgical type);
- Gloves, outer;
- Chemical protective;
- Boots, chemical protective, steel toe and shank;
- Radiation detector (if applicable); and
- Communications.

3.5.2 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.

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 or particulates, or splashes of materials that will affect the skin of personnel.

Personal protective equipment for Level B includes:

- Open circuit, pressure-demand SCBA;
- Chemical protective clothing:
- Overalls and long-sleeve jacket; or
- Coveralls;
- Gloves, inner (surgical type); gloves, outer, chemical protective;
- Boots, chemical protective, steel toe, and shank; and
- Communications optional.

3.5.3 Level C Protection

Level C protection is utilized when both 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.

Personal protective equipment for Level C typically includes:

- full facepiece air-purifying respirator;
- emergency escape respirator (optional);
- chemical protective clothing:
 - overalls and long-sleeved jacket; or
 - coveralls;
- gloves, inner (surgical type);
- gloves, outer, chemical protective; and
- boots, chemical protective, steel toe, and shank.

3.5.4 Level D Protection

Level D is the basic work uniform. Personal protective equipment for Level D includes:

- Coveralls;
- Safety boots/shoes;
- Eye protection;
- Hand protection;

- Reflective traffic safety vest (mandatory for traffic areas or railyards);
- Hard hat (with face shield is optional); and
- Emergency escape respirator is optional.

3.5.5 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.

3.5.6 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 cut down on 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 situation requires the use of 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 fit of the respirator.

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 prior to 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 in such a way 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 a 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 that have higher possibilities of vapors, gases or particulates.

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 | : | 03/2023 |
| REVISION NUMBER | : | 3 |

TABLE OF CONTENTS

| | |
|--|---|
| 1. PURPOSE..... | 1 |
| 2. SCOPE AND APPLICABILITY..... | 1 |
| 3. PROCEDURES..... | 1 |
| 3.1 Before Intrusive Activities/Job Planning Process | 1 |
| 3.2 Utility Mark Out | 2 |
| 3.3 Site Visit/Utility Walkthrough..... | 3 |
| 3.4 Guidance on Preferred Methods of Clearing the Subsurface | 3 |
| 3.4.1 Guidance for Tools and Equipment | 4 |
| 3.5 During Intrusive Activities | 4 |
| 3.6 Stop Work Authority..... | 5 |

APPENDICES

Appendix A – Roux Subsurface Utility Clearance Checklist

Appendix B – Utility Verification/Site Walkthrough Record

Appendix C – 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 Roux Subsurface Variance Form located within the Roux Health & Safety 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

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.

If there is the potential for unexploded ordinances or munitions, consultation with your OM and CHSD is required prior to site operations.

During the project kick-off meeting for intrusive activities, the Project Manager (PM) will review the Roux Subsurface Utility Clearance Checklist and Utility Verification (Appendix A) / Site Walkthrough Record (Appendix B) and the below bullet points with the project field team:

- 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 / GPR / geophysical-type services. 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 and 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 utilities that are identified 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 the soft Digging must be completed prior to intrusive work.
- 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.
 - 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.
- 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 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 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 Markout, ensure the contractor has a plan regarding what types of technology will be used based on Table 1 in Appendix C: Private Utility Technology Applications and Considerations. If possible, it is recommended that multiple technologies are used to sweep each location/work area. Use 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.

- Identify overhead utilities that may impede equipment mobilization or work zones to ensure adequate clearance distance, as specified within the site-specific Health and Safety Plan (HASP).

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, and valve box covers, clean-outs, etc.

By observing the path between the main service line and the connection point, 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.

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.

3.4 Guidance on Preferred Methods of Clearing the Subsurface

At least one of the methods listed below should 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.

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 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).

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.
- Crow bars, pinch bars, or pry bars should not be used to break hardened soil or backfill, except when authorized by the SS lead 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/SHSO immediately.

3.5 During Intrusive Activities

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 jack hammering 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.

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.

- The size of the pre-clearance exploratory test hole should be, at a minimum, twice the diameter of any downhole tool or boring device. Note: 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 PM and PP to evaluate alternative approaches for the project. Alternative approaches will need to be pre-approved by the OM.
- 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 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 are performed.
- Halt the intrusive activities and immediately consult with the PP if an unmarked utility is encountered.
- Completing any subsurface utility incident reports that are necessary.
- If a utility cannot be found as marked, Roux personnel shall notify the facility owner/operator directly or through the one-call center. 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; however, at a maximum, ticket life shall not exceed 20 working days.

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.

Appendix A - Roux Subsurface Utility Clearance Checklist

Roux Subsurface Utility Clearance Checklist

Date of Revision:
3/2023

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: <ul style="list-style-type: none"> Physically clear to a depth of 5 feet bls. The size of the pre-clearance exploratory test hole must 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% 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.
- 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.), to the minimum required depth.
- 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.

Appendix B - Utility Verification/Site Walkthrough Record

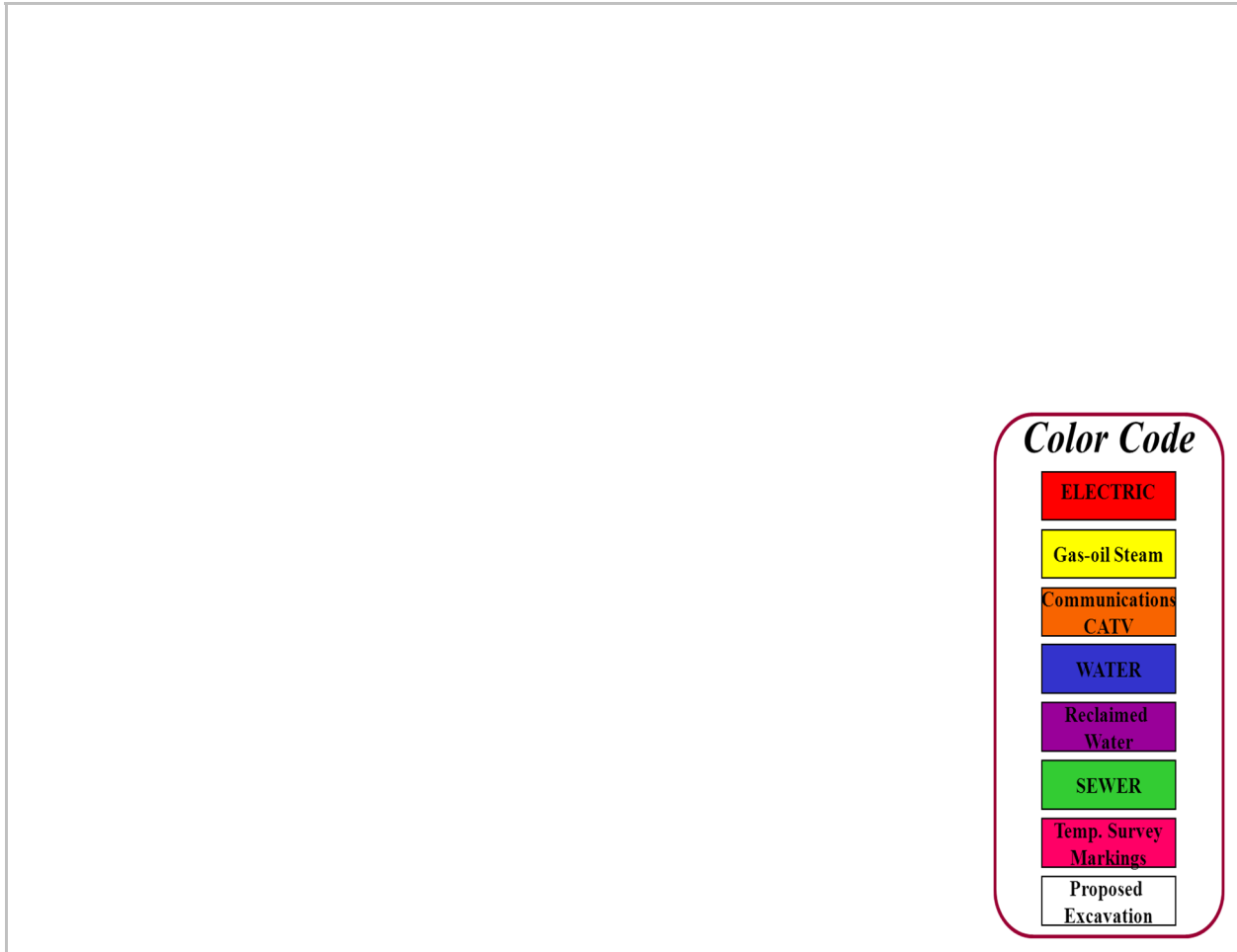
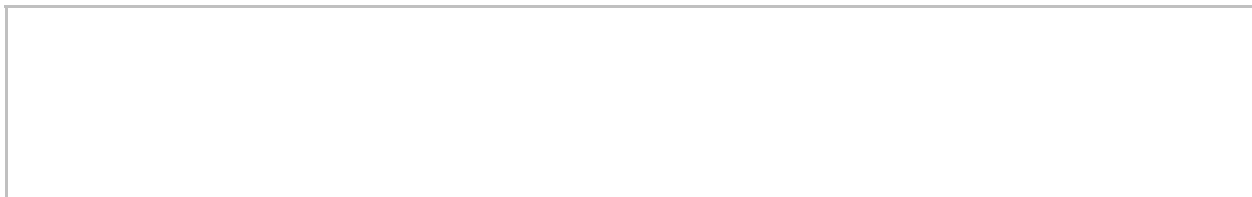
Employee Name: _____

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:***Color Code*****ELECTRIC****Gas-oil Steam****Communications
CATV****WATER****Reclaimed
Water****SEWER****Temp. Survey
Markings****Proposed
Excavation****Other Comments / Findings:**

Completed by: _____

Signature: _____ Date: _____

Appendix C – 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) ≡ |
|--|---|--|---------------------------------------|-------------------------------------|--|--|
| 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 metalli c |
| Metallic/Non-Metallic Line (without Tracer Wire) | G metallic | R non- metallic | R | * G | Y | G metalli c |
| Metal or Fiberglass UST | R | R | * G | R | R | G metalli c |

Additional Considerations

| Technology ⇒ Variable ↓ | Radio Frequency Electro-Magnetic Detector | Ground Penetrating Radar (GPR)⊙ | Acoustic Pipe Locator | Beacon, Sonde, or Conductive Rodder Insertion | EM-61 ≡ |
|---|---|--|--------------------------|--|------------|
| 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.
- ≡ Emerging technology with limited availability.
- + Access: induce unique electronic signature, apply acoustical impulse or insert conductive rod/sonde/beacon/sonde.

Green Generally, an applicable technology **Yellow** May or may not be applicable **Red** Not generally applicable

APPENDIX F

Heavy Equipment Exclusion Zone Management Program



**HEAVY EQUIPMENT EXCLUSION ZONE
MANAGEMENT PROGRAM**

CORPORATE HEALTH AND SAFETY DIRECTOR : Brian Hobbs, CIH, CSP
EFFECTIVE DATE : 01/2019
REVIEWED DATE : 03/2023
REVISION NUMBER : 2

TABLE OF CONTENTS

| | |
|----------------------------------|---|
| 1. PURPOSE..... | 1 |
| 2. SCOPE AND APPLICABILITY | 1 |
| 3. PROCEDURES..... | 1 |
| 3.1 Exceptions | 2 |
| 4. TRAINING | 2 |
| 5. STOP WORK AUTHORITY | 2 |

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) should be 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 were running.

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

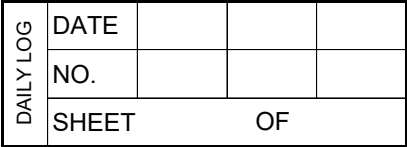
unsure how to carry out work safely. This includes upon observing any questionable safety-related behavior or condition, they are to stop work immediately and discuss the behavior or condition with the individual(s) involved. Upon stopping work, the following actions will be taken:

- 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 I

SITE MANAGEMENT FORMS

[illegible]



Enclosure 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form



Site Details

Box 1

Site No. **C915281**

Site Name **Former Trico Plant**

Site Address: 628 Ellicott Street Zip Code: 14203

City/Town: Buffalo

County: Erie

Site Acreage: 2.110

Reporting Period:

YES NO

1. Is the information above correct?

☐ ☐

If NO, include handwritten above or on a separate sheet.

2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?

☐ ☐

3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?

☐ ☐

4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?

☐ ☐

If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.

5. Is the site currently undergoing development?

☐ ☐

Box 2

YES NO

6. Is the current site use consistent with the use(s) listed below?

☐ ☐

Restricted-Residential, Commercial, and Industrial

7. Are all ICs in place and functioning as designed?

☐ ☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative

Date

Box 2A

YES NO

8. Has any new information revealed that assumptions made in the Qualitative Exposure Assessment regarding offsite contamination are no longer valid? ☐ ☐

If you answered YES to question 8, include documentation or evidence that documentation has been previously submitted with this certification form.

9. Are the assumptions in the Qualitative Exposure Assessment still valid?
(The Qualitative Exposure Assessment must be certified every five years) ☐ ☐

If you answered NO to question 9, the Periodic Review Report must include an updated Qualitative Exposure Assessment based on the new assumptions.

SITE NO. C915281**Box 3****Description of Institutional Controls**ParcelOwnerInstitutional Control

111.31-1-1.11

791 Washington Street, LLC

Ground Water Use Restriction
Soil Management Plan
Landuse Restriction
Site Management Plan
O&M Plan
IC/EC Plan

Monitoring Plan

- . Prohibition of use of groundwater.
- . Restricted Residential Use.
- . Soil Vapor Intrusion Evaluation for any future structures.
- . Soil Management or Excavation Work Plan for any future intrusive work.

Box 4**Description of Engineering Controls**ParcelEngineering Control

111.31-1-1.11

Vapor Mitigation
Cover System

If the lowest floors of the building remain as parking (not occupied), are continuously ventilated, and remaining contamination onsite continues to decrease, no SSDS is required. If these conditions change, a SVI assessment will be required.

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the Engineering Control certification;

b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and complete.

YES NO

☐☐

2. For each Engineering control listed in Box 4, I certify by checking "YES" below that all of the following statements are true:

(a) The Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

(b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

(c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

(d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

(e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES NO

☐☐

**IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and
DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.**

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative

Date

**IC CERTIFICATIONS
SITE NO. C915281**

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I _____ at _____,
print name print business address

am certifying as _____(Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Signature of Owner, Remedial Party, or Designated Representative
Rendering Certification

Date

EC CERTIFICATIONS

Box 7

Qualified Environmental Professional Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I _____ at _____,
print name print business address

am certifying as a Qualified Environmental Professional for the _____
(Owner or Remedial Party)

Signature of Qualified Environmental Professional, for
the Owner or Remedial Party, Rendering Certification

Stamp
(Required for PE)

Date

Enclosure 3
Periodic Review Report (PRR) General Guidance

- I. Executive Summary: (1/2-page or less)
 - A. Provide a brief summary of site, nature and extent of contamination, and remedial history.
 - B. Effectiveness of the Remedial Program - Provide overall conclusions regarding;
 - 1. progress made during the reporting period toward meeting the remedial objectives for the site
 - 2. the ultimate ability of the remedial program to achieve the remedial objectives for the site.
 - C. Compliance
 - 1. Identify any areas of non-compliance regarding the major elements of the Site Management Plan (SMP, i.e., the Institutional/Engineering Control (IC/EC) Plan, the Monitoring Plan, and the Operation & Maintenance (O&M) Plan).
 - 2. Propose steps to be taken and a schedule to correct any areas of non-compliance.
 - D. Recommendations
 - 1. recommend whether any changes to the SMP are needed
 - 2. recommend any changes to the frequency for submittal of PRRs (increase, decrease)
 - 3. recommend whether the requirements for discontinuing site management have been met.
- II. Site Overview (one page or less)
 - A. Describe the site location, boundaries (figure), significant features, surrounding area, and the nature and extent of contamination prior to site remediation.
 - B. Describe the chronology of the main features of the remedial program for the site, the components of the selected remedy, cleanup goals, site closure criteria, and any significant changes to the selected remedy that have been made since remedy selection.
- III. Evaluate Remedy Performance, Effectiveness, and Protectiveness
Using tables, graphs, charts and bulleted text to the extent practicable, describe the effectiveness of the remedy in achieving the remedial goals for the site. Base findings, recommendations, and conclusions on objective data. Evaluations and should be presented simply and concisely.
- IV. IC/EC Plan Compliance Report (if applicable)
 - A. IC/EC Requirements and Compliance
 - 1. Describe each control, its objective, and how performance of the control is evaluated.
 - 2. Summarize the status of each goal (whether it is fully in place and its effectiveness).
 - 3. Corrective Measures: describe steps proposed to address any deficiencies in ICECs.
 - 4. Conclusions and recommendations for changes.
 - B. IC/EC Certification
 - 1. The certification must be complete (even if there are IC/EC deficiencies), and certified by the appropriate party as set forth in a Department-approved certification form(s).
- V. Monitoring Plan Compliance Report (if applicable)
 - A. Components of the Monitoring Plan (tabular presentations preferred) - Describe the requirements of the monitoring plan by media (i.e., soil, groundwater, sediment, etc.) and by any remedial technologies being used at the site.
 - B. Summary of Monitoring Completed During Reporting Period - Describe the monitoring tasks actually completed during this PRR reporting period. Tables and/or figures should be used to show all data.
 - C. Comparisons with Remedial Objectives - Compare the results of all monitoring with the remedial objectives for the site. Include trend analyses where possible.
 - D. Monitoring Deficiencies - Describe any ways in which monitoring did not fully comply with the monitoring plan.
 - E. Conclusions and Recommendations for Changes - Provide overall conclusions regarding the monitoring completed and the resulting evaluations regarding remedial effectiveness.
- VI. Operation & Maintenance (O&M) Plan Compliance Report (if applicable)
 - A. Components of O&M Plan - Describe the requirements of the O&M plan including required activities, frequencies, recordkeeping, etc.
 - B. Summary of O&M Completed During Reporting Period - Describe the O&M tasks actually completed during this PRR reporting period.
 - C. Evaluation of Remedial Systems - Based upon the results of the O&M activities completed, evaluated

the ability of each component of the remedy subject to O&M requirements to perform as designed/expected.

- D. O&M Deficiencies - Identify any deficiencies in complying with the O&M plan during this PRR reporting period.
- E. Conclusions and Recommendations for Improvements - Provide an overall conclusion regarding O&M for the site and identify any suggested improvements requiring changes in the O&M Plan.

VII. Overall PRR Conclusions and Recommendations

- A. Compliance with SMP - For each component of the SMP (i.e., IC/EC, monitoring, O&M), summarize;
 - 1. whether all requirements of each plan were met during the reporting period
 - 2. any requirements not met
 - 3. proposed plans and a schedule for coming into full compliance.
- B. Performance and Effectiveness of the Remedy - Based upon your evaluation of the components of the SMP, form conclusions about the performance of each component and the ability of the remedy to achieve the remedial objectives for the site.
- C. Future PRR Submittals
 - 1. Recommend, with supporting justification, whether the frequency of the submittal of PRRs should be changed (either increased or decreased).
 - 2. If the requirements for site closure have been achieved, contact the Departments Project Manager for the site to determine what, if any, additional documentation is needed to support a decision to discontinue site management.

VIII. Additional Guidance

Additional guidance regarding the preparation and submittal of an acceptable PRR can be obtained from the Departments Project Manager for the site.

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)

Start Date: _____

Current Reporting Period

Reporting Period From: _____ To: _____

Contact Information

Preparer's Name: _____ Phone No.: _____

Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

| | Current Reporting Period | Total to Date |
|--|--------------------------|---------------|
| Fuel Type 1 (e.g. natural gas (cf)) | | |
| Fuel Type 2 (e.g. fuel oil, propane (gals)) | | |
| Electricity (kWh) | | |
| Of that Electric usage, provide quantity: | | |
| Derived from renewable sources (e.g. solar, wind) | | |
| Other energy sources (e.g. geothermal, solar thermal (Btu)) | | |

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

| | Current Reporting Period (tons) | Total to Date (tons) |
|---|---------------------------------|----------------------|
| Total waste generated on-site | | |
| OM&M generated waste | | |
| Of that total amount, provide quantity: | | |
| Transported off-site to landfills | | |
| Transported off-site to other disposal facilities | | |
| Transported off-site for recycling/reuse | | |
| Reused on-site | | |

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

| | Current Reporting Period (miles) | Total to Date (miles) |
|-------------------------------------|----------------------------------|-----------------------|
| Standby Engineer/Contractor | | |
| Laboratory Courier/Delivery Service | | |
| Waste Removal/Hauling | | |

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/ services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

| | Current Reporting Period (gallons) | Total to Date (gallons) |
|--|------------------------------------|-------------------------|
| Total quantity of water used on-site | | |
| Of that total amount, provide quantity: | | |
| Public potable water supply usage | | |
| Surface water usage | | |
| On-site groundwater usage | | |
| Collected or diverted storm water usage | | |

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

| | Current Reporting Period (acres) | Total to Date (acres) |
|----------------|----------------------------------|-----------------------|
| Land disturbed | | |
| Land restored | | |

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

| |
|---|
| Description of green remediation programs reported above (Attach additional sheets if needed) |
| Energy Usage: |
| Waste Generation: |
| Transportation/Shipping: |
| Water usage: |
| Land Use and Ecosystems: |
| Other: |

| | |
|---|----------------------------|
| CERTIFICATION BY CONTRACTOR | |
| I, _____ (Name) do hereby certify that I am _____ (Title) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. | |
| _____ Date | _____ Contractor |



**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

Site Name:

Site Number:

The allowable site use is:

Have Ecological Resources been identified?

Is this soil originating from the site?

How many cubic yards of soil will be imported/reused?

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?

Does it contain less than 10%, by weight, material that passes a size 100 sieve?

Is this virgin material from a permitted mine or quarry?

Is this material recycled concrete or brick from a DEC registered processing facility?

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:

Name and address of fill 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

APPENDIX J

VENTILATION SYSTEM INFORMATION

The design concepts, construction drawings and details presented herein are the sole property of Architectural Resources, P.C. Any reproduction or other use of this information without the written consent of Architectural Resources, P.C. is expressly prohibited. All rights reserved. Copyright Architectural Resources, P.C.

DIRECT GAS-FIRED MAKE-UP AIR UNIT SCHEDULE

| UNIT No. | LOCATION | SERVICE | CFM | ESP "W.G. | SUPPLY FAN RPM | SONES | MOTOR | | HEATING SECTION | | | | | | ELECTRICAL | | | MANUFACTURER | MODEL | WEIGHT | REMARKS |
|----------|----------------------|----------------|------|-----------|----------------|-------|-------|-----------|-----------------|--------|------|--------|------------|-------------|------------|------|-----|--------------|-------------|---------|-----------|
| | | | | | | | RPM | ENCLOSURE | INPUT | OUTPUT | EAT | LAT | EFFICIENCY | TYPE | POWER | MCA | MOP | | | | |
| MAU-1 | LOWER LEVEL PARKING | GARAGE HEATING | 1500 | 1.0 | 1425 | 12.1 | 1725 | ODP | 193.7 | 178.2 | 0 °F | 110 °F | 92.0 % | NATURAL GAS | 480-3-60 | 2.9 | 15 | GREENHECK | DG-109-H10 | 489 LBS | SEE NOTES |
| MAU-2 | LOWER LEVEL PARKING | GARAGE HEATING | 1000 | 1.0 | 1545 | 15.9 | 1725 | ODP | 129.1 | 118.8 | 0 °F | 110 °F | 92.0 % | NATURAL GAS | 480-3-60 | 2.3 | 15 | GREENHECK | DG-108-H10 | 479 LBS | SEE NOTES |
| MAU-3 | LOWER LEVEL PARKING | GARAGE HEATING | 1500 | 1.0 | 1425 | 12.1 | 1725 | ODP | 193.7 | 178.2 | 0 °F | 110 °F | 92.0 % | NATURAL GAS | 480-3-60 | 2.9 | 15 | GREENHECK | DG-109-H10 | 489 LBS | SEE NOTES |
| MAU-4 | LOWER LEVEL PARKING | GARAGE HEATING | 1500 | 1.0 | 1425 | 12.1 | 1725 | ODP | 193.7 | 178.2 | 0 °F | 110 °F | 92.0 % | NATURAL GAS | 480-3-60 | 2.9 | 15 | GREENHECK | DG-109-H10 | 489 LBS | SEE NOTES |
| MAU-5 | STREET LEVEL PARKING | GARAGE HEATING | 1500 | 1.0 | 1425 | 12.1 | 1725 | ODP | 193.7 | 178.2 | 0 °F | 110 °F | 92.0 % | NATURAL GAS | 480-3-60 | 2.9 | 15 | GREENHECK | DG-109-H10 | 489 LBS | SEE NOTES |
| MAU-6 | SECOND LEVEL PARKING | GARAGE HEATING | 1500 | 1.0 | 1425 | 12.1 | 1725 | ODP | 193.7 | 178.2 | 0 °F | 110 °F | 92.0 % | NATURAL GAS | 480-3-60 | 2.9 | 15 | GREENHECK | DG-109-H10 | 489 LBS | SEE NOTES |
| MAU-7 | FIRST FLOOR | LOADING DOCK | 800 | 1.0 | 1567 | 8.9 | 1725 | ODP | 103.3 | 95.0 | 0 °F | 110 °F | 92.0 Ø | NATURAL GAS | 208-1-60 | 11.7 | 20 | GREENHECK | DG-P115-H05 | 369 LBS | SEE NOTES |

NOTES:

1. PROVIDE OUTDOOR AIR ARRANGEMENT.
2. PROVIDE V-BANK FILTER MODULE, BURNER MODULE, AND FAN MODULE.
3. PROVIDE 120V MOTORIZED DAMPER INTERLOCKED WITH THE RESPECTIVE AIR HANDLING UNIT.
4. PROVIDE INSULATED CABINET ENCLOSURE.
5. PROVIDE FREEZE PROTECTION CONTROLS.
6. PROVIDE DISCHARGE TEMPERATURE CONTROLLER.
7. PROVIDE HANGING KIT WITH VIBRATION ISOLATORS.
8. PROVIDE FLEXIBLE DUCT CONNECTIONS.
9. PROVIDE FACTORY MOUNTED ELECTRICAL DISCONNECT SWITCH.
10. PROVIDE SMOKE DETECTORS.
11. PROVIDE DIRTY FILTER SWITCH.
12. PROVIDE BURNER CAPABLE OF 30:1 TURNDOWN.

PARKING GARAGE EXHAUST FAN SCHEDULE

| UNIT No. | LOCATION | SERVICE | TYPE | CFM | ESP "W.G. | FAN | | | MOTOR | | ELECTRICAL | | MANUFACTURER | MODEL | WEIGHT | REMARKS |
|----------|----------------------|----------------------------|---------------|--------|-----------|-------|-----|--------|-------|-------|------------|-----|--------------|----------------|--------|-------------|
| | | | | | | SONES | RPM | DRIVE | RPM | HP | POWER | FLA | | | | |
| EF-1 | LOWER LEVEL PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 9,000 | 0.30 | 26 | 797 | DIRECT | 1725 | 2 | 460-3-60 | - | GREENHECK | SC3-24-620-A20 | 80 | 1,5,6,7,8,9 |
| EF-2 | LOWER LEVEL PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 9,000 | 0.30 | 26 | 797 | DIRECT | 1725 | 2 | 460-3-60 | - | GREENHECK | SC3-24-620-A20 | 80 | 1,5,6,7,8,9 |
| EF-3 | LOWER LEVEL PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 9,000 | 0.30 | 26 | 797 | DIRECT | 1725 | 2 | 460-3-60 | - | GREENHECK | SC3-24-620-A20 | 80 | 1,5,6,7,8,9 |
| EF-4 | LOWER LEVEL PARKING | GENERAL GARAGE VENTILATION | SIDEWALL PROP | 3,000 | 0.30 | 14.5 | 666 | DIRECT | 1725 | 3/4 | 460-3-60 | - | GREENHECK | SC3-24-625-B7 | 317 | 1,5,6,7,8,9 |
| EF-5 | LOWER LEVEL PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 10,000 | 0.30 | 26 | 797 | BELT | 1725 | 1-1/2 | 480-3-60 | 3.0 | GREENHECK | SBE-3H36-15 | 317 | 1,5,6,7,8,9 |
| EF-6 | LOWER LEVEL PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 10,000 | 0.30 | 26 | 797 | BELT | 1725 | 1-1/2 | 480-3-60 | 3.0 | GREENHECK | SBE-3H36-15 | 317 | 1,5,6,7,8,9 |
| EF-7 | LOWER LEVEL PARKING | GENERAL GARAGE VENTILATION | SIDEWALL PROP | 3,000 | 0.30 | 14.5 | 666 | BELT | 1725 | 1/3 | 115-1-60 | 7.2 | GREENHECK | SBE-3H30-3 | 241 | 1,5,6,7,8,9 |
| EF-8 | FIRST FLOOR PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 7,000 | 0.30 | 23 | 923 | BELT | 1725 | 1 | 208-3-60 | 4.6 | GREENHECK | SBE-3H30-10 | 254 | 1,5,6,7,8,9 |
| EF-9 | FIRST FLOOR PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 7,000 | 0.30 | 23 | 923 | BELT | 1725 | 1 | 208-3-60 | 4.6 | GREENHECK | SBE-3H30-10 | 254 | 1,5,6,7,8,9 |
| EF-10 | SECOND FLOOR PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 11,000 | 0.30 | 28 | 844 | BELT | 1725 | 1-1/2 | 460-3-60 | 3.0 | GREENHECK | SBE-3H36-15 | 317 | 1,5,6,7,8,9 |
| EF-11 | SECOND FLOOR PARKING | EMERGENCY VENTILATION | SIDEWALL PROP | 12,000 | 0.5 | 32 | 820 | BELT | 1725 | 3 | 460-3-60 | 4.8 | GREENHECK | SBE-2H36-30 | 171 | 1,5,6,7,8,9 |
| EF-12 | MECH. ROOM 207 | GENERAL GARAGE VENTILATION | SIDEWALL PROP | 5,100 | 0.30 | 18.1 | 779 | BELT | 1725 | 3/4 | 460-3-60 | 1.6 | GREENHECK | SBE-3H30-7 | 250 | 1,5,6,7,8,9 |

NOTES:

1. PROVIDE ELECTRICAL DISCONNECT.
2. PROVIDE FLEXIBLE DUCT CONNECTIONS.
3. PROVIDE LOW VOLTAGE MOTORIZED OPERATED DAMPER. REFER TO THE SPECIFICATIONS FOR OPERATION.
4. PROVIDE HANGING KIT WITH VIBRATIONS ISOLATORS.
5. PROVIDE WIRE GUARD FAN ENCLOSURE.
6. PROVIDE SHEET METAL PLENUM CONNECTION FULL SIZE OF OUTLET CONNECTION.
7. PROVIDE BACK-DRAFT DAMPER.
8. PROVIDE MANUFACTURER'S WALL MOUNTING BRACKET KIT.

BOILER SCHEDULE

| UNIT No. | LOCATION | SERVICE | MAXIMUM INPUT (MBH) | MINIMUM INPUT (MBH) | CAPACITY (MBH) | AHRI THERMAL EFFICIENCY | TURNDOWN | FLOWRATE (GPM) | TEMPERATURE RISE (°F) | PRESSURE DROP (FT H2O) | GAS CONNECTION SIZE | AIR INLET SIZE | VENTING SIZE | SHIPPING WEIGHT | POWER | FLA | "LAARS" MODEL No. | REMARKS |
|----------|---------------------------|------------------|---------------------|---------------------|----------------|-------------------------|----------|----------------|-----------------------|------------------------|---------------------|----------------|--------------|-----------------|----------|-----|-------------------|-----------|
| B-1 | 6TH FLOOR MECHANICAL ROOM | HOT WATER SUPPLY | 2,500 | 125.0 | 2,300 | 92% | 5:1 | 200 | 20 | 1.7 | 2" | 8"Ø | 9"Ø | 3,652 LBS | 480-3-60 | 8.7 | MGH2500 | SEE NOTES |
| B-2 | 6TH FLOOR MECHANICAL ROOM | HOT WATER SUPPLY | 2,500 | 125.0 | 2,300 | 92% | 5:1 | 200 | 20 | 1.7 | 2" | 8"Ø | 9"Ø | 3,652 LBS | 480-3-60 | 8.7 | MGH2500 | SEE NOTES |
| B-3 | 6TH FLOOR MECHANICAL ROOM | HOT WATER SUPPLY | 2,500 | 125.0 | 2,300 | 92% | 5:1 | 200 | 20 | 1.7 | 2" | 8"Ø | 9"Ø | 3,652 LBS | 480-3-60 | 8.7 | MGH2500 | SEE NOTES |

NOTES:

1. PROVIDE CONDENSATE NEUTRALIZATION KIT.
2. PROVIDE 14"W.C. MAXIMUM GAS PRESSURE, 4"W.C. MINIMUM GAS PRESSURE.
3. PROVIDE HEADER SENSOR.
4. PROVIDE 10-YEAR HEAT EXCHANGER WARRANTY.
5. PROVIDE WITH BOILER PUMP - SEE PUMP SCHEDULE.

PUMP SCHEDULE

| UNIT No. | LOCATION | SERVICE | FLOW (GPM) | PRESSURE DROP (FT H2O) | SUCTION PIPING CONNECTION | DISCHARGE PIPING CONNECTION | PUMP SPEED (RPM) | EFFICIENCY @ DUTY POINT | HP | POWER | AMPS | TYPE | MANUFACTURER | MODEL No. | WEIGHT (LBS) | REMARKS |
|----------|-----------------------------|---------------------------|------------|------------------------|---------------------------|-----------------------------|------------------|-------------------------|------|----------|------|----------------------|----------------|-------------------|--------------|---------|
| BP-1 | 6TH FLOOR MECHANICAL ROOM | BOILER B-1 | 105 | 8.0 | 2" | 2" | - | - | 3.0 | 460-3-60 | 4.0 | INLINE | BELL & GOSSETT | XL 45-375 | 50 LBS | 2 |
| BP-2 | 6TH FLOOR MECHANICAL ROOM | BOILER B-2 | 105 | 8.0 | 2" | 2" | - | - | 3.0 | 460-3-60 | 4.0 | INLINE | BELL & GOSSETT | XL 45-375 | 50 LBS | 2 |
| BP-3 | 6TH FLOOR MECHANICAL ROOM | BOILER B-3 | 105 | 8.0 | 2" | 2" | - | - | 3.0 | 460-3-60 | 4.0 | INLINE | BELL & GOSSETT | XL 45-375 | 50 LBS | 2 |
| LP-1 | 6TH FLOOR MECHANICAL ROOM | HEAT PUMP LOOP | 1800 | 95 | 8" | 6" | 1770 | 87.4% | 60.0 | 460-3-60 | - | BASE MOUNTED | BELL & GOSSETT | 6E SERIES E-1510 | 1230 LBS | 1,2,3,4 |
| LP-2 | 6TH FLOOR MECHANICAL ROOM | HEAT PUMP LOOP | 1800 | 95 | 8" | 6" | 1770 | 87.4% | 60.0 | 460-3-60 | - | BASE MOUNTED | BELL & GOSSETT | 6E SERIES E-1510 | 1230 LBS | 1,2,3,4 |
| LP-3 | LOWER LEVEL MECHANICAL ROOM | RADIANT FLOOR HEATING | 130 | 50 | 3" | 3" | - | - | 5.0 | 460-3-60 | - | INLINE | BELL & GOSSETT | E-80 2.5X2.5X0.5C | 225 LBS | 2 |
| LP-5 | LOWER LEVEL MECHANICAL ROOM | RADIANT ZONE 6 | 10 | 35 | 1-1/2" | 1-1/2" | - | - | - | 208-1-60 | 2.0 | IN-LINE PACKAGED VFD | BELL & GOSSETT | XL 55-45 | 12 LBS | 2 |
| LP-6 | 3RD FLOOR MECHANICAL ROOM | RADIANT ZONE 7 | 17 | 35 | 1-1/2" | 1-1/2" | - | - | - | 208-1-60 | 2.0 | IN-LINE PACKAGED VFD | BELL & GOSSETT | XL 55-45 | 41 LBS | 2 |
| CTP-1 | 6TH FLOOR MECHANICAL ROOM | COOLING TOWER LOOP | 1800 | 55 | 8" | 6" | 1770 | 83.4% | 40.0 | 460-3-60 | - | BASE MOUNTED | BELL & GOSSETT | 6BD SERIES E-1510 | 1085 LBS | 1,3,4,5 |
| CTP-2 | 6TH FLOOR MECHANICAL ROOM | COOLING TOWER LOOP | 1800 | 55 | 8" | 6" | 1770 | 83.4% | 40.0 | 460-3-60 | - | BASE MOUNTED | BELL & GOSSETT | 6BD SERIES E-1510 | 1085 LBS | 1,3,4,5 |
| TP-1 | 6TH FLOOR MECHANICAL ROOM | RADIANT ZONE 1 THRU 6 | 209 | 34 | 3" | 3" | 1800 | 74.9% | 3.0 | 460-3-60 | - | IN-LINE PACKAGED VFD | BELL & GOSSETT | XL 45-375 | 50 LBS | 2 |
| UP-1 | 6TH FLOOR MECHANICAL ROOM | HEAT PUMP LOOP - HEAT ADD | 153 | 20 | 3" | 3" | - | - | - | 208-1-60 | 6.0 | IN-LINE PACKAGED VFD | BELL & GOSSETT | XL 40-275 | 72 LBS | 2 |
| LP-7 | 6TH FLOOR MECHANICAL ROOM | RUN-AROUND LOOP | 362 | 20 | 4" | 3" | 1615 | 78.1% | 3.0 | 460-3-60 | - | BASE MOUNTED | BELL & GOSSETT | 3AD SERIES E-1510 | 231 LBS | 1,3,4,5 |
| LP-8 | 6TH FLOOR MECHANICAL ROOM | RUN-AROUND LOOP | 362 | 20 | 4" | 3" | 1615 | 78.1% | 3.0 | 460-3-60 | - | BASE MOUNTED | BELL & GOSSETT | 3AD SERIES E-1510 | 231 LBS | 1,3,4,5 |

NOTES:

1. PROVIDE FLEXIBLE PIPE CONNECTIONS.
2. PROVIDE VARIABLE FREQUENCY DRIVES.
3. PROVIDE WITH INERTIA BASE - FILL WITH CONCRETE.
4. PROVIDE 4" HIGH CONCRETE EQUIPMENT PAD.
5. PROVIDE STARTER / DISCONNECT.

HEAT EXCHANGER SCHEDULE

| UNIT No. | LOCATION | SERVICE | TYPE | MANUFACTURER | MODEL No. | HOT SIDE | | | | | | COLD SIDE | | | | | | HEAT TRANSFER | | | | INTERNAL VOLUME | DRY WEIGHT | FLOODED WEIGHT | REMARKS |
|----------|-----------------------------|------------------------------|---------------|----------------|----------------|------------|--------|--------|--------|-------------|-----------------|------------|------------|--------|--------|-------------|-----------------|----------------------------|------|-------------------------------|----------|-----------------|------------|----------------|---------|
| | | | | | | FLOW (GPM) | MEDIUM | EWI °F | LWT °F | PD (FT H2O) | CONNECTION SIZE | FLOW (GPM) | MEDIUM | EWI °F | LWT °F | PD (FT H2O) | CONNECTION SIZE | TOTAL HEAT EXCHANGED (MBH) | LMTD | EFFECTIVE SURFACE AREA (SQFT) | | | | | |
| HEX-1 | 6TH FLOOR MECHANICAL ROOM | HEAT PUMP-COOLING TOWER LOOP | PLATE & FRAME | BELL & GOSSETT | GPX AP41 | 900 | WATER | 100 | 90 | 23.1 | 6" | 900 | WATER | 85 | 95 | 23.1 | 6" | 4481.8 | 5 °F | 736.3 | 50.5 GAL | 2340 LBS | 2781 LBS | SEE NOTES | |
| HEX-2 | 6TH FLOOR MECHANICAL ROOM | HEAT PUMP-COOLING TOWER LOOP | PLATE & FRAME | BELL & GOSSETT | GPX AP41 | 900 | WATER | 100 | 90 | 23.1 | 6" | 900 | WATER | 85 | 95 | 23.1 | 6" | 4481.8 | 5 °F | 736.3 | 50.5 GAL | 2340 LBS | 2781 LBS | SEE NOTES | |
| HEX-3 | LOWER LEVEL MECHANICAL ROOM | SNOW MELTING SYSTEM | PLATE & FRAME | TACO | PF 205-75-4-NH | 209.2 | WATER | 140 | 121 | 4.95 | 3" | 140 | 40% GLYCOL | 100 | 130 | 2.9 | 3" | 1951.3 | - | 188.6 | - | 955 LBS | 1107 LBS | SEE NOTES | |

NOTES:

1. PROVIDE 4" HIGH CONCRETE EQUIPMENT PAD.
2. PROVIDE AHRI LIQUID TO LIQUID HEAT EXCHANGER CERTIFICATION.

EXPANSION TANK SCHEDULE (ET)

| UNIT No. | LOCATION | SERVICE | TYPE | VOLUME - ACCEPTANCE VOLUME | FLUID | CONNECTION SIZE | FACTORY CHARGE PRESSURE | DRY WEIGHT (LBS) | MANUFACTURER | MODEL No. | REMARKS |
|----------|---------------------------|-----------------------|---------------------------|----------------------------|------------------|-----------------|-------------------------|------------------|--------------|-----------|-----------|
| ET-1 | 2ND FLOOR BOILER ROOM | HEAT PUMP SYSTEM | FLOOR MOUNTED PRE-CHARGED | 34 GAL | WATER | 1" NPT | 24PSI | 224 LBS | B&G | D-120V | SEE NOTES |
| ET-2 | 2ND FLOOR BOILER ROOM | HEAT PUMP SYSTEM | FLOOR MOUNTED PRE-CHARGED | 34 GAL | WATER | 1" NPT | 24PSI | 224 LBS | B&G | D-120V | SEE NOTES |
| ET-3 | LOWER LEVEL BOILER ROOM | RADIANT FLOOR HEATING | FLOOR MOUNTED PRE-CHARGED | 23 GAL | 40%-PROP. GLYCOL | 1" NPT | 12 PSI | 120 LBS | TACO | CA90-125 | SEE NOTES |
| ET-4 | 3RD FLOOR MECHANICAL ROOM | RADIANT FLOOR HEATING | BLADDER TYPE - IN-LINE | 23 GAL | 40%-PROP. GLYCOL | 1" NPT | 12 PSI | 120 LBS | TACO | CA90-125 | SEE NOTES |

NOTES:

1. PROVIDE 4" HIGH CONCRETE EQUIPMENT PAD.
2. PROVIDE ASME RATED TANK.

COOLING TOWER SCHEDULE

| UNIT No. | MANUFACTURER | MODEL No. | EAT DB/WB °F | WATER FLOW RATE (GPM) | EWT °F | LWT °F | CAPACITY (NOMINAL TONS) | FANS | | PIPING CONNECTIONS | | DIMENSIONS | | | ELECTRICAL | | | SHIPPING WEIGHT (LBS) | OPERATING WEIGHT (LBS) | REMARKS | | | | | | |
|----------|--------------|-------------|--------------|-----------------------|--------|--------|-------------------------|-------------|---------------|--------------------|----------|-------------|--------------|-------------|------------|--------|--------|-----------------------|------------------------|---------|----------|----------|-----------|-----------------------|-------------|-----------|
| | | | | | | | | NO. OF FANS | AIRFLOW (EA.) | TSP WG (EA.) | HP (EA.) | WATER INLET | WATER OUTLET | CW MAKE-UP. | LENGTH | WIDTH | HEIGHT | | | | TOWER | | | ELECTRIC BASIN HEATER | | |
| | | | | | | | | | | | | | | | | | | | | | POWER | TOWER HP | TOWER FLA | POWER | NO. HEATERS | KW EACH |
| CT-1 | TOWER TECH | TTXR-061975 | 89.7 / 78.0 | 1800 | 95.0 | 85.0 | 750 | 6 | 22,128 | 1,323 | 7.5 | 10"Ø | 10"Ø | 2"Ø | 19'-3" | 12'-0" | 17'-2" | 460-3-60 | 45.0 | 73.8 | 460-3-60 | 2 | 6 KW | 11,662 | 20,000 | SEE NOTES |

NOTES:

1. PROVIDE ELECTRICAL DISCONNECT SWITCH.
2. PROVIDE TOWER TECH MODEL "TTXR-06 ANCHOR PAD AND FOOTPAD SUPPORTS.
3. PROVIDE MODEL "T9900" CONTROL PANEL.
4. PROVIDE VFD CONTROL PANEL FOR OPERATION IN CONJUNCTION WITH VFD TOWER FANS.
5. COOLING TOWER SHALL BE PROVIDED WITH (2) SEPARATE SINGLE POWER POINT CONNECTIONS. (1) FOR THE TOWER AND (1) FOR THE BASIN HEATERS.

PACKAGED FILTRATION SYSTEM SCHEDULE

| UNIT No. | LOCATION | MANUFACTURER | MODEL No. | FLOWRATE (GPM) | INLET CONNECTION | OUTLET CONNECTION | PURGE CONNECTION | MAX PRESSURE (PSI) | MAX TEMP (°F) | ELECTRICAL | | | DRY WEIGHT (LBS) | REMARKS |
|----------|-----------|--------------|--------------|----------------|------------------|-------------------|------------------|--------------------|---------------|------------|------|---------|------------------|-----------|
| | | | | | | | | | | POWER | FLA | PUMP HP | | |
| FS-1 | 6TH FLOOR | LAKOS | TBX-0400-ABV | 400 | 6"Ø FLANGED | 4"Ø GROOVED | 1-1/2" | 150 PSI | 100°F | 460-3-60 | 11.0 | 7.5 | 1083 LBS | SEE NOTES |

ROOF TOP MOUNTED VENTILATION UNITS

| UNIT No. | SERVICE | AAXON MODEL No. | FAN SECTION | | | | | HEATING SECTION (NAT GAS) | | | | | | | | COOLING SECTION (DX) | | | | | | RE-HEAT COIL | | | ELECTRICAL | | | OPERATING WEIGHT (LBS) | REMARKS |
|----------|------------------|---------------------|------------------|-------------------|-------------------|-------------------------|--------------------------|---------------------------|--------------|--------------------|--------------------|--------|----------|-------|-------|----------------------|-------------|--------------------|--------------------|-------|-------------|----------------|--------------------|--------|--------------|------|-----------|------------------------|---------|
| | | | SUPPLY AIR (CFM) | OUTSIDE AIR (CFM) | EXHAUST AIR (CFM) | SUPPLY FAN ESP (IN. WC) | EXHAUST FAN ESP (IN. WC) | INPUT (MBH) | OUTPUT (MBH) | EAT (°F) (DB / WB) | LAT (°F) (DB / WB) | AFUE % | TURNDOWN | | | TOTAL (MBH) | SENS. (MBH) | EAT (°F) (DB / WB) | LAT (°F) (DB / WB) | EER | IEER | CAPACITY (MBH) | LAT (°F) (DB / WB) | RH (%) | POWER SUPPLY | MCA | MFS | | |
| RTU-1 | APARTMENTS | RN-020-3-0-EA09-38B | 6300 | 6300 | 6300 | 2.0 | 1.0 | 405.0 | 328.1 | 42.2 / 34.1 | 90.5 / 56.9 | 81.0 | 13:1 | 237.6 | 179.3 | 81.9 / 67.1 | 54.9 / 54.2 | 12.0 | 14.4 | 116.0 | 72.0 / 60.8 | 53.0 | 460-3-60 | 67.0 | 80A | 3672 | SEE NOTES | | |
| RTU-2 | APARTMENTS | RNA-011-C-0-3-DA0A | 3600 | 3600 | 3600 | 2.0 | 1.0 | 270.0 | 218.7 | 48.9 / 38.2 | 104.8 / 62.5 | 81.0 | 9:1 | 112.1 | 81.7 | 80.1 / 66.2 | 55.2 / 54.3 | 12.2 | 14.9 | 75.3 | 75.0 / 61.8 | 47.3 | 460-3-60 | 38.0 | 45A | 4178 | SEE NOTES | | |
| RTU-3 | COMMERCIAL SPACE | RN-006-3-0-EA09-32B | 1400 | 1400 | 1400 | 1.5 | 1.0 | 90.0 | 72.9 | 47.5 / 37.6 | 95.7 / 59.3 | 81.0 | 10:1 | 59.8 | 42.6 | 80.4 / 66.2 | 51.7 / 51.1 | 12.5 | 14.3 | 31.0 | 72.0 / 59.3 | 47.0 | 460-3-60 | 19.0 | 25A | 1477 | SEE NOTES | | |
| RTU-4 | APARTMENTS | RN-009-3-0-EA09-3FB | 2700 | 2700 | 2700 | 2.0 | 1.0 | 195.0 | 156.0 | 43.2 / 34.8 | 96.8 / 59.4 | 81.0 | 10:1 | 94.6 | 73.1 | 81.6 / 66.1 | 56.0 / 54.0 | 12.6 | 15.5 | 47.0 | 72.0 / 60.2 | 50.0 | 460-3-60 | 32.0 | 35A | 2348 | SEE NOTES | | |
| RTU-5 | APARTMENTS | RNA-013-C-0-3-DA0A | 4600 | 4600 | 4600 | 2.0 | 1.0 | 270.0 | 218.7 | 45.4 / 35.9 | 89.3 / 56.5 | 81.0 | 9:1 | 162.0 | 125.9 | 81.1 / 66.8 | 55.2 / 54.9 | 12.1 | 14.4 | 96.4 | 75.0 / 62.4 | 49.4 | 460-3-60 | 50.0 | 60A | 4295 | SEE NOTES | | |
| RTU-6 | APARTMENTS | RN-016-3-0-EA09-34B | 4300 | 4300 | 4300 | 2.0 | 1.0 | 270.0 | 218.7 | 46.2 / 36.5 | 93.4 / 58.1 | 81.0 | 9:1 | 181.4 | 127.8 | 80.8 / 66.7 | 52.7 / 52.1 | 11.8 | 13.8 | 90.0 | 72.0 / 58.7 | 49.0 | 460-3-60 | 51.0 | 60A | 3401 | SEE NOTES | | |
| RTU-7 | APARTMENTS | RN-016-3-0-EA09-34B | 5100 | 5100 | 5100 | 2.0 | 1.0 | 270.0 | 218.7 | 45.7 / 36.4 | 85.5 / 55.2 | 81.0 | 9:1 | 187.2 | 140.4 | 80.9 / 66.5 | 54.9 / 53.9 | 11.8 | 13.8 | 94.0 | 72.0 / 60.5 | 52.0 | 460-3-60 | 51.0 | 60A | 3401 | SEE NOTES | | |
| RTU-8 | COMMERCIAL SPACE | RNA-026-D-0-3-DA0A | 8900 | 8900 | 8900 | 2.0 | 1.0 | 600.0 | 480.0 | 43.7 / 35.0 | 93.4 / 58.1 | 81.0 | 10:1 | 326.1 | 249.9 | 81.5 / 66.9 | 54.9 / 54.4 | 11.4 | 15.1 | 180.9 | 74.2 / 61.7 | 50.0 | 460-3-60 | 104.0 | 125A | 6288 | SEE NOTES | | |
| RTU-9 | APARTMENTS | RN-016-3-0-EA09-34B | 4500 | 4500 | 4500 | 2.0 | 1.0 | 270.0 | 218.7 | 45.5 / 36.0 | 90.6 / 57.0 | 81.0 | 9:1 | 183.5 | 130.8 | 81.1 / 66.8 | 53.5 / 52.7 | 11.8 | 13.8 | 90.0 | 72.0 / 60.0 | 50.0 | 460-3-60 | 51.0 | 60A | 3401 | SEE NOTES | | |
| RTU-10 | COMMERCIAL SPACE | RN-006-3-0-EA09-32B | 1200 | 1200 | 1200 | 1.5 | 1.0 | 90.0 | 72.9 | 49.4 / 38.8 | 105.7 / 62.9 | 81.0 | 10:1 | 57.0 | 39.2 | 79.9 / 65.8 | 49.0 / 48.7 | 12.5 | 14.3 | 30.0 | 72.0 / 58.2 | 43.0 | 460-3-60 | 18.0 | 25A | 1464 | SEE NOTES | | |

- NOTES:
1. PROVIDE ELECTRICAL DISCONNECT.
2. PROVIDE WITH 120V CONVENIENCE OUTLET.
3. PROVIDE WITH 2" PLATED FILTERS, MIN. MERV 8
4. PROVIDE WITH FULL ENTHALPY ECONOMIZER.
5. PROVIDE WITH DUAL COMPRESSORS.
6. PROVIDE STAINLESS STEEL HEAT EXCHANGER.
8. PROVIDE MODULATING GAS-TEMPERATURE CONTROL.
9. PROVIDE WATTS MASTER VCC-X CONTROLS WITH BAGNET INTEGRATION CARD.
10. PROVIDE ENERGY RECOVERY WHEEL WITH BYPASS DAMPER CONTROL.
11. PROVIDE DOUBLE WALL INSULATED CABINET ENCLOSURE WITH R-13 FOAM INSULATION, AND STAINLESS STEEL DRAIN PAN.
12. SCHEDULED EXTERIOR AND LEAVING AIR TEMPERATURES BASED ON THE FOLLOWING AMBIENT TEMPERATURE CONDITIONS: HEATING: 0.0°F DB / -1.0 WB
COOLING: 95°F DB / 75°F WB
13. PROVIDE HOT-GAS RE-HEAT COIL.
14. UNITS MOUNTED ON PRE-FABRICATED CURBS FURNISHED BY THE UNIT MANUFACTURER. SEE THE DETAILS.

FAN FORCED ELECTRIC CABINET HEATER

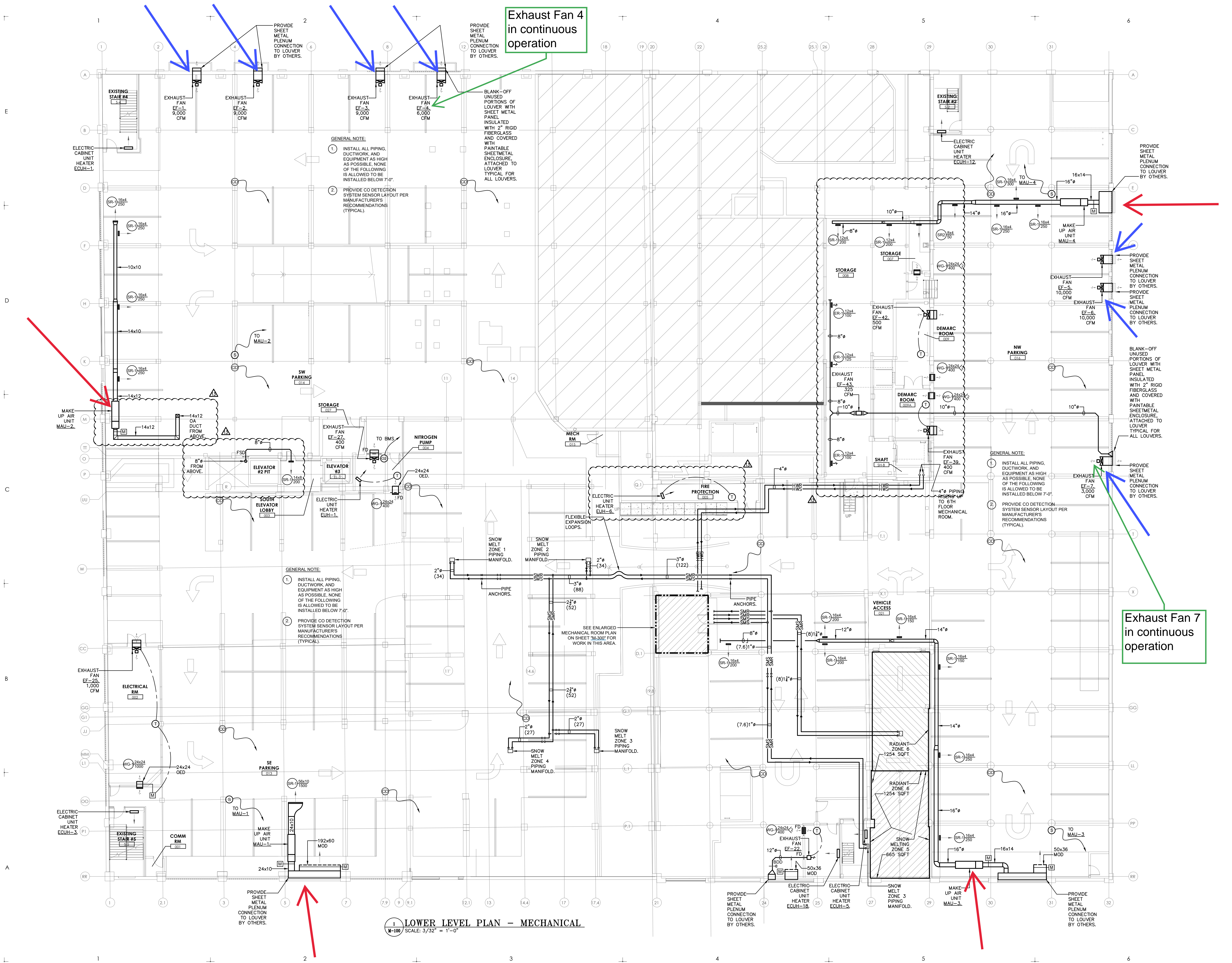
| UNIT No. | LOCATION | FLOOR | "MARKEL" MODEL No. | HIGH | | | | LOW | | | POWER | CABINET LENGTH | REMARKS |
|----------|----------------------|--------------|--------------------|------|--------|------|-----|-----|--------|-----|----------|----------------|-----------|
| | | | | KW | BTUS | AMPS | CFM | KW | BTUS | CFM | | | |
| ECUH-1 | EXISTING STAIR #4 | LOWER LEVEL | 6333A05271 | 5.0 | 17,060 | 19.0 | 250 | 3.0 | 10,236 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-2 | EXISTING STAIR #4 | THIRD FLOOR | 6333A05271 | 5.0 | 17,060 | 19.0 | 250 | 3.0 | 10,236 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-3 | EXISTING STAIR #5 | LOWER LEVEL | 6333A05271 | 5.0 | 17,060 | 19.0 | 250 | 3.0 | 10,236 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-4 | EXISTING STAIR #5 | THIRD FLOOR | 6333A05271 | 5.0 | 17,060 | 19.0 | 250 | 3.0 | 10,236 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-5 | EXISTING STAIR #1 | LOWER LEVEL | 6333A03271 | 3.0 | 10,236 | 11.7 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-6 | EXISTING STAIR #1 | THIRD FLOOR | 6333A03271 | 3.0 | 10,236 | 11.7 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-7 | STAIR #6 | STREET FLOOR | 6333A05271 | 5.0 | 17,060 | 19.0 | 250 | 3.0 | 10,236 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-8 | STAIR #6 | THIRD FLOOR | 6333A05271 | 5.0 | 17,060 | 19.0 | 250 | 3.0 | 10,236 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-9 | EXISTING STAIR #3 | SECOND FLOOR | 6333A04271 | 4.0 | 13,648 | 15.3 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-10 | EXISTING STAIR #3 | FOURTH FLOOR | 6333A04271 | 4.0 | 13,648 | 15.3 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-11 | APARTMENT ENTRY S15 | STREET LEVEL | 6333B03271 | 3.0 | 10,236 | 11.7 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-12 | EXISTING STAIR #2 | LOWER LEVEL | 6333A03271 | 3.0 | 10,236 | 11.7 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-13 | EXISTING STAIR #2 | THIRD FLOOR | 6333A03271 | 3.0 | 10,236 | 11.7 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-14 | STAIR #7 | STREET LEVEL | 6333B02271 | 2.0 | 6,825 | 8.2 | 250 | 1.0 | 3,413 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-15 | COMMERCIAL LOBBY S19 | STREET LEVEL | 6333B03271 | 3.0 | 10,236 | 11.7 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-16 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| ECUH-17 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| ECUH-18 | FIRE COMMAND CENTER | LOWER LEVEL | 6333B02271 | 2.0 | 6,825 | 8.2 | 250 | 1.0 | 3,413 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-19 | APARTMENT LOBBY | STREET LEVEL | 6333B03271 | 3.0 | 10,236 | 11.7 | 250 | 2.0 | 6,825 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-20 | PARKING VESTIBULE | STREET LEVEL | 6333B02271 | 2.0 | 6,825 | 8.2 | 250 | 1.0 | 3,413 | 230 | 277-1-60 | 33" | SEE NOTES |
| ECUH-21 | PARKING VESTIBULE | STREET LEVEL | 6333B02271 | 2.0 | 6,825 | 8.2 | 250 | 1.0 | 3,413 | 230 | 277-1-60 | 33" | SEE NOTES |

- NOTES:
1. PROVIDE FACTORY MOUNTED ELECTRICAL DISCONNECT.
2. PROVIDE BUILT-IN THERMOSTAT.
3. PROVIDE SURFACE MOUNTED ARRANGEMENT.

EXHAUST / SUPPLY FAN SCHEDULE

| UNIT No. | LOCATION | SERVICE | TYPE | DIRECTION OF AIRFLOW | CFM | ESP "W.G. | FAN | | MOTOR | | ELECTRICAL | | MANUFACTURER | MODEL | WEIGHT | REMARKS | |
|----------|-------------------------|-------------------------------------|----------------|----------------------|--------|-----------|---------------|------|--------|------|------------|----------|--------------|-----------|--------------------|----------|-------------------|
| | | | | | | | SONES (INLET) | RPM | DRIVE | RPM | POWER | POWER | | | | | FLA |
| SF-13 | FIRST FLOOR | TRANSFORMER ROOM SUMMER VENTILATION | INLINE | SUPPLY | 10,000 | 0.50 | 30.0 | 1090 | BELT | 1725 | 5 HP | 460-3-60 | 7.6 | GREENHECK | BSQ-240-50 | 336 LBS | 1,2,3,4,8,14 |
| EF-14 | FIRST FLOOR | TRANSFORMER ROOM SUMMER VENTILATION | INLINE | EXHAUST | 10,000 | 0.50 | 30.0 | 1090 | BELT | 1725 | 5 HP | 460-3-60 | 7.6 | GREENHECK | BSQ-240-50 | 336 LBS | 1,2,4,9,14 |
| SF-15 | FIRST FLOOR | TRANSFORMER ROOM WINTER VENTILATION | PROPELLER | SUPPLY | 8,000 | 0.25 | 18.0 | 778 | DIRECT | 860 | 1 HP | 208-3-60 | - | GREENHECK | SE2-30-625-C10-VGD | 273 LBS | 1,2,6,7,8,9,10 |
| EF-16 | STREET LEVEL | TRANSFORMER ROOM WINTER VENTILATION | PROPELLER | EXHAUST | 8,000 | 0.25 | 18.0 | 778 | DIRECT | 860 | 1 HP | 208-3-60 | - | GREENHECK | SE2-30-625-C10-VGD | 273 LBS | 1,2,6,7,9,10 |
| EF-17 | STREET LEVEL | WATER ROOM S25 | CEILING | EXHAUST | 725 | 0.65 | 6.0 | 1109 | DIRECT | 1725 | 786 WATTS | 115-1-60 | - | GREENHECK | SP-A1410 | 57 LBS | 1,2,4,8,9,14 |
| EF-18 | FIRST FLOOR | LOADING DOCK CO SYSTEM | INLINE | EXHAUST | 2,800 | 0.50 | 18.0 | 1694 | DIRECT | 1725 | 1 HP | 115-1-60 | 12.0 | GREENHECK | SQ-140-VG | 120 LBS | 1,2,4,6,7,9,10,11 |
| SF-19 | ROOF | ELEVATOR PRESSURIZATION | UTILITY SET | SUPPLY | 6,000 | 0.50 | 14.6 | 1570 | BELT | 1725 | 1½ HP | 460-3-60 | 3.0 | GREENHECK | USF-324-BI | 389 LBS | 1,9,12,13,14 |
| SF-20 | ROOF | ELEVATOR PRESSURIZATION | UTILITY SET | SUPPLY | 7,000 | 0.50 | 9.6 | 1163 | BELT | 1725 | 1 HP | 460-3-60 | - | GREENHECK | USF-333-BI | 962 LBS | 1,9,12,13,14 |
| SF-21 | ROOF | ELEVATOR PRESSURIZATION | UTILITY SET | SUPPLY | 5,000 | 0.50 | 11.7 | 1570 | BELT | 1725 | 1 HP | 460-3-60 | 2.1 | GREENHECK | USF-324-BI | 385 LBS | 1,9,12,13,14 |
| EF-22 | LOWER LEVEL | ELEV RN 013 | CEILING | EXHAUST | 400 | 0.30 | 4.0 | 1036 | DIRECT | - | 224 WATTS | 115-1-60 | - | GREENHECK | SP-A510 | 32 LBS | 1,2,4,8,9,14 |
| SF-23 | ROOF | ELEVATOR PRESSURIZATION | UTILITY SET | SUPPLY | 14,000 | 0.50 | 12.2 | 936 | BELT | 1725 | 3 HP | 460-3-60 | - | GREENHECK | USD-340-BI | 1480 LBS | 1,9,12,13,14 |
| SF-24 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| EF-25 | LOWER LEVEL PARKING | ELECTRICAL ROOM | SIDEWALL PROP. | EXHAUST | 1,000 | 0.25 | 7.4 | 1196 | DIRECT | 1725 | 1/2 HP | 115-1-60 | 6.8 | GREENHECK | SE-114-436-VG | 44 LBS | 1,3,6,7,8,9,10 |
| EF-26 | STREET LEVEL | FIRE PUMP ROOM EXHAUST S23 | INLINE | EXHAUST | 2,500 | 0.50 | 10.3 | 1073 | DIRECT | 1725 | 3/4 HP | 115-1-60 | 10.6 | GREENHECK | SQ-160-VG | 146 LBS | 1,2,3,4 |
| EF-27 | LOWER LEVEL | MECHANICAL ROOM | SIDEWALL PROP. | EXHAUST | 400 | 0.30 | 5.5 | 1143 | DIRECT | 1725 | 1/4 HP | 115-1-60 | 3.3 | GREENHECK | SE-112-432-VG | 35 LBS | 1,6,7,9,10 |
| EF-28 | LOWER LEVEL BOILER ROOM | LOWER LEVEL BOILER ROOM COOLING | SIDEWALL PROP. | EXHAUST | 800 | 0.25 | 7.2 | 1134 | DIRECT | 1725 | 1/2 HP | 115-1-60 | 6.8 | GREENHECK | SE-114-436-VG | 44 LBS | 1,3,6,7,8,9,10 |
| EF-29 | ROOF | 6TH FLOOR BOILER ROOM VENTILATION | ROOF MOUNTED | EXHAUST | 1,200 | 0.50 | 8.8 | 1143 | DIRECT | 1725 | 1/4 HP | 115-1-60 | 3.7 | GREENHECK | G-133-VG | 43 LBS | 1,3,5,8,14 |
| EF-30 | FIRST FLOOR | LOADING DOCK GENERAL VENTILATION | INLINE | EXHAUST | 900 | 0.50 | 6.1 | 1165 | DIRECT | 1725 | 1/2 HP | 115-1-60 | 6.2 | GREENHECK | SQ-120-VG | 66 LBS | 1,2,4,9 |
| EF-31 | ROOF | ELEVATOR VENTILATION | ROOF MOUNTED | EXHAUST | 425 | 0.25 | 6.7 | 1474 | DIRECT | 1725 | 1/10 HP | 115-1-60 | 2.6 | GREENHECK | G-085-VG | 25 LBS | 1,3,5,8,9 |
| EF-32 | ROOF | ELEVATOR VENTILATION | ROOF MOUNTED | EXHAUST | 425 | 0.25 | 6.7 | 1474 | DIRECT | 1725 | 1/10 HP | 115-1-60 | 2.6 | GREENHECK | G-085-VG | 25 LBS | 1,3,5,8,9 |
| SF-33 | ROOF | ELEVATOR PRESSURIZATION | ROOF MOUNTED | SUPPLY | 5,000 | 0.50 | 11.7 | 1570 | BELT | 1725 | 1 HP | 460-3-60 | 2.1 | GREENHECK | USF-324-BI | 385 LBS | 1,9,12,13,14 |
| EF-34 | ROOF | ELEVATOR VENTILATION | ROOF MOUNTED | EXHAUST | 850 | 0.25 | 6.2 | 1189 | DIRECT | 1725 | 1/4 HP | 115-1-60 | 3.7 | GREENHECK | G-103-VG | 37 LBS | 1,3,5,8,9 |
| EF-35 | ROOF | ELEVATOR VENTILATION | ROOF MOUNTED | EXHAUST | 425 | 0.25 | 6.7 | 1474 | DIRECT | 1725 | 1/10 HP | 115-1-60 | 2.6 | GREENHECK | G-085-VG | 25 LBS | 1,3,5,8,9 |
| EF-36 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| EF-37 | STREET LEVEL | FIRE PUMP ROOM VENTILATION | INLINE | EXHAUST | 550 | 0.50 | 14.5 | 1723 | DIRECT | 1725 | 1/4 HP | 115-1-60 | 3.7 | GREENHECK | SQ-98-VG | 58 LBS | 1,2,4,8,9 |
| SF-38 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| EF-39 | LOWER LEVEL | DEMARCO ROOM 009A | SIDEWALL PROP. | EXHAUST | 300 | 0.30 | 5.5 | 1143 | DIRECT | 1725 | 1/4 HP | 115-1-60 | 3.3 | GREENHECK | SE-112-432-VG | 35 LBS | 1,6,7,9,10 |
| EF-40 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| EF-41 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| EF-42 | LOWER LEVEL | DEMARCO ROOM 009 | SIDEWALL PROP. | EXHAUST | 500 | 0.30 | 6.8 | 1725 | DIRECT | - | 1/4 HP | 115-1-70 | 3.3 | GREENHECK | SE-112-432-VG | 35 LBS | 1,6,8,9,10,14 |
| EF-43 | LOWER LEVEL | STORAGE 008 | INLINE | EXHAUST | 325 | 0.50 | 2.5 | 1070 | DIRECT | - | 177 WATTS | 115-1-60 | - | GREENHECK | CSP-A510 | 37 LBS | 1,2,4,9,14 |
| EF-44 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| EF-45 | STREET LEVEL | DOG WASH SL27 | SIDEWALL PROP. | EXHAUST | 300 | 0.30 | 5.5 | 1143 | DIRECT | 1725 | 1/4 HP | 115-1-60 | 3.3 | GREENHECK | SE-112-432-VG | 35 LBS | 1,6,7,9,10 |

The design concepts, construction drawings and details presented herein are the sole property of Architectural Resources, P.C. Any reproduction or other use of this information without the written consent of Architectural Resources, P.C. is expressly prohibited. All rights reserved. Copyright Architectural Resources, P.C.



1 LOWER LEVEL PLAN - MECHANICAL
SCALE: 3/32" = 1'-0"



Architectural Resources
505 Franklin St.
Buffalo, New York 14202
303 West 13th Street
New York, New York 10014
716-883-5566 716-883-5569 fax



The Krog Group
4 Centre Drive
Orchard Park, NY 14227
Ph. (716) 667-1234



C.J. Brown Energy, P.C.
Energy Services & Consulting Group



tredo ENGINEERS
755 Seneca Street
Suite 202
Buffalo, New York 14210
716-876-7147 ph
716-876-0887 fax



CS Engineers
141 Elm Street, Suite 100
Buffalo, NY 14203
716-847-1630 716-847-1454

Trico Redevelopment
791 Washington Street, LLC
791 Washington Street
Buffalo, NY 14203

CONSTRUCTION DOCUMENTS
01/28/2022

| Revisions | Description | Date |
|-----------|---------------|----------|
| Rev 8 | | 05/10/11 |
| Rev 11 | | 01/24/22 |
| Rev 12 | | 03/19/22 |
| Rev 13 | Permit Update | 01/14/22 |
| Rev 14 | | 01/28/22 |

LOWER LEVEL FLOOR PLAN MECHANICAL

Alt Job No: 508.01
Client No:
Drawn by: BPZ
Sheet No:

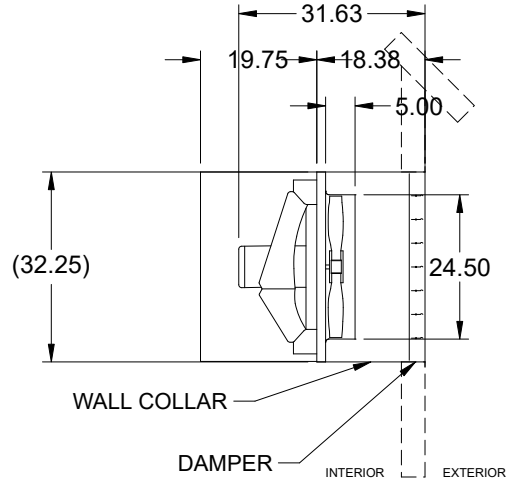
M-100



Model: AER-24

Sidewall Direct Drive Fan
Motor Access From Int. of Bldg.

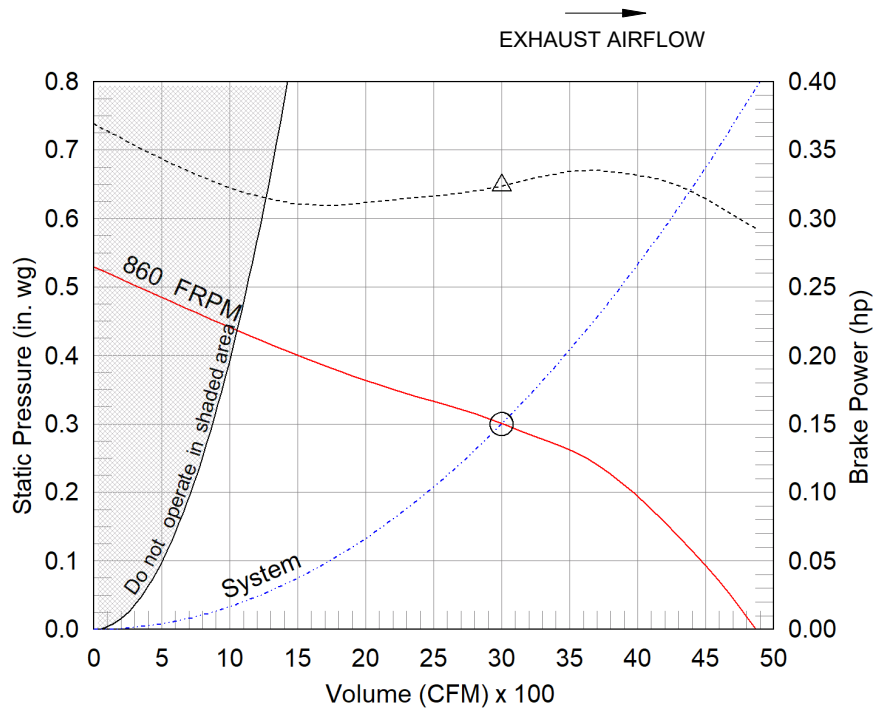
| Dimensional | |
|------------------------|---------------|
| Quantity | 1 |
| Weight w/o Acc's (lb) | 50 |
| Weight w/ Acc's (lb) | 179 |
| Max T Motor Frame Size | 184 |
| Optional Damper (in.) | 26 x 26 |
| Wall Opening (in.) | 33.75 x 33.75 |



| Performance | |
|----------------------------|-------|
| Requested Volume (CFM) | 3,000 |
| Actual Volume (CFM) | 3,000 |
| Total External SP (in. wg) | 0.3 |
| Fan RPM | 860 |
| Operating Power (hp) | 0.32 |
| Elevation (ft) | 705 |
| Airstream Temp.(F) | 70 |
| Air Density (lb/ft3) | 0.073 |
| Tip Speed (ft/min) | 5,432 |
| Static Eff. (%) | 44 |

| Misc Fan Data | |
|--------------------------|-----|
| Fan Eff. Index (FEI) | - |
| Outlet Velocity (ft/min) | 926 |

| Motor | |
|---------------------|----------|
| Motor Mounted | Yes |
| Size (hp) | 3/4 |
| Voltage/Cycle/Phase | 460/60/3 |
| Enclosure | TEFC |
| Motor RPM | 860 |
| Efficiency Rating | Standard |
| Windings | 1 |



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Static Pressure Calculations

| | |
|-----------------------------|------------|
| External SP | 0.3 in. wg |
| Direct Drive RPM Adjustment | 0 in. wg |
| Total External SP | 0.3 in. wg |

Notes:

All dimensions shown are in units of in.
*Please consult factory for actual motor amp draw
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB
attenuation per Octave band at 5 ft - dBA levels are not licensed
by AMCA International
Sones - calculated using AMCA 301 at 5 ft

Nameplate Model: AER-24-03-0921

Sound Power by Octave Band

| Sound Data | 62.5 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | LwA | dBA | Sones |
|------------|------|-----|-----|-----|------|------|------|------|-----|-----|-------|
| Inlet | 85 | 89 | 82 | 78 | 70 | 66 | 58 | 52 | 80 | 68 | 17.1 |



Model: AER-24

Sidewall Direct Drive Fan

Standard Construction Features:

- Galvanized steel fan panel - Die formed, galvanized steel drive frame assembly
- Cast aluminum airfoil blade propeller - Ball bearing motors - Corrosion resistant fasteners

Selected Options & Accessories:

UL/cUL 705 Listed - "Power Ventilators"

Airflow Direction: Exhaust

Motor Access: From Int. of Bldg.

Wall Collar Assembled

Switch, NEMA-1, T.O., Toggle, Shipped with Unit

Junction Box Mounted & Wired

OSHA Approved Motor Side Guard

Unit Warranty: 1 Yr (Standard)

Damper Mounted, WD-320-PB-26X26, Gravity Operated, Not Coated

Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.

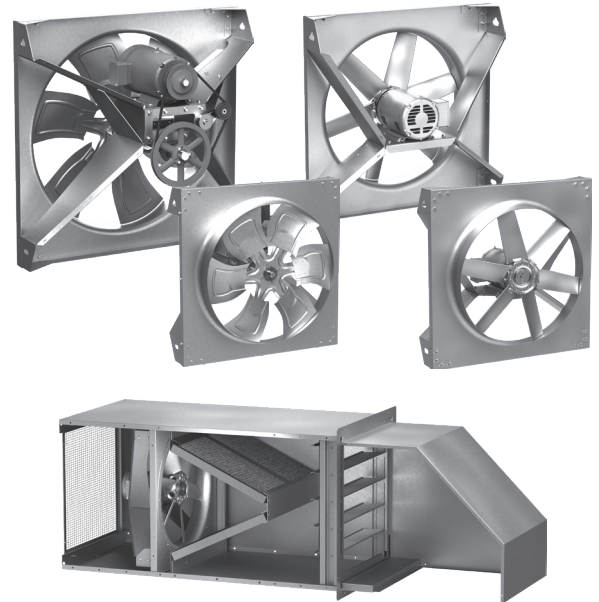
Axial Exhaust and Supply Fans

Axial propeller wall fans are ideal for factory and warehouse applications where high volumes of air and low pressures are required. From general ventilation to industrial duty, the range of construction and performance capabilities offered represent the most comprehensive sidewall propeller fan line in the industry.

Wall mounted fans include both direct- and belt-driven fans with various impeller styles for exhaust, supply and filtered supply applications.

Axial Filtered Supply Fans

Optional filtered supply wall housings are designed with the draw-thru concept to achieve the highest filter and fan efficiencies. Permanent 2-inch washable filters are accessed through a bolted panel and can be easily removed for cleaning.



General Safety Information

Only qualified personnel should install this fan. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electric Code (CEC) in Canada.
2. The rotation of the propeller is critical. It must be free to rotate without striking or rubbing any stationary objects.
3. Motor must be securely and adequately grounded.
4. Do not spin fan propeller faster than max cataloged fan RPM. Adjustments to fan speed significantly affects motor load. If the fan RPM is changed, the

motor current should be checked to make sure it is not exceeding the motor nameplate amps.

5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open access doors to a duct while the fan is running.

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

CAUTION

When servicing the fan, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

Precaution should be taken in explosive atmospheres.

| |
|---|
| DANGER |
| Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien. |
| ATTENTION |
| Lors de toute intervention sur la soufflante, le moteur peut être suffisamment chaud pour provoquer une douleur voire une blessure. Laisser le moteur refroidir avant toute maintenance. |
| ATTENTION |
| Faire preuve de précaution dans les atmosphères explosives. |

Receiving

Upon receiving the product check to ensure all items are accounted for by referencing the delivery receipt or packing list. Inspect each crate or carton for shipping damage before accepting delivery. Alert the carrier of any damage detected. The customer will make a notation of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading which is countersigned by the delivering carrier. If damaged, immediately contact your local representative. Any physical damage to the unit after acceptance is not the responsibility of the manufacturer.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Due to availability of transportation and truck space all items for the unit may not be shipped together. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Note: The filtered supply unit ships with all ordered components completely factory-assembled. The optional weatherhood ships knocked down for field assembly and installation.

Storage

Fans are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the fan and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

Storage Environment

The ideal environment for the storage of fans and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain or snow. Temperatures should be evenly maintained between 30° to 110°F (-1° to 43°C). Wide temperature swings may cause condensation

and “sweating” of metal parts. All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice or snow and wipe dry before moving to indoor storage. To avoid “sweating” of metal parts allow cold parts to reach room temperature. To dry parts and packages use a portable electric heater to get rid of any moisture build up. Leave coverings loose to permit air circulation and to allow for periodic inspection. The unit should be stored at least 3-1/2 inch off the floor on wooden blocks covered with moisture proof paper or polyethylene sheathing. Aisles between parts and along all walls should be provided to permit air circulation and space for inspection.

Fans designed for outdoor applications may be stored outdoors, if absolutely necessary. Roads or aisles for portable cranes and hauling equipment are needed.

The fan should be placed on a level surface to prevent water from leaking into the fan. The fan should be elevated on an adequate number of wooden blocks so that it is above water and snow levels and has enough blocking to prevent it from settling into soft ground. Locate parts far enough apart to permit air circulation, sunlight and space for periodic inspection. To minimize water accumulation, place all fan parts on blocking supports so that rain water will run off. Do not cover parts with plastic film or tarps as these cause condensation of moisture from the air passing through heating and cooling cycles. Fan propellers should be blocked to prevent spinning caused by strong winds.

Inspection and Maintenance During Storage

While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed.

If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the wheel by hand ten to fifteen revolutions to distribute lubricant in motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Thoroughly wipe clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, WD-40® or the equivalent.

Removing From Storage

As fans are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion until the fan equipment goes into operation.

Pre-Installation Checks

1. Check chart below for correct wall opening dimensions.
2. Check motor voltage and amperage rating for compatibility with electrical supply. Supply wiring must be properly fused and conform to local and national codes.
3. Motor load amperage must be checked and compared to nameplate rating to avoid serious damage to motor when speed is increased.

Wall Opening Requirements

Wall opening size and propeller-to-damper distance (M) are two important dimensions for fan installation. Fans mounted to the wall require a different wall opening size than those mounted in collars or wall housings.

Propeller-to-damper distance (M) is important to reduce turbulence and damper flutter which may lead to premature damper failure.

Figure 1 and 2 show the wall opening recommended for installations with either a wall housing or collar.

Figure 3 shows the recommended wall opening when fan is to be placed within wall opening.

Figure 4 shows the recommended wall opening and the minimum distance (M) suggested between the fan and damper for HCAI Seismic direct to wall installations.

Figure 5 shows the dimensions and wall opening recommended for installations with a filtered supply wall housing.

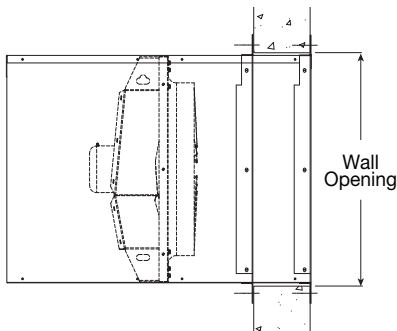


Figure 1 - Wall Housing Installation

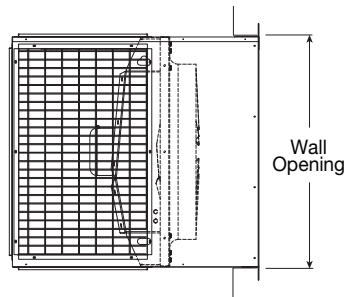


Figure 2 - Wall Collar Installation

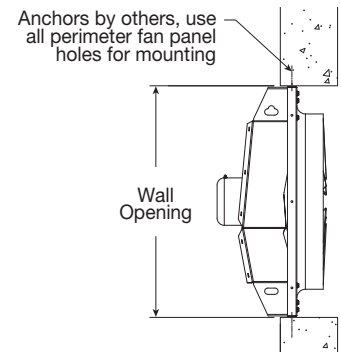


Figure 3 - Direct to Wall Installation

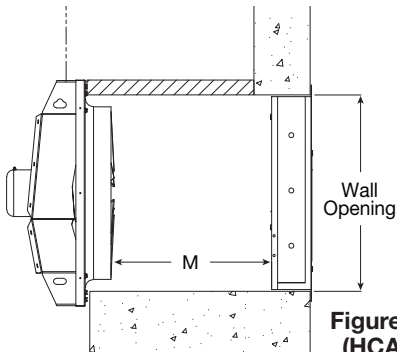


Figure 4 - Direct to Wall (HCAI Seismic Rated) Installation

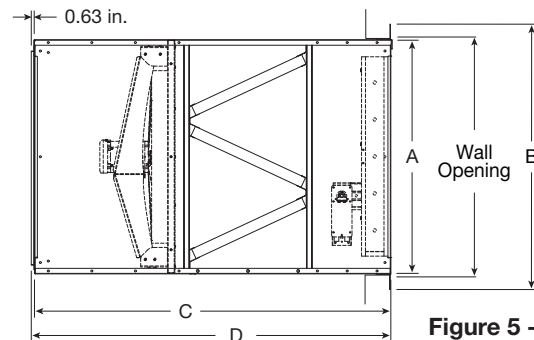


Figure 5 - Filtered Supply Wall Housing Installation

| Fan Size | Damper Size Square | Recommended Wall Opening Square | | | | M Minimum | Filtered Supply Wall Housing Only | | | | | |
|------------------|--------------------|---------------------------------|----------|----------|----------|-----------|-----------------------------------|------|--------|--------|--------------------------|---------|
| | | Figure 1 and 2 | Figure 3 | Figure 4 | Figure 5 | | A Sq. | B | C | D | Filter Quantity and Size | |
| AER Direct Drive | | | | | | | | | | | | |
| 20 | 22 | 27.375 | 26.625 | 23.25 | - | 12 | - | - | - | - | - | - |
| 24 | 26 | 33.5 | 32.625 | 26.125 | 33.5 | 13 | 32.625 | 38.5 | 63.5 | 64.125 | 4 | 17 x 24 |
| 30 | 32 | 39.5 | 38.625 | 32.125 | 39.5 | 13 | 38.625 | 44.5 | 65.375 | 66 | 4 | 20 x 25 |
| 36 | 38 | 45.5 | 44.625 | 38.125 | 45.5 | 14 | 44.625 | 50.5 | 67.75 | 68.375 | 6 | 23 x 24 |
| 42 | 44 | 51.5 | 50.625 | 44.125 | 51.5 | 15 | 50.625 | 56.5 | 73.375 | 74 | 6 | 25 x 26 |
| 48 | 50 | 57.5 | 56.625 | 50.125 | 57.5 | 16 | 56.625 | 62.5 | 73.5 | 74.125 | 12 | 19 x 24 |
| 54 | 56 | 63.375 | 62.5 | 56 | - | 17 | - | - | - | - | - | - |
| 60 | 62 | 69.375 | 68.5 | 62 | - | 19 | - | - | - | - | - | - |
| BAER Belt Drive | | | | | | | | | | | | |
| 24 | 26 | 33.5 | 32.625 | 26.125 | 33.5 | 13 | - | - | - | - | - | - |
| 30 | 32 | 39.5 | 38.625 | 32.125 | 39.5 | 13 | - | - | - | - | - | - |
| 36 | 38 | 45.5 | 44.625 | 38.125 | 45.5 | 14 | - | - | - | - | - | - |
| 42 | 44 | 51.5 | 50.625 | 44.125 | 51.5 | 15 | - | - | - | - | - | - |
| 48 | 50 | 57.5 | 56.625 | 50.125 | 57.5 | 16 | - | - | - | - | - | - |

All dimensions in inches. Filters are 2-inch nominal thickness. Filter sizes are actual dimensions.

Typical Installation

NOTE: For units supplied or used with a Variable Frequency Drive (VFD), reference the VFD documentation for installation requirements, start-up settings, parameter adjustments and trouble shooting. VFDs provided by the manufacturer are factory programmed for basic motor parameters, incoming voltage parameters and maximum operating speed (Hz).

Follow NEC and local codes for VFD wiring and installation. If the wire length between the VFD and the controlled motor exceeds 100 ft (30.5 m), DV/DT filters or VFD cabling may be required. Calculations and proper application of DV/DT filters and VFD cabling is by others; failing to do so may result in premature motor failure.

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

DANGER

Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.

Move fan to the desired location and determine the method by which the fan is to be mounted as shown in Figures 1-5 shown on page 3. Optional wall mount housings (Figure 1) and wall mount collars (Figure 2) provide a convenient means of mounting sidewall propeller fans while maintaining the proper distance between propeller and damper.

Attach the fan by inserting a suitable fastener through each of the prepunched mounting holes in the fan panel. Care should be taken not to bend or distort the fan panel or drive components during installation.

Support Braces

Wall Housing sizes 42 and larger with heavy motors and all Filtered Supply Wall Housings need additional bracing.

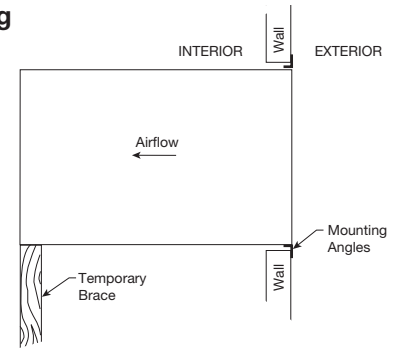
Filtered Supply Wall Housing Installation

Step 1 – Install Housing

Install housing through wall opening from outside.

Temporarily brace end of unit until permanent support braces are installed.

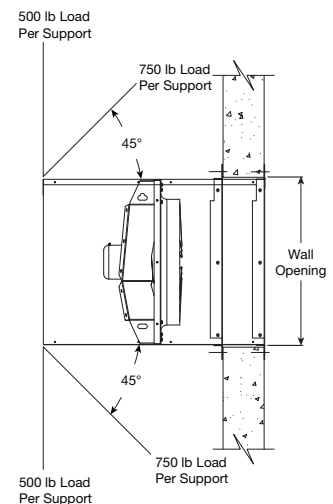
Secure through prepunched holes in angles with suitable fasteners.



Step 2 – Install Support Braces

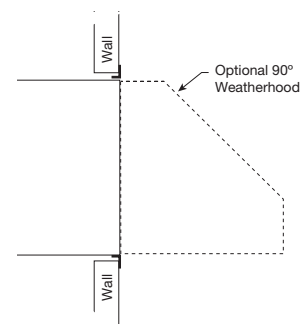
Choose method of support. Attach support to end of unit (above or below housing) with rods, cable, angle, etc. (supplied by others) as shown.

Vertical braces must carry a minimum load of 500 pounds per support, and angled (45°) braces a minimum of 750 pounds per support based on two supports.



Step 3 – Install Weatherhood

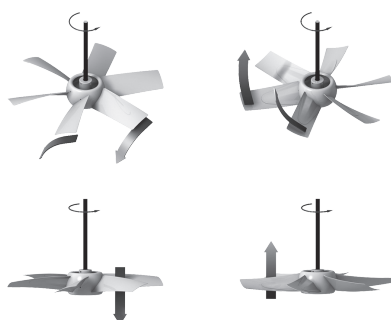
Position weatherhood over end of wall housing and fasten through mounting holes with self-tapping screws. Caulk, flash and complete electrical hook-up to finish installation.



Pre-Start-Up Checks

Check all fasteners and setscrews for tightness. This is especially important for bearing setscrews.

The propeller should rotate freely and not rub on the fan panel venturi. Rotation direction of the propeller should be checked by momentarily turning the unit on. Propeller blade should cup and throw the air when rotating in the correct rotation as shown in the figure. Rotation should be in the same direction as the rotation decal affixed to the unit.



For 3-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads. For single-phase installations follow the wiring diagram located on the motor.

For belt drive fans, the adjustable motor pulley is preset at the factory for the specified fan RPM. Fan speed can be increased by closing or decreased by opening the adjustable pulley. Two or three groove variable pitch pulleys must be adjusted an equal number of turns open. Any increase in fan speed represents a substantial increase in horsepower required from the motor. Always check motor load amperage and compare to nameplate rating when changing fan speed.

Maintenance

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

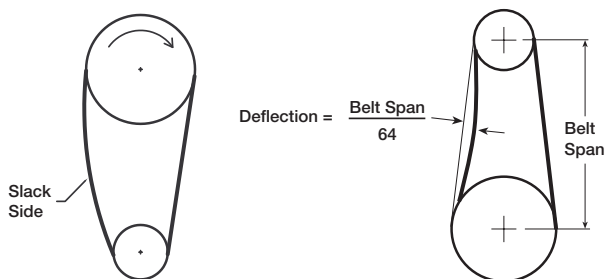
DANGER

Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.

Once the fan has been put into operation, a periodic maintenance program should be set up to preserve the reliability and performance of the fan. Items to be included in this program are belts, bearings, fasteners and setscrews, lubrication, and removal of dust and dirt.

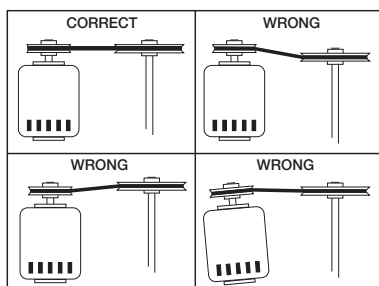
Belts

Premature belt failures are frequently caused by improper belt tension (either too tight or too loose) or misaligned pulleys. The proper tension for operating a V-belt is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the proper belt deflection halfway between pulley centers is 1/64 inch for each inch of belt span. For example, if the belt span is 64 inches, the belt deflection should be one inch using moderate thumb pressure at midpoint of the drive. See figure shown below.



Check belt tension two times during the first 24 hours of operation and periodically thereafter.

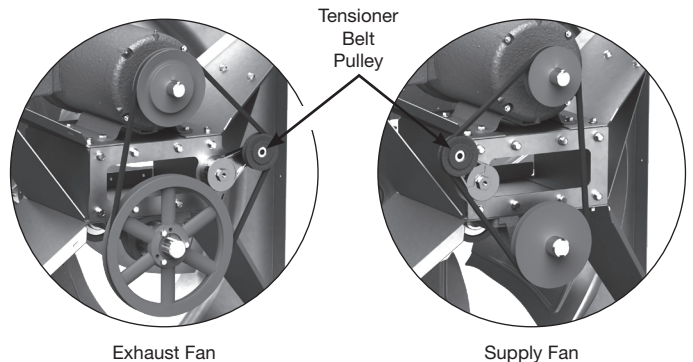
It is very important that the drive pulleys remain in proper alignment after adjustments are made. Misalignment of pulleys will result in premature belt wear noise, vibration and power loss.



Automatic Belt-Tensioner

Automatic belt-tensioners adjust belt tension as the belt wears which can maximize the life of the belt(s). Proper belt tension helps minimize drive losses which improves fan efficiencies.

If belt replacement is necessary apply a wrench to the nut on the backside of the tensioner belt pulley, push down to loosen the spring tensioner, and remove the belt. To install belt, reverse the noted process. After belt replacement, check belt tension two times in the first 24 hours of operation and periodically thereafter.



Bearings

Bearings are the most critical moving part of the fan and should be inspected at periodic intervals. Locking collars and setscrews, in addition to fasteners attaching the bearings to the bearing plate, must be checked for tightness. In a clean environment and temperatures above 32°F (0°C) and below 200°F (93°C), fan shaft bearings with grease fittings should be lubricated semi-annually using a high-quality lithium complex grease. If unusual environmental conditions exist, temperatures below 32°F (0°C) and above 200°F (93°C), moisture or contaminants, more frequent lubrication is required.

With the unit running, add grease very slowly with a manual grease gun until a slight bead of grease forms at the seal. Be careful not to unseat the seal by over lubricating or using excessive pressure. Bearings without grease fittings are lubricated for life.

Fasteners and Setscrews

Any fan vibration has a tendency to loosen mechanical fasteners. A periodic inspection should include checking all fasteners and setscrews for tightness. Particular attention should be paid to setscrews or taper-lock bushings attaching the propeller to the motor shaft and the motor shaft to the bearings. Loose bearing setscrews will lead to premature failure of the fan shaft. In addition, check all fasteners attaching the motor to the motor plate.

Lubrication

Refer to the paragraph on bearings for bearing lubrication. Many fractional horsepower motors installed on the smaller fans are lubricated for life and require no further attention. Motors equipped with oil holes should be oiled in accordance with the manufacturer's instructions printed on the motor. Use a high grade SAE 20 machine oil and use caution not to over lubricate. Motors supplied with grease fittings should be greased according to directions printed on the motor.

Removal of Dust and Dirt

Dirt clogs cooling openings on the motor housing, contaminates bearing lubricant and collects on propeller blades causing severe imbalance if left unchecked. The exterior surface of the motor, fan panel and entire propeller should be thoroughly cleaned periodically. Use caution and do not allow water or solvents to enter the motor or bearings. Motors or bearings must not be sprayed with steam or water.

The filters also require periodic cleaning. The 2 inch washable aluminum filters are accessed through the bolted access panel.

Troubleshooting

WARNING

Before taking any corrective action, make certain unit is not capable of operation during repairs.

AVERTISSEMENT

Avant d'entreprendre toute action corrective, s'assurer que l'appareil ne pourra pas fonctionner durant les réparations.

| PROBLEM | CAUSE | CORRECTIVE ACTION |
|----------------------|-------------------------------------|---|
| Too much airflow | Resistance lower than designed | Decrease fan speed. |
| Reduced airflow | System resistance too high | Check backdraft dampers for proper operation. Remove obstructions in ductwork. Clean dirty filters. Check for adequate supply air for exhaust fans or exhaust air for supply fans. |
| | Fan too close to damper | Increase distance between fan and damper. |
| | Fan speed too low | Increase fan speed. |
| | Excessive dirt buildup on propeller | Clean propeller. |
| Excessive noise | Bearings | Tighten collars and fasteners. Lubricate bearings. Replace defective bearings. |
| | V-belt drive | Tighten pulleys on motor and fan shaft. Adjust belt tension. Align pulleys properly. Replace worn belts or pulleys. See Maintenance. |
| | Excessive vibration | Clean dirt buildup from propeller. Check all setscrews and fasteners for tightness. Check for worn bearing. Correct propeller imbalance. Check for loose dampers, guards or ductwork. |
| | Defective motor | Replace motor. |
| | Variable frequency drive (VFD) | Check VFD for drive setting, some controllers are able to be adjusted to lower the harmonic noises sometimes heard during operation by adjusting a simple setting on the controller. |
| | Debris | Remove all debris from the fan. |
| Fan does not operate | Electrical supply | Check fuses/circuit breakers. Check for switches turned off or disconnected. Check for correct supply voltage. |
| | Drive | Check for broken or worn belts. Tighten loose pulleys. |
| | Motor | Assure motor is correct horsepower and not tripping overload protector. |

Parts List

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local representative and the factory in providing service and replacement parts. Before taking any corrective action, make certain unit is not capable of operation during repairs.

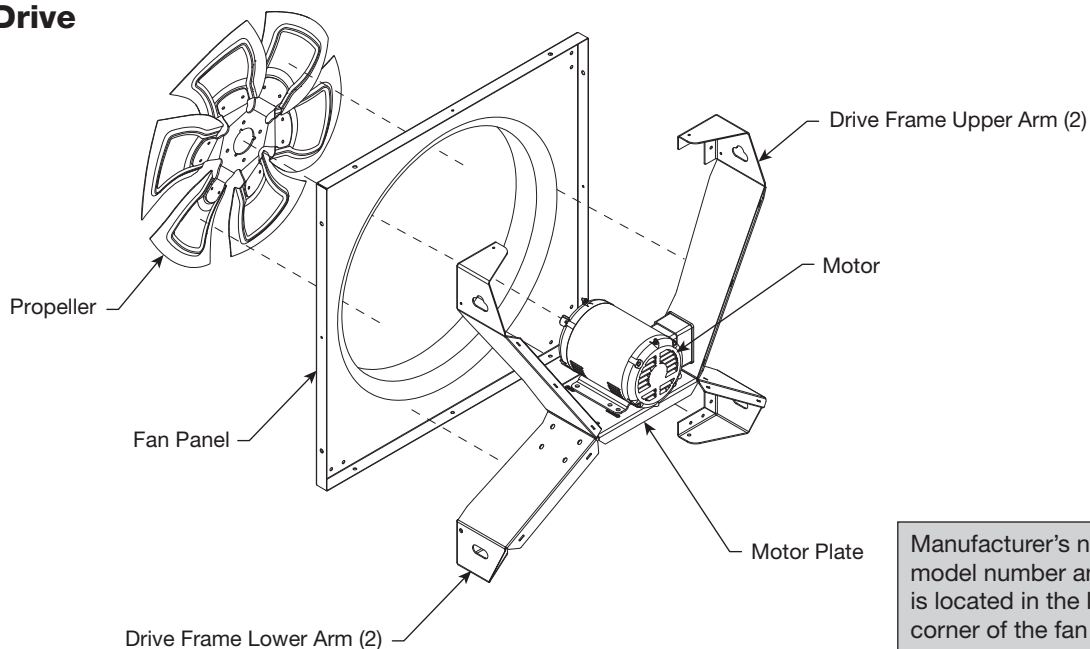
CAUTION

A fan manufactured with an explosion resistant motor does not certify the entire unit to be explosion proof. Refer to UL Listing Mark for the fans approved usage.

CAUTION

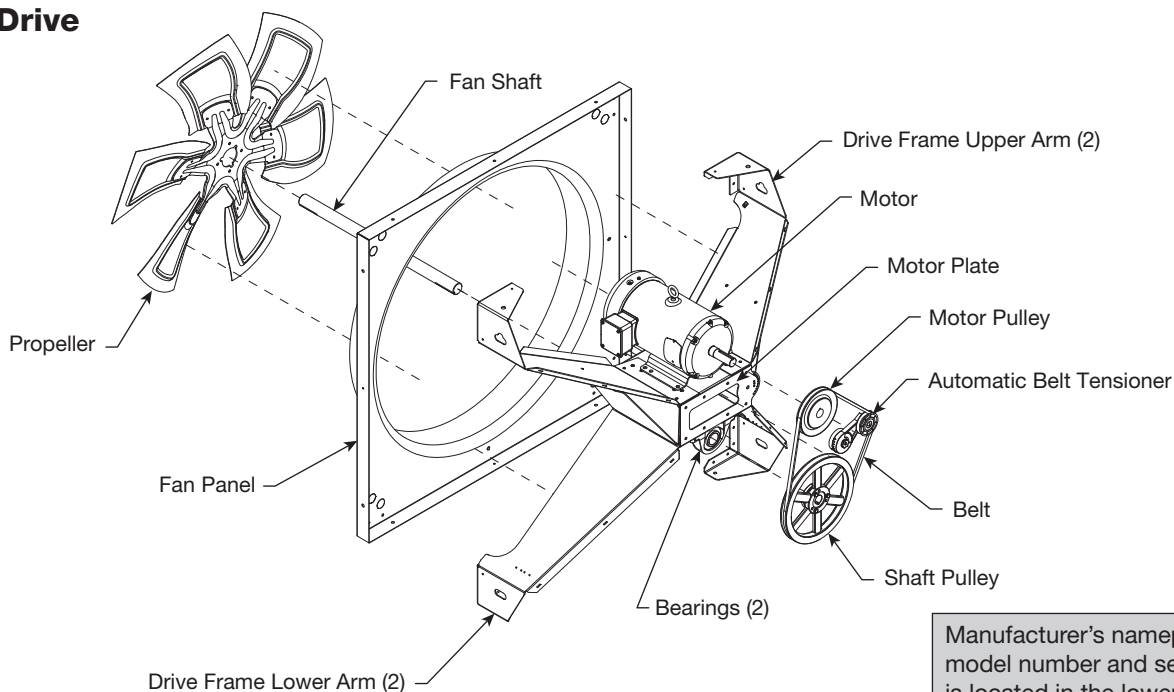
La présence d'un moteur antidéflagrant sur un ventilateur ne garantit pas que tout l'appareil est antidéflagrant. Pour connaître les emplois autorisés de l'appareil, voir son marquage de conformité UL.

Direct Drive AER



Manufacturer's nameplate with model number and serial number is located in the lower right-hand corner of the fan panel.

Belt Drive BAER



Manufacturer's nameplate with model number and serial number is located in the lower right-hand corner of the fan panel.

Maintenance Log

Date Time AM/PM
Notes:

Date Time AM/PM
Notes:

Date Time AM/PM
Notes:

Date Time AM/PM
Notes:

Date Time AM/PM
Notes:

Date Time AM/PM
Notes:

Date Time AM/PM
Notes:

Date Time AM/PM
Notes:

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.

Greenheck’s AER and BAER Sidewall Propeller Fans catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.



Model: SBE-3H30-3

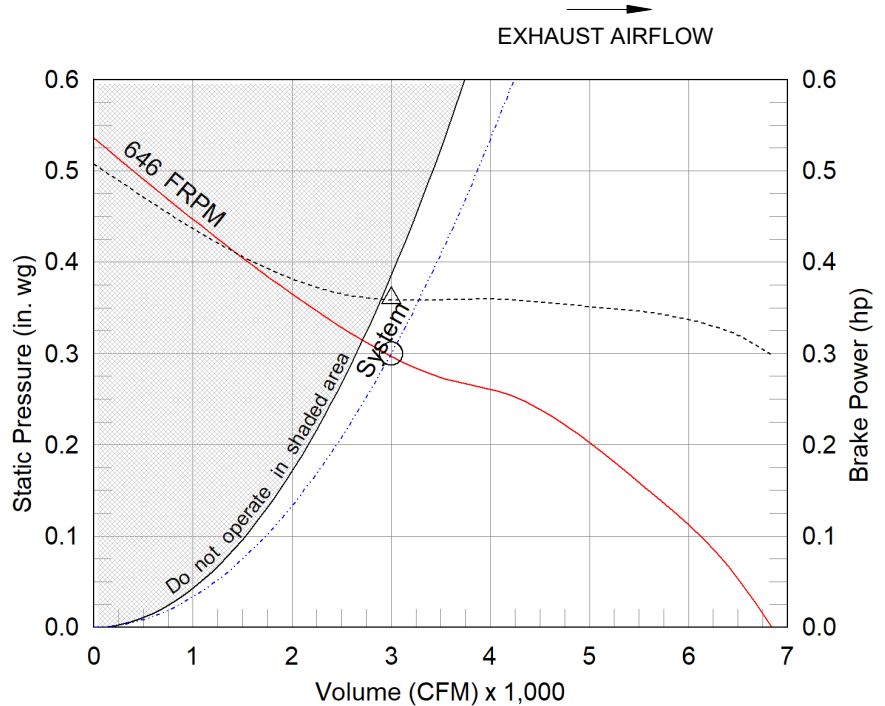
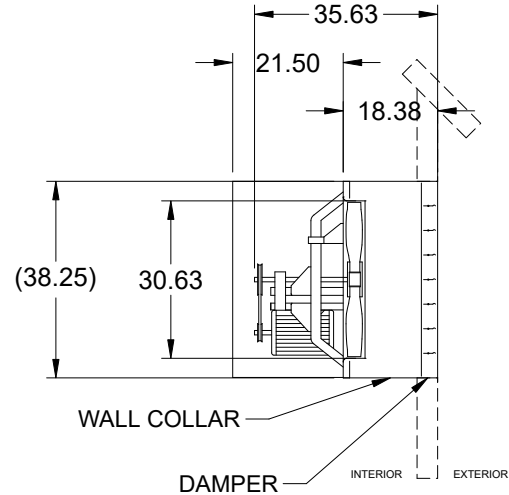
Sidewall Belt Drive Fan

Motor Access From Int. of Bldg.

| Dimensional | |
|------------------------|---------------|
| Quantity | 1 |
| Weight w/o Acc's (lb) | 96 |
| Weight w/ Acc's (lb) | 257 |
| Max T Motor Frame Size | 184 |
| Optional Damper (in.) | 32 x 32 |
| Wall Opening (in.) | 39.75 x 39.75 |

| Performance | |
|----------------------------|-------|
| Requested Volume (CFM) | 3,000 |
| Actual Volume (CFM) | 3,000 |
| Total External SP (in. wg) | 0.3 |
| Fan RPM | 646 |
| Operating Power (hp) | 0.36 |
| Elevation (ft) | 705 |
| Airstream Temp.(F) | 70 |
| Air Density (lb/ft3) | 0.073 |
| Drive Loss (%) | 10.0 |
| Tip Speed (ft/min) | 5,072 |
| Static Eff. (%) | 44 |

| Motor | |
|---------------------|----------|
| Motor Mounted | Yes |
| Size (hp) | 1/3 |
| Voltage/Cycle/Phase | 115/60/1 |
| Enclosure | TEFC |
| Motor RPM | 1725 |
| Efficiency Rating | Standard |
| Windings | 1 |
| NEC FLA* (Amps) | 7.2 |



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- - - System curve
- Brake horsepower curve

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory. MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4 dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5 ft

Sound Power by Octave Band

| Sound Data | 62.5 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | LwA | dBA | Sones |
|------------|------|-----|-----|-----|------|------|------|------|-----|-----|-------|
| Inlet | 80 | 78 | 78 | 74 | 70 | 68 | 64 | 59 | 77 | 65 | 13.7 |



Model: SBE-3H30-3

Sidewall Belt Drive Fan

Standard Construction Features:

- Galvanized steel fan panel - Die formed, galvanized steel drive frame assembly
- Fabricated steel propeller for Levels 1 and 2, welded and painted steel for Level 3
- Adjustable motor pulley - Ball bearing motors - Fan shaft mounted in ball bearing pillow blocks - Static resistant belts - Corrosion resistant fasteners

Selected Options & Accessories:

Spare Belt(s) - 1 Set (Attached)
UL/cUL 705 Listed - "Power Ventilators"
Airflow Direction: Exhaust
Motor Access: From Int. of Bldg.
Wall Collar Assembled
Switch, NEMA-1, T.O., Toggle, Shipped with Unit
Junction Box Mounted & Wired
OSHA Approved Motor Side Guard
Bearings with Grease Fittings
Unit Warranty: 1 Yr (Standard)
Damper Mounted, WD-320-PB-32X32, Gravity Operated, Not Coated

Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.

Models SE1, SS1, SE2, SS2, SCR3, SBE-1, SBS-1, SBE-2, SBS-2, SBE-3, SBS-3, SBCE, SBCS, SBCR

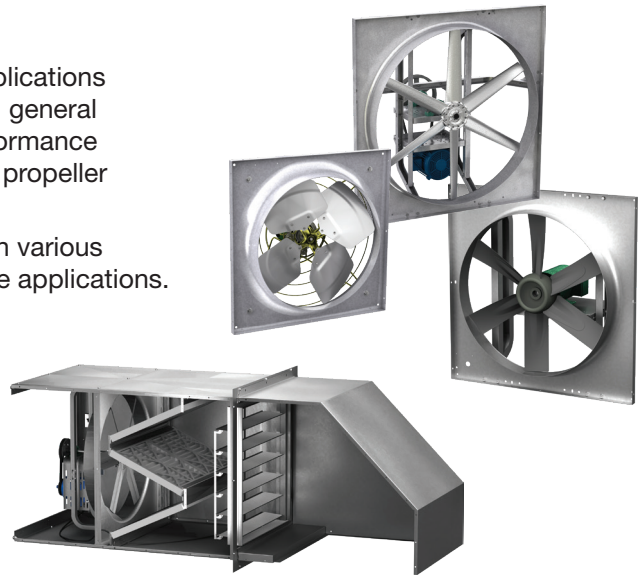
Axial Propeller Wall Fans

Axial propeller wall fans are ideal for factory and warehouse applications where high volumes of air and low pressures are required. From general ventilation to industrial duty, the range of construction and performance capabilities offered represent the most comprehensive sidewall propeller fan line in the industry.

Wall mounted fans include both direct- and belt-driven fans with various impeller styles for exhaust, supply, filtered supply, and reversible applications.

Filtered Supply

Optional filtered supply wall housings are designed with the draw-thru concept to achieve the highest filter and fan efficiencies. Permanent 2-inch (51 mm) washable filters are accessed through a bolted panel and can be easily removed for cleaning.



General Safety Information

Only qualified personnel should install this fan. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electric Code (CEC) in Canada.
2. The rotation of the propeller is critical. It must be free to rotate without striking or rubbing any stationary objects.
3. Motor must be securely and adequately grounded.
4. Do not spin fan propeller faster than max cataloged fan RPM. Adjustments to fan speed significantly affects motor load. If the fan RPM is changed, the

motor current should be checked to make sure it is not exceeding the motor nameplate amps.

5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open access doors to a duct while the fan is running.

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

CAUTION

When servicing the fan, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

Precaution should be taken in explosive atmospheres.

| |
|---|
| DANGER |
| Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien. |
| ATTENTION |
| Lors de toute intervention sur la soufflante, le moteur peut être suffisamment chaud pour provoquer une douleur voire une blessure. Laisser le moteur refroidir avant toute maintenance. |
| ATTENTION |
| Faire preuve de précaution dans les atmosphères explosives. |

Receiving

Upon receiving the product, check to ensure all items are accounted for by referencing the delivery receipt or packing list. Inspect each crate or carton for shipping damage before accepting delivery. Alert the carrier of any damage detected. The customer will make notification of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading which is countersigned by the delivering carrier. If damaged, immediately contact your Representative. Any physical damage to the unit after acceptance is not the responsibility of the Manufacturer.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Note: The filtered supply unit ships with all ordered components completely factory-assembled. The optional weatherhood ships knocked down for field assembly and installation.

Storage

Fans are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the fan and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

Storage Environment

The ideal environment for the storage of fans and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain or snow. Temperatures should be evenly maintained between 30° to 110°F (-1° to 43°C). Wide temperature swings may cause condensation

and “sweating” of metal parts. All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice or snow and wipe dry before moving to indoor storage. To avoid “sweating” of metal parts allow cold parts to reach room temperature. To dry parts and packages use a portable electric heater to get rid of any moisture buildup. Leave coverings loose to permit air circulation and to allow for periodic inspection. The unit should be stored at least 3-1/2 inch off the floor on wooden blocks covered with moisture proof paper or polyethylene sheathing. Aisles between parts and along all walls should be provided to permit air circulation and space for inspection.

Fans designed for outdoor applications may be stored outdoors, if absolutely necessary. Roads or aisles for portable cranes and hauling equipment are needed.

The fan should be placed on a level surface to prevent water from leaking into the fan. The fan should be elevated on an adequate number of wooden blocks so that it is above water and snow levels and has enough blocking to prevent it from settling into soft ground. Locate parts far enough apart to permit air circulation, sunlight and space for periodic inspection. To minimize water accumulation, place all fan parts on blocking supports so that rain water will run off.

Do not cover parts with plastic film or tarps as these cause condensation of moisture from the air passing through heating and cooling cycles. Fan propellers should be blocked to prevent spinning caused by strong winds.

Inspection and Maintenance During Storage

While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed. If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the wheel by hand ten to fifteen revolutions to distribute lubricant on motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Thoroughly wipe clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, WD-40® or the equivalent.

Removing From Storage

As fans are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion until the fan equipment goes into operation.

Pre-Installation Checks

- Check chart below for correct wall opening dimensions.
- Check motor voltage and amperage rating for compatibility with electrical supply. Supply wiring must be properly fused and conform to local and national codes.
- Motor load amperage must be checked and compared to nameplate rating to avoid serious damage to motor when speed is increased.

Wall Opening Requirements

Wall opening size and propeller-to-damper distance are two important dimensions for fan installation. Fans mounted to the wall require a different wall opening

size than those mounted in collars or wall housings. Propeller-to-damper distance (M) is important to reduce turbulence and damper flutter which may lead to premature damper failure.

Figure 1 and 2 show the wall opening required for installations with either a wall housing or collar.

Figure 3 shows the recommended wall opening and the minimum distance (M) suggested between the fan and damper for direct to wall installations.

Figure 4 shows the dimensions and wall opening required for installations with a filtered supply wall housing.

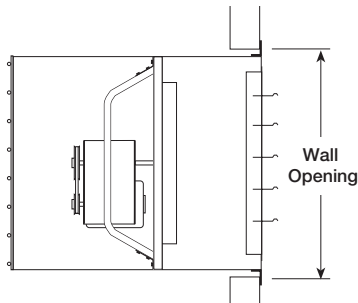


Figure 1 - Wall Housing Installation

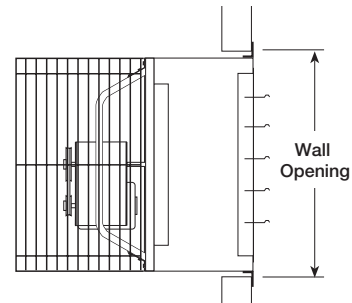


Figure 2 - Wall Collar Installation

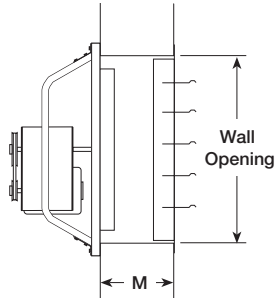


Figure 3 - Direct to Wall Installation

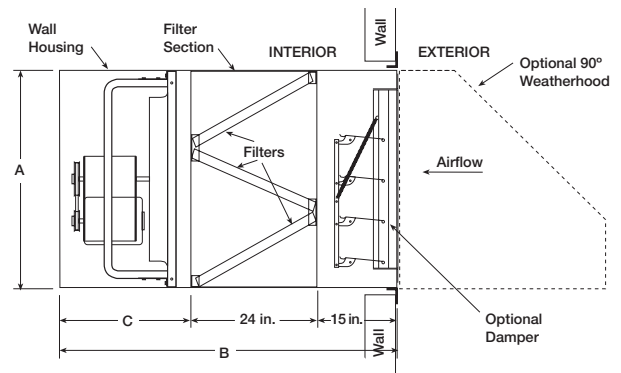


Figure 4 - Filtered Supply Wall Housing Installation

| Fan Size | Damper Size Square | Recommended Wall Opening Square | | | M Minimum | Filtered Supply Wall Housing Only | | | | |
|----------|--------------------|---------------------------------|----------|----------|-----------|-----------------------------------|----------|----------|------------------------|-----------------|
| | | Figures 1 and 2 | Figure 3 | Figure 4 | | A | B | C | Filter Quantity & Size | |
| 8 | 10 | 14-1/4 | 10-1/2 | - | 6 | - | - | - | - | - |
| 10 | 12 | 16-1/4 | 12-1/2 | - | 6 | - | - | - | - | - |
| 12 | 14 | 19-1/4 | 14-1/2 | - | 7 | - | - | - | - | - |
| 14 | 16 | 21-1/4 | 16-1/2 | - | 8 | - | - | - | - | - |
| 16 | 18 | 23-1/4 | 18-1/2 | - | 9 | - | - | - | - | - |
| 18 | 20 | 25-1/4 | 20-1/2 | - | 10 | - | - | - | - | - |
| 20 | 22 | 27-1/4 | 22-1/2 | - | 12 | - | - | - | - | - |
| 24 | 26 | 33-3/4 | 26-1/2 | 33-3/4 | 13 | 32-1/4 | 63 | 24 | 4 | 23-1/4 x 16-1/4 |
| 30 | 32 | 39-3/4 | 32-1/2 | 39-3/4 | 13 | 38-1/4 | 65 | 26 | 4 | 24-5/8 x 19-1/4 |
| 36 | 38 | 45-3/4 | 38-1/2 | 45-3/4 | 14 | 44-1/4 | 67-1/4 | 28-1/4 | 6 | 23-1/4 x 22-1/8 |
| 42 | 44 | 51-3/4 | 44-1/2 | 51-3/4 | 15 | 50-1/8 | 72-7/8 | 34 | 6 | 24-1/8 x 25-1/8 |
| 48 | 50 | 57-3/4 | 50-1/2 | 57-3/4 | 16 | 56-1/8 | 72-7/8 | 34 | 12 | 23-1/4 x 18-3/4 |
| 54 | 56 | 63-3/4 | 56-1/2 | 63-3/4 | 17 | 62-3/8 | 79-11/16 | 40-11/16 | 12 | 23-1/4 x 20-3/4 |
| 60 | 62 | 69-3/4 | 62-1/2 | - | 19 | - | - | - | - | - |
| 72 | 74 | 84-3/4 | 74-1/2 | - | 19 | - | - | - | - | - |

All dimensions in inches. Filters are 2 inch nominal thickness. Above filter sizes are actual dimensions.

Typical Installation

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

DANGER

Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.

Move fan to the desired location and determine the method by which the fan is to be mounted as shown in Figures 1-4 shown on page 3. Optional wall mount housings (Figure 1) and wall mount collars (Figure 2) provide a convenient means of mounting sidewall propeller fans while maintaining the proper distance between propeller and damper.

Attach the fan by inserting a suitable fastener through each of the prepunched mounting holes in the fan panel. Care should be taken not to bend or distort the fan panel or drive components during installation.

Support Braces

Wall Housing sizes 42 and larger with heavy motors and all Filtered Supply Wall Housings need additional bracing.

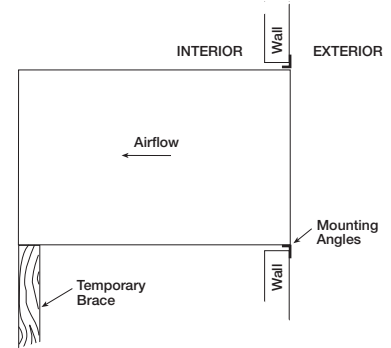
Filtered Supply Wall Housing Installation

Step 1 Install Housing

Install housing through wall opening from outside.

Temporarily brace end of unit until permanent support braces are installed.

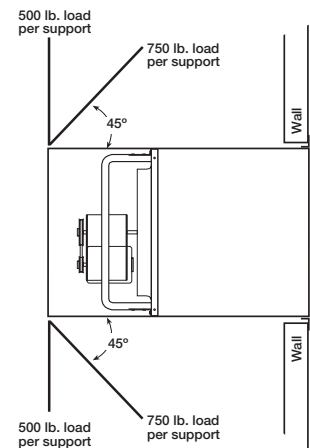
Secure through prepunched holes in angles with suitable fasteners.



Step 2 Install Support Braces

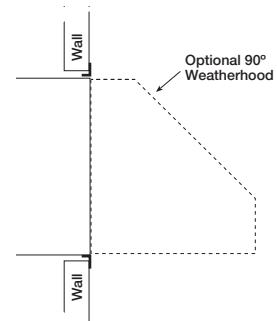
Choose method of support. Attach support to end of unit (above or below housing) with rods, cable, angle, etc. (supplied by others) as shown.

Vertical braces must carry a minimum load of 500 pounds per support, and angled (45°) braces a minimum of 750 pounds per support based on two supports.



Step 3 Install Weatherhood

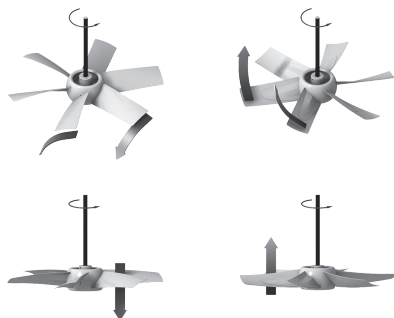
Position weatherhood over end of wall housing and fasten through mounting holes with self-tapping screws. Caulk, flash and complete electrical hook-up to finish installation.



Pre-Start-Up Checks

Check all fasteners and setscrews for tightness. This is especially important for bearing setscrews.

The propeller should rotate freely and not rub on the fan panel venturi. Rotation direction of the propeller should be checked by momentarily turning the unit on. Propeller blade should cup and throw the air when rotating in the correct rotation as shown in the figure. Rotation should be in the same direction as the rotation decal affixed to the unit.



For 3-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads. For single-phase installations follow the wiring diagram located on the motor.

For belt drive fans, the adjustable motor pulley is preset at the factory for the specified fan RPM. Fan speed can be increased by closing or decreased by opening the adjustable pulley. Two or three groove variable pitch pulleys must be adjusted an equal number of turns open. Any increase in fan speed represents a substantial increase in horsepower required from the motor. Always check motor load amperage and compare to nameplate rating when changing fan speed.

Maintenance

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

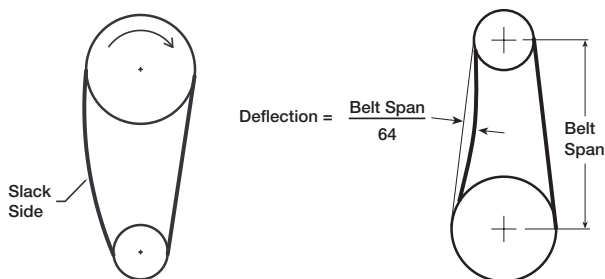
DANGER

Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.

Once the fan has been put into operation, a periodic maintenance program should be set up to preserve the reliability and performance of the fan. Items to be included in this program are belts, bearings, fasteners and setscrews, lubrication, and removal of dust and dirt.

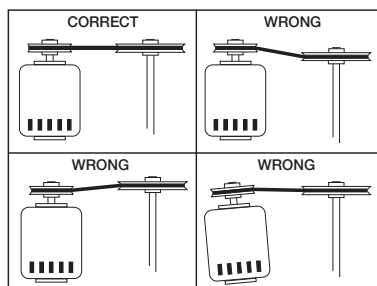
Belts

Premature belt failures are frequently caused by improper belt tension (either too tight or too loose) or misaligned pulleys. The proper tension for operating a V-belt is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the proper belt deflection halfway between pulley centers is 1/64 inch (0.4 mm) for each inch of belt span. For example, if the belt span is 64 inches (1626 mm), the belt deflection should be one inch (25 mm) using moderate thumb pressure at midpoint of the drive. See figure shown below.



Check belt tension two times during the first 24 hours of operation and periodically thereafter. To adjust belt tension, simply loosen four fasteners (two on each side of the motor plate) and slide the motor plate away from the fan shaft until proper belt tension is attained. On some fans, fasteners attaching the motor to the motor plate must be loosened in order to adjust the belt.

It is very important that the drive pulleys remain in proper alignment after adjustments are made. Misalignment of pulleys will result in premature belt wear noise, vibration and power loss.



Bearings (for belt drive fans only)

Bearings are the most critical moving part of the fan and should be inspected at periodic intervals. Locking collars and setscrews, in addition to fasteners attaching the bearings to the bearing plate, must be checked for tightness. In a clean environment and temperatures above 32°F (0°C) and below 200°F (93°C), fan shaft bearings with grease fittings should be lubricated semi-annually using a high-quality lithium based grease. If unusual environmental conditions exist, temperatures below 32°F (0°C) and above 200°F (93°C), moisture or contaminants, more frequent lubrication is required.

With the unit running, add grease very slowly with a manual grease gun until a slight bead of grease forms at the seal. Be careful not to unseat the seal by over lubricating or using excessive pressure. Bearings without grease fittings are lubricated for life.

Fasteners and Setscrews

Any fan vibration has a tendency to loosen mechanical fasteners. A periodic inspection should include checking all fasteners and setscrews for tightness. Particular attention should be paid to setscrews or taper-lock bushings attaching the propeller to the motor shaft and the motor shaft to the bearings. Loose bearing setscrews will lead to premature failure of the fan shaft. In addition, check all fasteners attaching the motor to the motor plate.

Lubrication

Refer to the paragraph on bearings for bearing lubrication. Many fractional horsepower motors installed on the smaller fans are lubricated for life and require no further attention. Motors equipped with oil holes should be oiled in accordance with the manufacturer's instructions printed on the motor. Use a high grade SAE 20 machine oil and use caution not to over lubricate. Motors supplied with grease fittings should be greased according to directions printed on the motor.

Removal of Dust and Dirt

Dirt clogs cooling openings on the motor housing, contaminates bearing lubricant and collects on propeller blades causing severe imbalance if left unchecked. The exterior surface of the motor, fan panel and entire propeller should be thoroughly cleaned periodically. Use caution and do not allow water or solvents to enter the motor or bearings. Motors or bearings must not be sprayed with steam or water.

The filters also require periodic cleaning. The 2 inch (51 mm) washable aluminum filters are accessed through the bolted access panel.

Troubleshooting

WARNING

Before taking any corrective action, make certain unit is not capable of operation during repairs.

AVERTISSEMENT

Avant d'entreprendre toute action corrective, s'assurer que l'appareil ne pourra pas fonctionner durant les réparations.

| PROBLEM | CAUSE | CORRECTIVE ACTION |
|----------------------|-------------------------------------|---|
| Too much airflow | Resistance lower than designed | Decrease fan speed. |
| Reduced airflow | System resistance too high | Check backdraft dampers for proper operation. Remove obstructions in ductwork. Clean dirty filters. Check for adequate supply air for exhaust fans or exhaust air for supply fans. |
| | Fan too close to damper | Increase distance between fan and damper. |
| | Fan speed too low | Increase fan speed. |
| | Excessive dirt buildup on propeller | Clean propeller. |
| Excessive noise | Bearings | Tighten collars and fasteners. Lubricate bearings. Replace defective bearings. |
| | V-belt drive | Tighten pulleys on motor and fan shaft. Adjust belt tension. Align pulleys properly. Replace worn belts or pulleys. See Maintenance. |
| | Excessive vibration | Clean dirt buildup from propeller. Check all setscrews and fasteners for tightness. Check for worn bearing. Correct propeller imbalance. Check for loose dampers, guards or ductwork. |
| | Defective motor | Replace motor. |
| | Variable frequency drive (VFD) | Check VFD for drive setting, some controllers are able to be adjusted to lower the harmonic noises sometimes heard during operation by adjusting a simple setting on the controller. |
| | Debris | Remove all debris from the fan. |
| Fan does not operate | Electrical supply | Check fuses/circuit breakers. Check for switches turned off or disconnected. Check for correct supply voltage. |
| | Drive | Check for broken or worn belts. Tighten loose pulleys. |
| | Motor | Assure motor is correct horsepower and not tripping overload protector. |

Parts List

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local representative and the factory in providing service and replacement parts. Before taking any corrective action, make certain unit is not capable of operation during repairs.

CAUTION

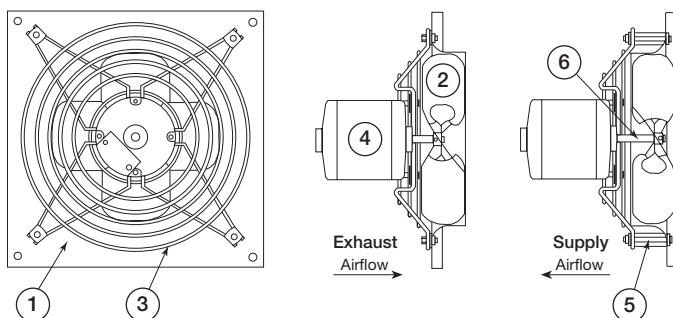
A fan manufactured with an explosion resistant motor does not certify the entire unit to be explosion proof. Refer to UL Listing Mark for the fans approved usage.

CAUTION

La présence d'un moteur antidéflagrant sur un ventilateur ne garantit pas que tout l'appareil est antidéflagrant. Pour connaître les emplois autorisés de l'appareil, voir son marquage de conformité UL.

Direct Drive

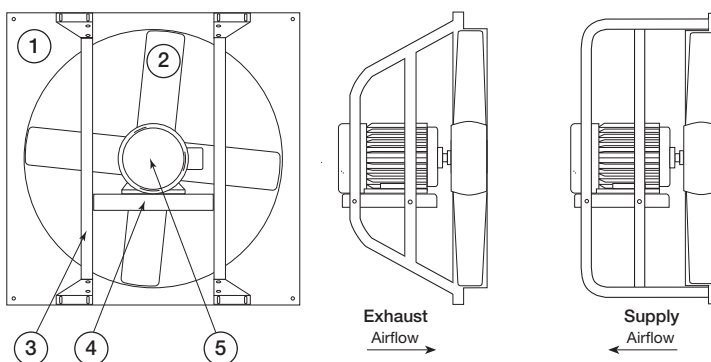
SE1 and SS1 (Sizes 8 thru 12 - D, G and E Motor Speeds)



1. Fan Panel
2. Propeller
3. Drive Frame/Motor Support
4. Motor
5. Riser Blocks (4) - supply fan only
6. Shaft Extension - supply fan only

Direct Drive

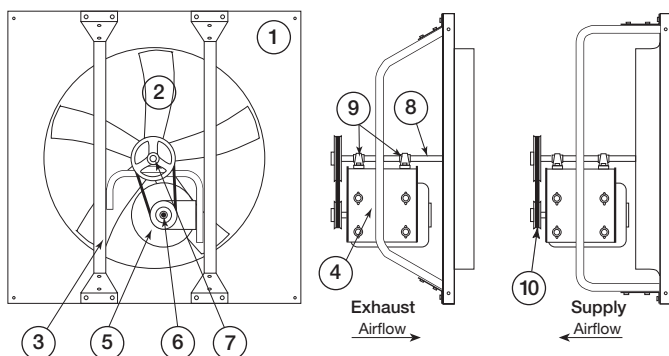
SE1 and SS1 (Sizes 12 thru 24 - A, B and C Motor Speeds) SE2, SS2 and SCR3



1. Fan Panel
2. Propeller
3. Drive Frame Channels (2)
4. Motor Plate
5. Motor

Belt Drive

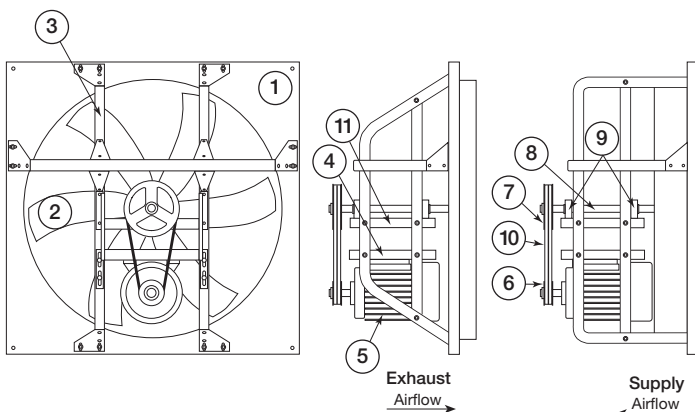
SBE-1, SBS-1, SBE-2 and SBS-2 (L and H propellers)



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor /Bearing Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt

Belt Drive

SBE-3, SBS-3, SBCE, SBCE and SBCE (L and H propellers)



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt
11. Bearing Plate

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.

Greenheck's Sidewall Propeller Fans catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.



Model: SBE-3H30-7

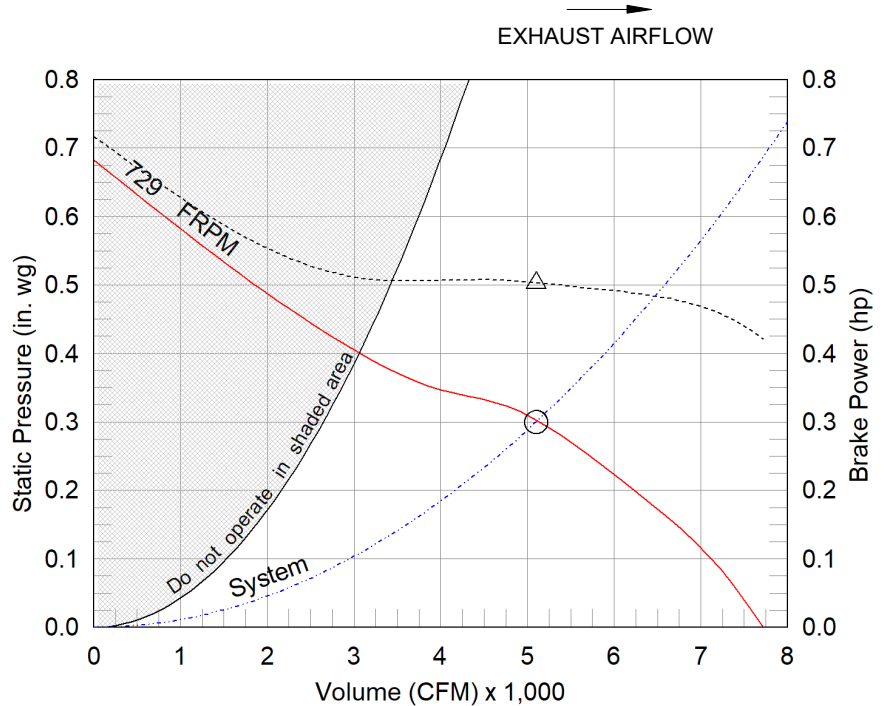
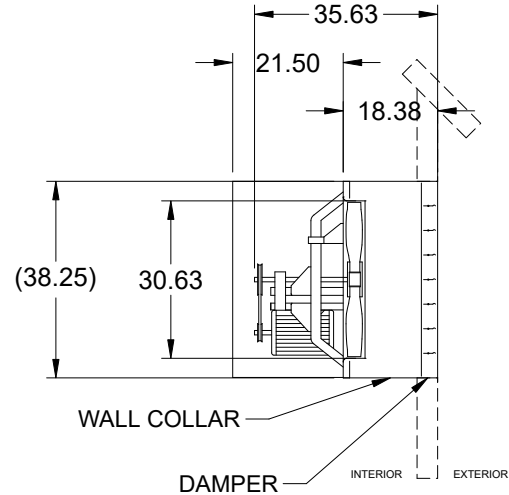
Sidewall Belt Drive Fan

Motor Access From Int. of Bldg.

| Dimensional | |
|------------------------|---------------|
| Quantity | 1 |
| Weight w/o Acc's (lb) | 98 |
| Weight w/ Acc's (lb) | 259 |
| Max T Motor Frame Size | 184 |
| Optional Damper (in.) | 32 x 32 |
| Wall Opening (in.) | 39.75 x 39.75 |

| Performance | |
|----------------------------|-------|
| Requested Volume (CFM) | 5,100 |
| Actual Volume (CFM) | 5,100 |
| Total External SP (in. wg) | 0.3 |
| Fan RPM | 729 |
| Operating Power (hp) | 0.5 |
| Elevation (ft) | 705 |
| Airstream Temp.(F) | 70 |
| Air Density (lb/ft3) | 0.073 |
| Drive Loss (%) | 8.4 |
| Tip Speed (ft/min) | 5,725 |
| Static Eff. (%) | 52 |

| Motor | |
|---------------------|----------|
| Motor Mounted | Yes |
| Size (hp) | 3/4 |
| Voltage/Cycle/Phase | 460/60/3 |
| Enclosure | ODP |
| Motor RPM | 1725 |
| Efficiency Rating | Standard |
| Windings | 1 |
| NEC FLA* (Amps) | 1.6 |



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- - - System curve
- Brake horsepower curve

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory. MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4 dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5 ft
The motor provided on this fan is inverter ready and meets NEMA MG1 Part 31.4.4.2

Sound Power by Octave Band

| Sound Data | 62.5 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | LwA | dBA | Sones |
|------------|------|-----|-----|-----|------|------|------|------|-----|-----|-------|
| Inlet | 81 | 80 | 80 | 77 | 72 | 70 | 67 | 62 | 79 | 67 | 15.8 |



Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.

Models SE1, SS1, SE2, SS2, SCR3, SBE-1, SBS-1, SBE-2, SBS-2, SBE-3, SBS-3, SBCE, SBCS, SBCR

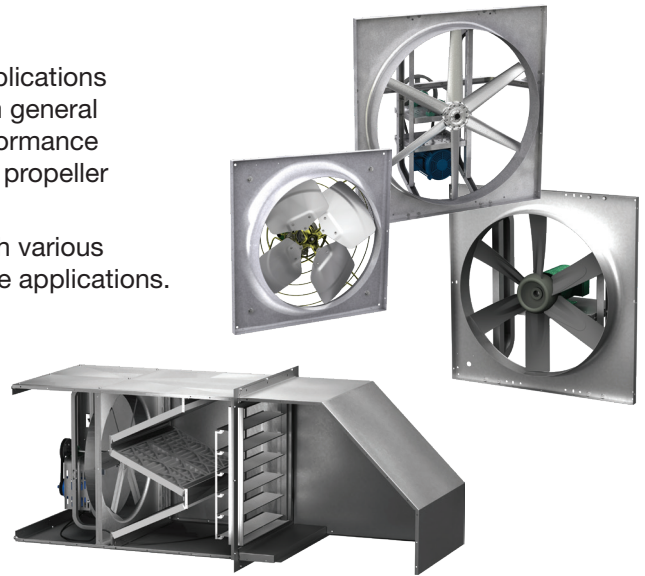
Axial Propeller Wall Fans

Axial propeller wall fans are ideal for factory and warehouse applications where high volumes of air and low pressures are required. From general ventilation to industrial duty, the range of construction and performance capabilities offered represent the most comprehensive sidewall propeller fan line in the industry.

Wall mounted fans include both direct- and belt-driven fans with various impeller styles for exhaust, supply, filtered supply, and reversible applications.

Filtered Supply

Optional filtered supply wall housings are designed with the draw-thru concept to achieve the highest filter and fan efficiencies. Permanent 2-inch (51 mm) washable filters are accessed through a bolted panel and can be easily removed for cleaning.



General Safety Information

Only qualified personnel should install this fan. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electric Code (CEC) in Canada.
2. The rotation of the propeller is critical. It must be free to rotate without striking or rubbing any stationary objects.
3. Motor must be securely and adequately grounded.
4. Do not spin fan propeller faster than max cataloged fan RPM. Adjustments to fan speed significantly affects motor load. If the fan RPM is changed, the

motor current should be checked to make sure it is not exceeding the motor nameplate amps.

5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open access doors to a duct while the fan is running.

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

CAUTION

When servicing the fan, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

Precaution should be taken in explosive atmospheres.

| DANGER |
|---|
| Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien. |
| ATTENTION |
| Lors de toute intervention sur la soufflante, le moteur peut être suffisamment chaud pour provoquer une douleur voire une blessure. Laisser le moteur refroidir avant toute maintenance. |
| ATTENTION |
| Faire preuve de précaution dans les atmosphères explosives. |

Receiving

Upon receiving the product, check to ensure all items are accounted for by referencing the delivery receipt or packing list. Inspect each crate or carton for shipping damage before accepting delivery. Alert the carrier of any damage detected. The customer will make notification of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading which is countersigned by the delivering carrier. If damaged, immediately contact your Representative. Any physical damage to the unit after acceptance is not the responsibility of the Manufacturer.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Note: The filtered supply unit ships with all ordered components completely factory-assembled. The optional weatherhood ships knocked down for field assembly and installation.

Storage

Fans are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the fan and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

Storage Environment

The ideal environment for the storage of fans and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain or snow. Temperatures should be evenly maintained between 30° to 110°F (-1° to 43°C). Wide temperature swings may cause condensation

and “sweating” of metal parts. All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice or snow and wipe dry before moving to indoor storage. To avoid “sweating” of metal parts allow cold parts to reach room temperature. To dry parts and packages use a portable electric heater to get rid of any moisture buildup. Leave coverings loose to permit air circulation and to allow for periodic inspection. The unit should be stored at least 3-1/2 inch off the floor on wooden blocks covered with moisture proof paper or polyethylene sheathing. Aisles between parts and along all walls should be provided to permit air circulation and space for inspection.

Fans designed for outdoor applications may be stored outdoors, if absolutely necessary. Roads or aisles for portable cranes and hauling equipment are needed.

The fan should be placed on a level surface to prevent water from leaking into the fan. The fan should be elevated on an adequate number of wooden blocks so that it is above water and snow levels and has enough blocking to prevent it from settling into soft ground. Locate parts far enough apart to permit air circulation, sunlight and space for periodic inspection. To minimize water accumulation, place all fan parts on blocking supports so that rain water will run off.

Do not cover parts with plastic film or tarps as these cause condensation of moisture from the air passing through heating and cooling cycles. Fan propellers should be blocked to prevent spinning caused by strong winds.

Inspection and Maintenance During Storage

While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed. If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the wheel by hand ten to fifteen revolutions to distribute lubricant on motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Thoroughly wipe clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, WD-40® or the equivalent.

Removing From Storage

As fans are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion until the fan equipment goes into operation.

Pre-Installation Checks

- Check chart below for correct wall opening dimensions.
- Check motor voltage and amperage rating for compatibility with electrical supply. Supply wiring must be properly fused and conform to local and national codes.
- Motor load amperage must be checked and compared to nameplate rating to avoid serious damage to motor when speed is increased.

Wall Opening Requirements

Wall opening size and propeller-to-damper distance are two important dimensions for fan installation. Fans mounted to the wall require a different wall opening

size than those mounted in collars or wall housings. Propeller-to-damper distance (M) is important to reduce turbulence and damper flutter which may lead to premature damper failure.

Figure 1 and 2 show the wall opening required for installations with either a wall housing or collar.

Figure 3 shows the recommended wall opening and the minimum distance (M) suggested between the fan and damper for direct to wall installations.

Figure 4 shows the dimensions and wall opening required for installations with a filtered supply wall housing.

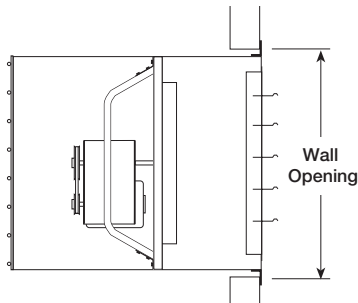


Figure 1 - Wall Housing Installation

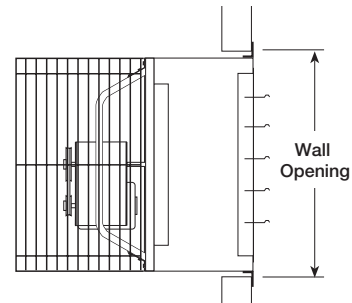


Figure 2 - Wall Collar Installation

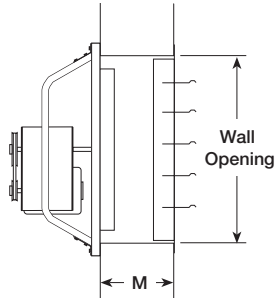


Figure 3 - Direct to Wall Installation

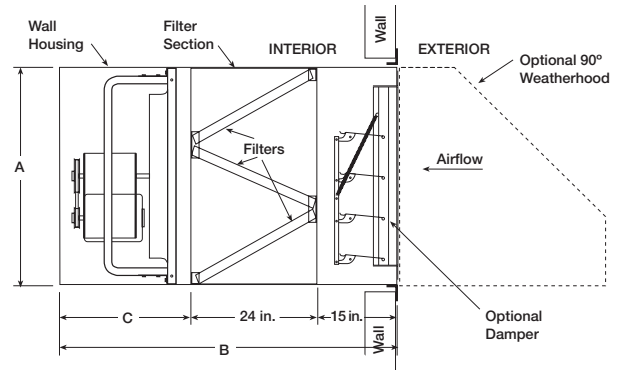


Figure 4 - Filtered Supply Wall Housing Installation

| Fan Size | Damper Size Square | Recommended Wall Opening Square | | | M Minimum | Filtered Supply Wall Housing Only | | | | |
|----------|--------------------|---------------------------------|----------|----------|-----------|-----------------------------------|----------|----------|------------------------|-----------------|
| | | Figures 1 and 2 | Figure 3 | Figure 4 | | A | B | C | Filter Quantity & Size | |
| 8 | 10 | 14-1/4 | 10-1/2 | - | 6 | - | - | - | - | - |
| 10 | 12 | 16-1/4 | 12-1/2 | - | 6 | - | - | - | - | - |
| 12 | 14 | 19-1/4 | 14-1/2 | - | 7 | - | - | - | - | - |
| 14 | 16 | 21-1/4 | 16-1/2 | - | 8 | - | - | - | - | - |
| 16 | 18 | 23-1/4 | 18-1/2 | - | 9 | - | - | - | - | - |
| 18 | 20 | 25-1/4 | 20-1/2 | - | 10 | - | - | - | - | - |
| 20 | 22 | 27-1/4 | 22-1/2 | - | 12 | - | - | - | - | - |
| 24 | 26 | 33-3/4 | 26-1/2 | 33-3/4 | 13 | 32-1/4 | 63 | 24 | 4 | 23-1/4 x 16-1/4 |
| 30 | 32 | 39-3/4 | 32-1/2 | 39-3/4 | 13 | 38-1/4 | 65 | 26 | 4 | 24-5/8 x 19-1/4 |
| 36 | 38 | 45-3/4 | 38-1/2 | 45-3/4 | 14 | 44-1/4 | 67-1/4 | 28-1/4 | 6 | 23-1/4 x 22-1/8 |
| 42 | 44 | 51-3/4 | 44-1/2 | 51-3/4 | 15 | 50-1/8 | 72-7/8 | 34 | 6 | 24-1/8 x 25-1/8 |
| 48 | 50 | 57-3/4 | 50-1/2 | 57-3/4 | 16 | 56-1/8 | 72-7/8 | 34 | 12 | 23-1/4 x 18-3/4 |
| 54 | 56 | 63-3/4 | 56-1/2 | 63-3/4 | 17 | 62-3/8 | 79-11/16 | 40-11/16 | 12 | 23-1/4 x 20-3/4 |
| 60 | 62 | 69-3/4 | 62-1/2 | - | 19 | - | - | - | - | - |
| 72 | 74 | 84-3/4 | 74-1/2 | - | 19 | - | - | - | - | - |

All dimensions in inches. Filters are 2 inch nominal thickness. Above filter sizes are actual dimensions.

Typical Installation

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

DANGER

Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.

Move fan to the desired location and determine the method by which the fan is to be mounted as shown in Figures 1-4 shown on page 3. Optional wall mount housings (Figure 1) and wall mount collars (Figure 2) provide a convenient means of mounting sidewall propeller fans while maintaining the proper distance between propeller and damper.

Attach the fan by inserting a suitable fastener through each of the prepunched mounting holes in the fan panel. Care should be taken not to bend or distort the fan panel or drive components during installation.

Support Braces

Wall Housing sizes 42 and larger with heavy motors and all Filtered Supply Wall Housings need additional bracing.

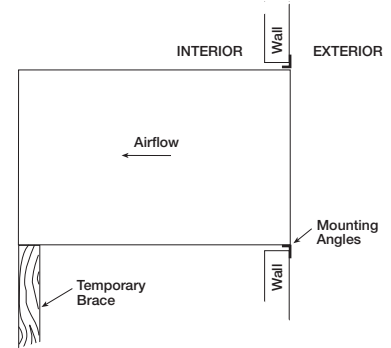
Filtered Supply Wall Housing Installation

Step 1 Install Housing

Install housing through wall opening from outside.

Temporarily brace end of unit until permanent support braces are installed.

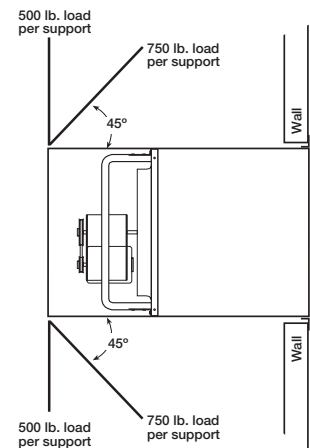
Secure through prepunched holes in angles with suitable fasteners.



Step 2 Install Support Braces

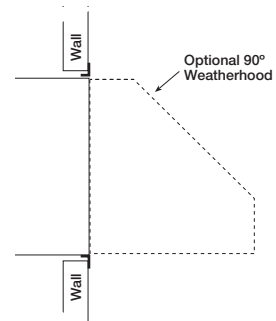
Choose method of support. Attach support to end of unit (above or below housing) with rods, cable, angle, etc. (supplied by others) as shown.

Vertical braces must carry a minimum load of 500 pounds per support, and angled (45°) braces a minimum of 750 pounds per support based on two supports.



Step 3 Install Weatherhood

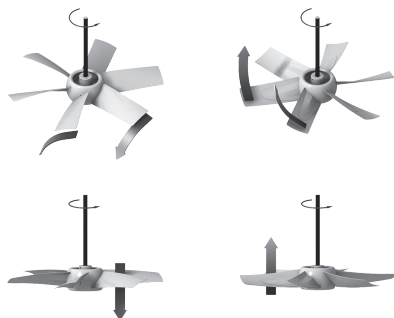
Position weatherhood over end of wall housing and fasten through mounting holes with self-tapping screws. Caulk, flash and complete electrical hook-up to finish installation.



Pre-Start-Up Checks

Check all fasteners and setscrews for tightness. This is especially important for bearing setscrews.

The propeller should rotate freely and not rub on the fan panel venturi. Rotation direction of the propeller should be checked by momentarily turning the unit on. Propeller blade should cup and throw the air when rotating in the correct rotation as shown in the figure. Rotation should be in the same direction as the rotation decal affixed to the unit.



For 3-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads. For single-phase installations follow the wiring diagram located on the motor.

For belt drive fans, the adjustable motor pulley is preset at the factory for the specified fan RPM. Fan speed can be increased by closing or decreased by opening the adjustable pulley. Two or three groove variable pitch pulleys must be adjusted an equal number of turns open. Any increase in fan speed represents a substantial increase in horsepower required from the motor. Always check motor load amperage and compare to nameplate rating when changing fan speed.

Maintenance

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

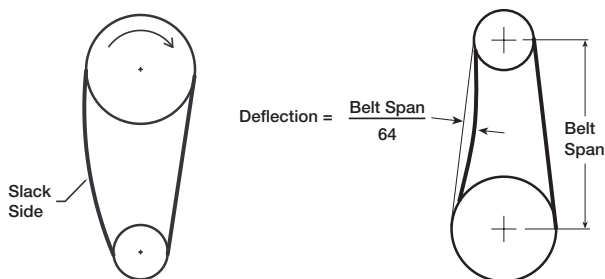
DANGER

Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.

Once the fan has been put into operation, a periodic maintenance program should be set up to preserve the reliability and performance of the fan. Items to be included in this program are belts, bearings, fasteners and setscrews, lubrication, and removal of dust and dirt.

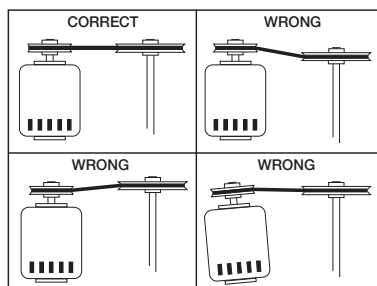
Belts

Premature belt failures are frequently caused by improper belt tension (either too tight or too loose) or misaligned pulleys. The proper tension for operating a V-belt is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the proper belt deflection halfway between pulley centers is 1/64 inch (0.4 mm) for each inch of belt span. For example, if the belt span is 64 inches (1626 mm), the belt deflection should be one inch (25 mm) using moderate thumb pressure at midpoint of the drive. See figure shown below.



Check belt tension two times during the first 24 hours of operation and periodically thereafter. To adjust belt tension, simply loosen four fasteners (two on each side of the motor plate) and slide the motor plate away from the fan shaft until proper belt tension is attained. On some fans, fasteners attaching the motor to the motor plate must be loosened in order to adjust the belt.

It is very important that the drive pulleys remain in proper alignment after adjustments are made. Misalignment of pulleys will result in premature belt wear noise, vibration and power loss.



Bearings (for belt drive fans only)

Bearings are the most critical moving part of the fan and should be inspected at periodic intervals. Locking collars and setscrews, in addition to fasteners attaching the bearings to the bearing plate, must be checked for tightness. In a clean environment and temperatures above 32°F (0°C) and below 200°F (93°C), fan shaft bearings with grease fittings should be lubricated semi-annually using a high-quality lithium based grease. If unusual environmental conditions exist, temperatures below 32°F (0°C) and above 200°F (93°C), moisture or contaminants, more frequent lubrication is required.

With the unit running, add grease very slowly with a manual grease gun until a slight bead of grease forms at the seal. Be careful not to unseat the seal by over lubricating or using excessive pressure. Bearings without grease fittings are lubricated for life.

Fasteners and Setscrews

Any fan vibration has a tendency to loosen mechanical fasteners. A periodic inspection should include checking all fasteners and setscrews for tightness. Particular attention should be paid to setscrews or taper-lock bushings attaching the propeller to the motor shaft and the motor shaft to the bearings. Loose bearing setscrews will lead to premature failure of the fan shaft. In addition, check all fasteners attaching the motor to the motor plate.

Lubrication

Refer to the paragraph on bearings for bearing lubrication. Many fractional horsepower motors installed on the smaller fans are lubricated for life and require no further attention. Motors equipped with oil holes should be oiled in accordance with the manufacturer's instructions printed on the motor. Use a high grade SAE 20 machine oil and use caution not to over lubricate. Motors supplied with grease fittings should be greased according to directions printed on the motor.

Removal of Dust and Dirt

Dirt clogs cooling openings on the motor housing, contaminates bearing lubricant and collects on propeller blades causing severe imbalance if left unchecked. The exterior surface of the motor, fan panel and entire propeller should be thoroughly cleaned periodically. Use caution and do not allow water or solvents to enter the motor or bearings. Motors or bearings must not be sprayed with steam or water.

The filters also require periodic cleaning. The 2 inch (51 mm) washable aluminum filters are accessed through the bolted access panel.

Troubleshooting

WARNING

Before taking any corrective action, make certain unit is not capable of operation during repairs.

AVERTISSEMENT

Avant d'entreprendre toute action corrective, s'assurer que l'appareil ne pourra pas fonctionner durant les réparations.

| PROBLEM | CAUSE | CORRECTIVE ACTION |
|----------------------|-------------------------------------|---|
| Too much airflow | Resistance lower than designed | Decrease fan speed. |
| Reduced airflow | System resistance too high | Check backdraft dampers for proper operation. Remove obstructions in ductwork. Clean dirty filters. Check for adequate supply air for exhaust fans or exhaust air for supply fans. |
| | Fan too close to damper | Increase distance between fan and damper. |
| | Fan speed too low | Increase fan speed. |
| | Excessive dirt buildup on propeller | Clean propeller. |
| Excessive noise | Bearings | Tighten collars and fasteners. Lubricate bearings. Replace defective bearings. |
| | V-belt drive | Tighten pulleys on motor and fan shaft. Adjust belt tension. Align pulleys properly. Replace worn belts or pulleys. See Maintenance. |
| | Excessive vibration | Clean dirt buildup from propeller. Check all setscrews and fasteners for tightness. Check for worn bearing. Correct propeller imbalance. Check for loose dampers, guards or ductwork. |
| | Defective motor | Replace motor. |
| | Variable frequency drive (VFD) | Check VFD for drive setting, some controllers are able to be adjusted to lower the harmonic noises sometimes heard during operation by adjusting a simple setting on the controller. |
| | Debris | Remove all debris from the fan. |
| Fan does not operate | Electrical supply | Check fuses/circuit breakers. Check for switches turned off or disconnected. Check for correct supply voltage. |
| | Drive | Check for broken or worn belts. Tighten loose pulleys. |
| | Motor | Assure motor is correct horsepower and not tripping overload protector. |

Parts List

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local representative and the factory in providing service and replacement parts. Before taking any corrective action, make certain unit is not capable of operation during repairs.

CAUTION

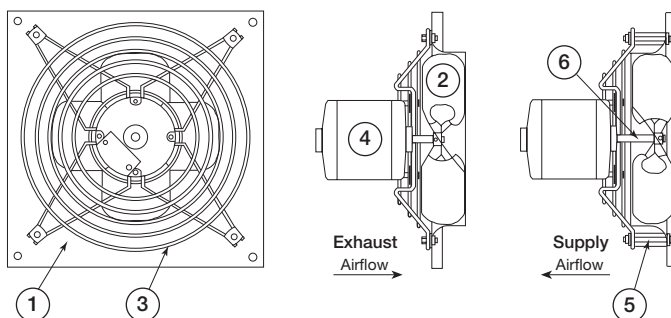
A fan manufactured with an explosion resistant motor does not certify the entire unit to be explosion proof. Refer to UL Listing Mark for the fans approved usage.

CAUTION

La présence d'un moteur antidéflagrant sur un ventilateur ne garantit pas que tout l'appareil est antidéflagrant. Pour connaître les emplois autorisés de l'appareil, voir son marquage de conformité UL.

Direct Drive

SE1 and SS1 (Sizes 8 thru 12 - D, G and E Motor Speeds)

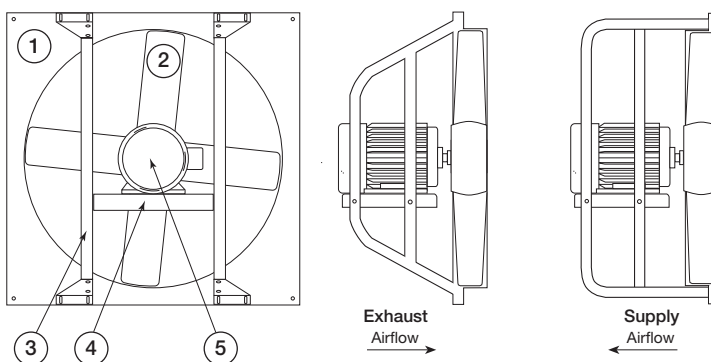


1. Fan Panel
2. Propeller
3. Drive Frame/Motor Support
4. Motor
5. Riser Blocks (4) - supply fan only
6. Shaft Extension - supply fan only

Direct Drive

SE1 and SS1 (Sizes 12 thru 24 - A, B and C Motor Speeds)

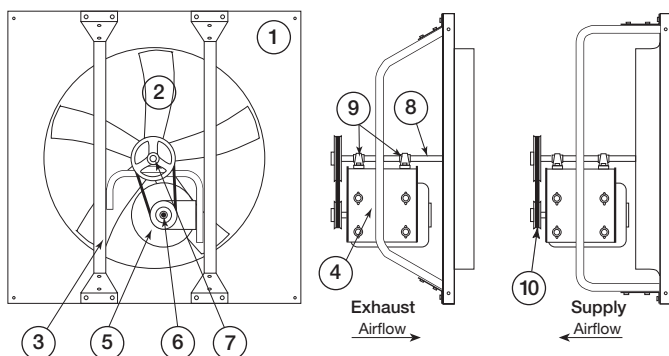
SE2, SS2 and SCR3



1. Fan Panel
2. Propeller
3. Drive Frame Channels (2)
4. Motor Plate
5. Motor

Belt Drive

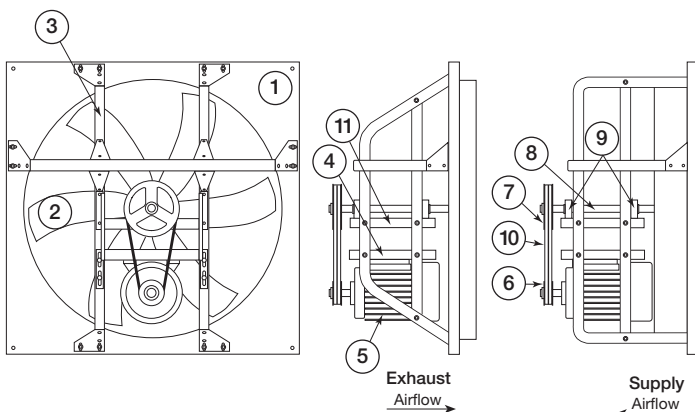
SBE-1, SBS-1, SBE-2 and SBS-2 (L and H propellers)



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor /Bearing Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt

Belt Drive

SBE-3, SBS-3, SBCE, SBCE and SBCR (L and H propellers)



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt
11. Bearing Plate

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.

Greenheck's Sidewall Propeller Fans catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.



APPENDIX K

REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION FOR FORMER TRICO PLANT

TABLE OF CONTENTS

1.0 INTRODUCTION

- 1.1 SITE OVERVIEW
- 1.2 PROJECT OBJECTIVES AND SCOPE OF WORK
- 1.3 REPORT OVERVIEW

2.0 REMEDIAL ACTION DESCRIPTION

- 2.1 SITE LOCATION AND HISTORY
- 2.2 REGULATORY HISTORY AND REQUIREMENTS
- 2.3 CLEAN-UP GOALS AND SITE CLOSURE CRITERIA
- 2.4 PREVIOUS REMEDIAL ACTIONS
- 2.5 DESCRIPTION OF EXISTING REMEDY
 - 2.5.1 System Goals and Objectives
 - 2.5.2 System Description
 - 2.5.3 Operation and Maintenance Program

3.0 FINDINGS AND OBSERVATIONS

- 3.1 SUBSURFACE PERFORMANCE
- 3.2 TREATMENT SYSTEM PERFORMANCE
- 3.3 REGULATORY COMPLIANCE 3-3
- 3.4 MAJOR COST COMPONENTS OR PROCESSES
- 3.5 SAFETY RECORD

4.0 RECOMMENDATIONS

- 4.1 RECOMMENDATIONS TO ACHIEVE OR ACCELERATE SITE CLOSURE
 - 4.1.1 Source Reduction/Treatment
 - 4.1.2 Sampling
 - 4.1.3 Conceptual Site Model (Risk Assessment)
 - 4.2 RECOMMENDATIONS TO IMPROVE PERFORMANCE
 - 4.2.1 Maintenance Improvements
 - 4.2.2 Monitoring Improvements
 - 4.2.3 Process Modifications
 - 4.3 RECOMMENDATIONS TO REDUCE COSTS
 - 4.3.1 Supply Management
 - 4.3.2 Process Improvements or Changes
 - 4.3.3 Optimize Monitoring Program
 - 4.3.4 Maintenance and Repairs
 - 4.4 RECOMMENDATIONS FOR IMPLEMENTATION
-

APPENDIX L

CLIMATE SCREENING & ENVIRONMENTAL FOOTPRINT ANALYSIS

Former Trico Plant
Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
 Input Workbook

Track 4 Restricted-Residential cleanup with cover system and in-situ groundwater treatment

| | |
|--|-------------------------|
| Enter the path name (if not saved in the same directory) and file name of the "Main" workbook for the project. | |
| Path Name: | |
| Main File Name: | SEFA_main_(121718).xlsx |
| | |

| Component | Remedy Component Names |
|-------------|-------------------------------|
| Component 1 | <i>Groundwater Monitoring</i> |
| Component 2 | <i>Annual Inspections</i> |
| Component 3 | < Component 3 > |
| Component 4 | < Component 4 > |
| Component 5 | < Component 5 > |
| Component 6 | < Component 6 > |

Component names are autofilled from the "Main" workbook.

The following color coding applies to cells in the worksheets in this workbook.

| | |
|--|---|
| | Green cells indicate notes or instructions |
| | Yellow cells are for manual data input |
| | Red cells are for manual data input from a drop-down list of selections and are protected |
| | Blue cells are calculated cells that are protected |
| | Gray cells are not available and/or not applicable for data entry |

| Remedy Component Number → | | Input Summary | | | | | | | | | | | | | | Remedy Component Subtotals | | | | | | |
|--|-----------------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------------|-----|---|---|---|---|-------|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | | | | | | | |
| Item | | Groundwater Monitoring | Annual Inspections | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| On-Site | | | | | | | | | | | | | | | | | | | | | | |
| <u>On-site Renewable Energy</u> | | | | | | | | | | | | | | | | | | | | | | |
| Renewable electricity generated on-site | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Landfill gas combusted on-site for energy use | ccf CH ₄ | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site biodiesel use | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site biodiesel use - Other | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined on-site renewable energy use #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined on-site renewable energy use #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <u>On-Site Conventional Energy</u> | | | | | | | | | | | | | | | | | | | | | | |
| Grid electricity | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site diesel use - Other | Gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site diesel use <75 hp | Gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site diesel use 75-hp<750 | Gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site diesel use >750 hp | Gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site gasoline use - Other | Gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site gasoline use <25 hp | Gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site gasoline use >25 hp | Gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site natural gas use | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site compressed natural gas use - Other | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site compressed natural gas use | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site liquified petroleum gas use - Other | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site liquified petroleum gas use | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other forms of on-site conventional energy use #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other forms of on-site conventional energy use #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <u>Other On-site Emissions</u> | | | | | | | | | | | | | | | | | | | | | | |
| On-site HAP process emissions | Lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site GHG emissions | Lbs CO ₂ e | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| On-site carbon storage | Lbs CO ₂ e | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GHG avoided by flaring on-site landfill methane | ccf CH ₄ | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other on-site NOx emissions or reductions | Lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other on-site SOx emissions or reductions | Lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other on-site PM emissions or reductions | Lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Electricity Generation | | | | | | | | | | | | | | | | | | | | | | |
| Grid electricity | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Voluntary purchase of renewable electricity | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Voluntary purchase of RECs | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Transportation | | | | | | | | | | | | | | | | | | | | | | |
| <u>Transportation Fuel Use Breakdown</u> | | | | | | | | | | | | | | | | | | | | | | |
| Biodiesel use - Personnel Transport | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Personnel Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Equipment Transport | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Equipment Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Material Transport | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Material Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Waste Transport | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Biodiesel use - Waste Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - other vehicles | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - car | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - passenger truck | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Personnel Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Equipment Transport | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Equipment Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Material Transport | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Material Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel use - Waste Transport | gal | 8.3 | 0 | | | | | | | | | | | | | 8.3 | 0 | 0 | 0 | 0 | 0 | 8.3 |
| Diesel use - Waste Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Personnel Transport - other vehicles | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Personnel Transport - car | gal | 0.6 | 0.6 | | | | | | | | | | | | | 0.6 | 0.6 | 0 | 0 | 0 | 0 | 1.2 |
| Gasoline use - Personnel Transport - passenger truck | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Personnel Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Equipment Transport | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gasoline use - Equipment Transport - User Defined | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural Gas use - Personnel Transport | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural Gas use - Personnel Transport - User Defined | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural Gas use - Equipment Transport | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Remedy Component Number → | | Input Summary | | | | | | | | | | | | | | Remedy Component Subtotals | | | | | | |
|--|-----------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------------|-----|---|---|---|---|-------|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | | | | | | | |
| Item | | Groundwater Monitoring | Annual Inspections | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| Conventional Energy | | | | | | | | | | | | | | | | | | | | | | |
| Transportation diesel use | gal | 8.3 | 0 | | | | | | | | | | | | | 8.3 | 0 | 0 | 0 | 0 | 0 | 8.3 |
| Transportation gasoline use | gal | 0.6 | 0.6 | | | | | | | | | | | | | 0.6 | 0.6 | 0 | 0 | 0 | 0 | 1.2 |
| Transportation natural gas use | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined conventional energy transportation #1 | TBD | 10 | 10 | | | | | | | | | | | | | 10 | 10 | 0 | 0 | 0 | 0 | 20 |
| User-defined conventional energy transportation #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Renewable Energy | | | | | | | | | | | | | | | | | | | | | | |
| Transportation biodiesel use | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined renewable energy transportation #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined renewable energy transportation #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-Site | | | | | | | | | | | | | | | | | | | | | | |
| Construction Materials | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum, Rolled Sheet | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Asphalt, mastic | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Asphalt, paving-grade | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethanol, Corn, 95% | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethanol, Corn, 99.7% | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethanol, Petroleum, 99.7% | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gravel/Sand Mix, 65% Gravel | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gravel/sand/clay | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HDPE | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Photovoltaic system (installed) | W | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PVC | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Portland cement, US average | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ready-mixed concrete, 20 MPa | ft ³ | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Round Gravel | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sand | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stainless Steel | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Steel | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other refined construction materials | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other unrefined construction materials | lb | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Treatment Materials & Chemicals | | | | | | | | | | | | | | | | | | | | | | |
| Cheese Whey | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Emulsified vegetable oil | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Granular activated carbon, primary | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Granular activated carbon, regenerated | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hydrogen Peroxide, 50% in H ₂ O | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Iron (II) Sulfate | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lime, Hydrated, Packed | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Molasses | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Phosphoric Acid, 70% in H ₂ O | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Potassium Permanganate | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sodium Hydroxide, 50% in H ₂ O | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Treatment Chemicals & Materials | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Material Type | | | | | | | | | | | | | | | | | | | | | | |
| Total Virgin Refined Materials | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Recycled Refined Materials | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Reused Refined Materials | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Refined Material | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Virgin Unrefined Materials | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Recycled Unrefined Materials | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Reused Unrefined Materials | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Unrefined Material | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fuel Processing | | | | | | | | | | | | | | | | | | | | | | |
| Biodiesel produced | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diesel produced | gal | 8.3 | 0 | | | | | | | | | | | | | 8.3 | 0 | 0 | 0 | 0 | 0 | 8.3 |
| Gasoline produced | gal | 0.6 | 0.6 | | | | | | | | | | | | | 0.6 | 0.6 | 0 | 0 | 0 | 0 | 1.2 |
| Compressed natural gas produced | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Liquified petroleum gas produced | gal | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural gas produced | ccf | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water Use | | | | | | | | | | | | | | | | | | | | | | |
| Public Water Supply | gal x 1000 | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Extracted Groundwater | gal x 1000 | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Surface Water | gal x 1000 | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reclaimed Water | gal x 1000 | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Collected/Diverted Storm Water | gal x 1000 | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined water resource #1 | gal x 1000 | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| User-defined water resource #2 | gal x 1000 | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Remedy Component Number → | | Input Summary | | | | | | | | | | | | | | Remedy Component Subtotals | | | | | | | |
|---|------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------------|---|---|---|---|---|------|---|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| Item | | Groundwater Monitoring | Annual Inspections | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | | | | | | | | |
| <u>Waste/Recycle Handling</u> | | | | | | | | | | | | | | | | | | | | | | | |
| Hazardous waste incineration | lbs | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site waste water treatment (POTW) | gal x 1000 | 0.02 | 0 | | | | | | | | | | | | | 0.02 | 0 | 0 | 0 | 0 | 0 | 0.02 | |
| Off-site non-hazardous waste landfill | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site hazardous waste landfill | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Recycled/Reused On-Site | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Recycled/Reused Off-Site | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| <u>Solid Waste Totals</u> | | | | | | | | | | | | | | | | | | | | | | | |
| Total Non-Hazardous Waste | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Total Hazardous Waste | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Total Recycled/Reused | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Total Waste (all types) | tons | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| <u>Lab Services</u> | | | | | | | | | | | | | | | | | | | | | | | |
| Off-site Laboratory Analysis - Other | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - Metals | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - Mercury | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - Inorganic Anions | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - Alkalinity | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - Perchlorate | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - Nitrogen/Nitrate | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - Sulfate | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - PCBs | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - VOCs | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Off-site Laboratory Analysis - SVOCs | sample | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| <u>Resource Extraction for Electricity</u> | | | | | | | | | | | | | | | | | | | | | | | |
| Coal extraction and processing | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Natural gas extraction and processing | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Nuclear fuel extraction and processing | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Oil extraction and processing | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Other fuel extraction and processing | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| <u>Electricity Transmission</u> | | | | | | | | | | | | | | | | | | | | | | | |
| Transmission and distribution losses | MWh | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

| Remedy Component Number → | | Input Summary | | | | | | | | | | | | | | Remedy Component Subtotals | | | | | | | Total |
|---|-----|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------------|---|---|---|---|---|---|-------|
| | | Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations) | | | | | | | | | | | | | | | | | | | | | |
| | | Groundwater Monitoring | Annual Inspections | Input Template (3) | Input Template (4) | Input Template (5) | Input Template (6) | Input Template (7) | Input Template (8) | Input Template (9) | Input Template (10) | Input Template (11) | Input Template (12) | Input Template (13) | Input Template (14) | | | | | | | | |
| Item | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 1 | 2 | 3 | 4 | 5 | 6 | | |
| Other: | | | | | | | | | | | | | | | | | | | | | | | |
| User-defined material #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #3 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #4 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #5 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #6 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #7 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #8 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #9 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #10 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #11 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #12 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #13 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #14 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #15 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #16 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #17 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #18 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #19 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined material #20 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined Waste Destinations | | | | | | | | | | | | | | | | | | | | | | | |
| User-defined recycled/reused on-site #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined recycled/reused on-site #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined recycled/reused on-site #3 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined recycled/reused off-site #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined recycled/reused off-site #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined recycled/reused off-site #3 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined non-hazardous waste destination #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined non-hazardous waste destination #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined non-hazardous waste destination #3 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined hazardous waste destination #1 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined hazardous waste destination #2 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| User-defined hazardous waste destination #3 | TBD | 0 | 0 | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

| | | |
|--|-------------|------------------------|
| Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results) | Component 1 | Groundwater Monitoring |
|--|-------------|------------------------|

| General Scope | Example Items Eliminated through Screening Process |
|---------------|--|
| | |

Other Notes and References

[illegible]

* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

[illegible]

* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Remedy Component that this Input worksheet is part of:

| | |
|-------------|------------------------|
| Component 1 | Groundwater Monitoring |
|-------------|------------------------|

On-Site Electricity Use

| Equipment Type | HP | Load Factor (%) | Efficiency (%) | Electrical Rating (kW) | Hours Used | Energy Used (kWh) | Notes |
|---|----|-----------------|----------------|------------------------|------------|-------------------|-------|
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| Estimated Total Electricity Usage Based on Above | | | | | | 0 | |
| Renewable Electricity Generated On-Site* | | | | | | | |
| Total Electricity Usage Based on Personnel Transportation | | | | | | 0 | |
| Total Grid Electricity Used | | | | | | 0 | |

* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

Materials Use and Transportation

[illegible]

** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

On-Site Natural Gas Use

| Equipment Type | Power Rating (Btu/hr) | Efficiency (%) | Hours Used | Energy Required (Btu) | Natural Gas Used (ccf) | Notes |
|----------------|--------------------------|----------------|------------|--------------------------|---------------------------|-------|
| | | | | | | |
| | | | | | | |
| | | | | | 0 | |
| | | | | 0 | | |
| | | | | 0 | 0 | |
| | | Totals | 0 | 0 | 0 | |

Landfill Gas Combusted On-Site for Energy Use

| Equipment Type | Landfill Gas (ccf) | % Methane by volume | Used for electricity? | Landfill Gas Methane Used (ccf) | Notes |
|----------------|--------------------|---------------------|-----------------------|---------------------------------|-------|
| | | | | 0 | |
| | | | | 0 | |
| | | | | 0 | |
| | | | | 0 | |
| Total | | | | 0 | |

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Groundwater Monitoring

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
Former Trico Plant - Track 4 Restricted-Residential cleanup with cover system and in-situ groundwater treatment

| | | |
|--|-------------|------------------------|
| Remedy Component that this Input worksheet is part of: | Component 1 | Groundwater Monitoring |
|--|-------------|------------------------|

Waste Disposal and Transportation

| Waste Destination* | Unit | Quantity | Tons | Default One-way Distance to Site (miles) | One-way Distance to Site Override (miles) | Number of One-way Trips to Site | Include Return Trip in Calculations? | Total Distance Transported (miles) | Mode of Transportation ** | Transport Fuel Type | Default Transport Fuel Usage Rate (gptm or mpg) | Transport Fuel Usage Rate Override (gptm or mpg) | Fuel Used for Waste Transport (gallons) | Notes and Description of Waste |
|---------------------------------------|------------|----------|--------|--|---|---------------------------------|--------------------------------------|------------------------------------|---------------------------|---------------------|---|--|---|--------------------------------|
| Off-site waste water treatment (POTW) | gal x 1000 | 0.02 | 0.0834 | 50 | | 1 | No | 50 | Truck (mpg) | Diesel | 6 | | 8.3 | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |

* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Type of Water Used

| Source of Water Used* | Unit | Quantity | Tons | Source Location/Aquifer (optional) | Quality of Water Used (optional) | Water Uses (optional) | Fate of Used Water (optional) |
|-----------------------|------|----------|------|------------------------------------|----------------------------------|-----------------------|-------------------------------|
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |

* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

See the "Detailed Notes and Explanations" tab for use of this table

| | | |
|---|--|--|
| Description of purchased renewable electricity (green pricing product or green marketing product) | Provider: | |
| | Type of product: | |
| | Type of renewable energy source: | |
| | Date of renewable system installation: | |
| Description of purchased RECs | Provider: | |
| | Type of renewable energy source: | |
| | Date of renewable system installation: | |
| | Location of renewable system installation: | |

| | | |
|--|-------------|--------------------|
| Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results) | Component 2 | Annual Inspections |
|--|-------------|--------------------|

| General Scope | Example Items Eliminated through Screening Process |
|---------------|--|
| | |

Other Notes and References

[illegible]

* See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.

[illegible]

* HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation and other aspects of data entry in Columns M, N, and P. Units are gallons for Fuel Used for Equipment Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Remedy Component that this Input worksheet is part of:

| Component 2 | Annual Inspections |
|-------------|--------------------|
|-------------|--------------------|

On-Site Electricity Use

| Equipment Type | HP | Load Factor (%) | Efficiency (%) | Electrical Rating (kW) | Hours Used | Energy Used (kWh) | Notes |
|---|----|-----------------|----------------|------------------------|------------|-------------------|-------|
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with HP, Efficiency, and Hours> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known kW rating> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| <Equip. with known total Energy Used> | | | | | | | |
| Estimated Total Electricity Usage Based on Above | | | | | | 0 | |
| Renewable Electricity Generated On-Site* | | | | | | | |
| Total Electricity Usage Based on Personnel Transportation | | | | | | 0 | |
| Total Grid Electricity Used | | | | | | 0 | |

* Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).

Materials Use and Transportation

[illegible]

** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

**** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.**

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, O, and Q. Units are gallons for Fuel Used for Materials Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

On-Site Natural Gas Use

| Equipment Type | Power Rating (Btu/hr) | Efficiency (%) | Hours Used | Energy Required (Btu) | Natural Gas Used (ccf) | Notes |
|----------------|-----------------------|----------------|------------|-----------------------|------------------------|-------|
| | | | | | | |
| | | | | | | |
| | | | | | 0 | |
| | | | | 0 | | |
| | | | | 0 | 0 | |
| | | Totals | 0 | | 0 | |

Landfill Gas Combusted On-Site for Energy Use

| Equipment Type | Landfill Gas (ccf) | % Methane by volume | Used for electricity? | Landfill Gas Methane Used (ccf) | Notes |
|----------------|--------------------|---------------------|-----------------------|---------------------------------|-------|
| | | | | 0 | |
| | | | | 0 | |
| | | | | 0 | |
| | | | | 0 | |
| | | | Total | 0 | |

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Annual Inspections

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
Former Trico Plant - Track 4 Restricted-Residential cleanup with cover system and in-situ groundwater treatment

Remedy Component that this Input worksheet is part of:

Component 2

Annual Inspections

Waste Disposal and Transportation

| Waste Destination* | Unit | Quantity | Tons | Default One-way Distance to Site (miles) | One-way Distance to Site Override (miles) | Number of One-way Trips to Site | Include Return Trip in Calculations? | Total Distance Transported (miles) | Mode of Transportation ** | Transport Fuel Type | Default Transport Fuel Usage Rate (gptm or mpg) | Transport Fuel Usage Rate Override (gptm or mpg) | Fuel Used for Waste Transport (gallons) | Notes and Description of Waste |
|--------------------|------|----------|------|--|---|---------------------------------|--------------------------------------|------------------------------------|---------------------------|---------------------|---|--|---|--------------------------------|
| | | | 0 | | | | No | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | |

* No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.

** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, L, and N. Units are gallons for Fuel Used for Waste Transport and miles/gallon (mpg) or gallons per ton-mile (gptm) for Transport Fuel Usage Rate.

Type of Water Used

| Source of Water Used* | Unit | Quantity | Tons | Source Location/Aquifer (optional) | Quality of Water Used (optional) | Water Uses (optional) | Fate of Used Water (optional) |
|-----------------------|------|----------|------|------------------------------------|----------------------------------|-----------------------|-------------------------------|
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |

* Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections.

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

| Other Energy Use and Air Emissions | | Units | Quantity | Notes |
|--|---------------|----------|----------|-------|
| On-site | | | | |
| User-defined on-site conventional energy use #1 | *User-Defined | TBD | | |
| User-defined on-site conventional energy use #2 | *User-Defined | TBD | | |
| On-site HAP process emissions** | | lbs | | |
| On-site GHG emissions** | | lbs CO2e | | |
| On-site carbon storage** | | lbs CO2e | | |
| Landfill gas flared on-site | | ccf CH4 | | |
| Other on-site NOx emissions or reductions** | | lbs | | |
| Other on-site SOx emissions or reductions** | | lbs | | |
| Other on-site PM emissions or reductions** | | lbs | | |
| Transportation | | Units | Quantity | Notes |
| User-defined conventional energy transportation #1 | *User-Defined | TBD | 10 | |
| User-defined conventional energy transportation #2 | *User-Defined | TBD | | |

See the "Detailed Notes and Explanations" tab for use of this table.

| Other Voluntary Renewable Energy Use | | Units | Quantity | Notes |
|---|---------------|-------|----------|-------|
| User-defined on-site renewable energy use #1 | *User-Defined | TBD | | |
| User-defined on-site renewable energy use #2 | *User-Defined | TBD | | |
| User-defined renewable energy transportation #1 | *User-Defined | TBD | | |
| User-defined renewable energy transportation #2 | *User-Defined | TBD | | |
| Voluntary purchase of renewable electricity** | | MWh | | |
| Voluntary purchase of RECs** | | MWh | | |

See the "Detailed Notes and Explanations" tab for use of this table

| <i>Off-Site Laboratory Analysis</i> | | |
|--|--------------------------|-----------------|
| Parameter and Notes | Number of Samples | Comments |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Totals | 0 | |

| | | |
|---|--|--|
| Description of purchased renewable electricity (green pricing product or green marketing product) | Provider: | |
| | Type of product: | |
| | Type of renewable energy source: | |
| | Date of renewable system installation: | |
| Description of purchased RECs | Provider: | |
| | Type of renewable energy source: | |
| | Date of renewable system installation: | |
| | Location of renewable system installation: | |

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
Former Trico Plant - Track 4 Restricted-Residential cleanup with cover system and in-situ groundwater treatment

Fuel Mix for Grid Electricity

Please Select One Option for Fuel Mix -->

Use Different Fuel Mixes

| Mix per Remedy Component | 1 | 2 | 3 | 4 | 5 | 6 | *Default Fuel Mix % of Total |
|--|-------------|-------------|-------------|-------------|-------------|-------------|------------------------------|
| Type of Fuel | % of Total | % of Total | % of Total | % of Total | % of Total | % of Total | |
| Coal | 30.5% | 6.0% | 6.0% | 6.0% | 6.0% | 6.0% | 30.5% |
| Natural Gas | 33.9% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 33.9% |
| Oil | 0.7% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 0.7% |
| Nuclear | 19.8% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 19.8% |
| Biomass | 1.7% | 66.0% | 66.0% | 66.0% | 66.0% | 66.0% | 1.7% |
| Geothermal | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% |
| Hydro | 6.4% | 11.0% | 11.0% | 11.0% | 11.0% | 11.0% | 6.4% |
| Solar | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.9% |
| Wind | 5.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 5.6% |
| Other (enter information in table below) | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

U.S. national average fuel mix from 2016 is noted in Column N, and is populated as the default fuel mix in Column B.

For use of this worksheet, please see instructions at the end of the worksheet.

** The Default Fuel Mix noted in Column N is a simplified representation of the U.S. national average fuel mix from 2016. Column B is also populated with the default fuel mix. The default fuel mix is taken from EPA's "eGRID2016 - Year 2016 Summary Tables", created February 2018.*

| Item or Service Used | Unit | User Defined Conversion Factors for "Other" Fuel Type in Fuel Mix table (above) Parameters Used, Extracted, Emitted, or Generated | | | | | | Ref |
|---|------|--|--------------------|---------------|---------------|--------------|----------------------|-----|
| | | Energy (MMBtu/MWh) | GHG (lbs CO2e/MWh) | NOx (lbs/MWh) | SOx (lbs/MWh) | PM (lbs/MWh) | Air Toxics (lbs/MWh) | |
| Electricity generation with "Other" fuel | MWh | | | | | | | |
| Fuel extraction & processing for "Other" fuel | MWh | | | | | | | |

"MMBtu" = millions of Btus

"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)

Please fill in all yellow cells in the User Defined Conversion Factors table above

Notes and References

Instructions for "Grid Electricity" tab

Overview of Grid Electricity

Use this worksheet to define the fuel mix for grid electricity used at your site. The fuel mix is the percentage of the various energy sources (natural gas, coal, nuclear, hydro, etc.) used to generate the grid electricity. SEFA uses this fuel mix to calculate the footprint from generation of the grid electricity. SEFA provides a default fuel mix for grid electricity in Rows 9 - 19 (Column B) of on this worksheet. This fuel mix is an average for the U.S. in 2016. The fuel mix for grid electricity can vary greatly from locale to locale. The fuel mix for the grid electricity at your site may have a footprint significantly larger or smaller than this average. If you have high electricity demand at your site, you should research the local grid supplier to determine its fuel mix. Fuel mixes for local grid electricity providers can often be found on the web pages of the providers. Once you determine the fuel mix of the local grid supplier, you may enter it in the table above. Be sure to document the source of information for the local grid mix in the space provided on Row 33.

Notes for Use of this Worksheet

(1) On the "Grid Electricity" tab of the "Input" workbook, you may either (a) enter one fuel mix and specify that it applies to all six of the Remedy Components, or (b) enter unique fuel mixes for each Remedy Component.

(a) To set a single fuel mix for all Remedy Components, choose "Use a Single Fuel Mix" from the drop-down menu in Cell L5, and enter the fuel mix in Column B. This fuel mix will be carried forward to all Remedy Components.

(b) To specify the fuel mix individually for each of 6 (or fewer) Remedy Components, choose "Use Different Fuel Mixes" from the drop-down menu in Cell L5, and enter the specific fuel mix for each of the Remedy Components in Columns B - L (depending on how many Remedy Components are used in the analysis).

(c) The entry for each fuel type must be less than 100% and the sum of all entries in each of the Columns B - L must add to 100%.

(d) Note that the default fuel mix (U.S. average in 2016) is also documented in Column N. This allows you to recover this information in the event that you override the default mix originally located in Column B.

(2) When specifying the fuel mix, you have the option to enter an "Other" type of fuel (Row 18 above). If "Other" fuel is specified, then the table on Row 23 above must be filled in to represent the footprint from electricity generation and resource extraction for the "Other" fuel. These entries would be based on research that you conduct. When the table on Row 23 is filled in, it will apply to "Other" fuel sources entered for all Remedy Components (Columns B - L). If the table on Row 23 is not filled in then the footprint from the "Other" portion of the fuel mix will be zero in the SEFA calculations.

(3) Based on the values entered in the tables above, SEFA automatically calculates the footprint conversion factors for the grid electricity (in the "Grid Electricity Conversions" tab in the "Calculations" workbook), and automatically applies the footprint conversion factors (in the "Components" tabs in the "Calculations" workbook). The footprint conversion factors are applied to the electricity usage that you enter in the "Input Template" tab of the "Input" workbook. Specifically, they are applied to the total grid electricity usage found in Cell G68 of the "Input Template" tab.