SESI
CONSULTING
ENGINEERS

# REMEDIAL ACTION WORKPLAN

**For:**

**10 Commerce Drive**
**Parcel ID 1-238-0005**
**New Rochelle, Westchester County, New York**

**BCP # C360192**

**Prepared for:**

**BRP 10 Commerce LLC**
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**AUGUST 2021**
**REVISED OCTOBER 2021**

CERTIFICATIONS

*I, Fuad Dahan, certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10)*

| Fuad Dahan | 11/01/2021 | |
|---|---|---|
| NYS Professional Engineer (# 090531) | Date | Signature |

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# LIST OF ACRONYMS

| Acronym | Definition |
|---|---|
| AWQS | Ambient Water Quality Standards |
| BCA | Brownfield Cleanup Agreement |
| BCP | Brownfield Cleanup Program |
| bbg | Below Basement Grade |
| bgs | Below Grade Surface |
| CAMP | Community Air Monitoring Plan |
| CCR | Construction Completion Report |
| COC | Certificate of Completion |
| CPP | Citizens Participation Plan |
| CVOCs | Chlorinated Volatile Organic Compounds |
| cy | Cubic yard |
| DER | Division of Environmental Remediation |
| DER-10 | NYSDEC Technical Guidance for Site Investigation & Remediation |
| DMM | Division of Materials Management |
| DO | Dissolved Oxygen |
| DUSR | Data Usability Summary Report |
| ECs | Engineering Controls |
| ECL | Environmental Conservation Law |
| EE | Environmental Easement |
| ESA | Environmental Site Assessment |
| FER | Final Engineering Report |
| FWRIA | Fish and Wildlife Resources Impact Analysis |
| GAC | Granular Activated Carbon |
| HASP | Health and Safety Plan |

| Acronym | Definition |
|---|---|
| HHEA | Human Health Exposure Assessment |
| ICs | Institutional Controls |
| MNA | Monitored Natural Attenuation |
| MW | Monitoring Well |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| PAHs | Polyaromatic Hydrocarbons |
| PCE | Tetrachloroethene |
| PCB | Polychlorinated Biphenyls |
| PFOS | Perfluorooctanesulfonic Acid |
| PFHxA | Perfluorohexanoic Acid |
| PFOA | Perfluorooctanoic Acid |
| PFAS | Per and Polyfluoroalkyl Substances |
| PID | Photoionization Detector |
| QAPP | Quality Assurance Project Plan |
| QA/QC | Quality Assurance/Quality Control |
| OSHA | Occupational Safety and Health Administration |
| RAOs | Remedial Action Objectives |
| RAWP | Remedial Action Work Plan |
| RCRA | Resource Conservation and Recovery Act |
| RECs | Recognized Environmental Concerns |
| RI | Remedial Investigation |
| RIR | Remedial Investigation Report |
| RIWP | Remedial Investigation Work Plan |
| RRSCOs | Restricted Residential Soil Cleanup Objectives |
| SESC | Soil Erosion and Sediment Control |

| Acronym | Definition |
|---|---|
| SCG | Standards, Criteria, and Guidance |
| SCO | Soil Cleanup Objectives |
| SOE | Support of Excavation |
| SOP | Standard Operating Procedure |
| SoMP | Soil/Materials Management Plan |
| SESI | SESI Consulting Engineers, DPC |
| SMP | Site Management Plan |
| SSDS | Sub-Stab Depressurization System |
| SVOCs | Semi-Volatile Organic Compounds |
| SWPPP | Storm-Water Pollution Prevention Plan |
| TAGM | Technical and Administrative Guidance Memorandum |
| TAL | Target Analyte List |
| TCE | Trichloroethene |
| TCL | Target Compound List |
| TOGS | Technical and Operations Guidance Series |
| USCOs | Unrestricted Use Soil Cleanup Objectives |
| USEPA | United States Environmental Protection Agency |
| UST | Underground Storage Tank |
| VOCs | Volatile Organic Compounds |
| WCDOH | Westchester County Department of Health |

# EXECUTIVE SUMMARY

## Site Description/Physical Setting/Site History

The New York State Department of Environmental Conservation (NYSDEC) entered into a Brownfield Cleanup Agreement (BCA) with BRP 10 Commerce LLC (the Volunteer) on February 5, 2020 concerning the property located at 10 Commerce Drive in New Rochelle, Westchester County, New York (the "Site"), designated as BCP Site No. C360192. The Site consists of a 0.99959-acre property and is bound by Commerce Drive to the north and similar commercial properties to the south, east, and west. The Site is located in a commerical area of the City of New Rochelle, New York, and is identified as Parcel 1-238-0005 on the Westchester County Tax Map.

The stratigraphy underlying the Site consists of a surficial layer of fill material overlaying dense native fine-grained sandy soil with some clay and silt and trace amounts of fine gravel. The fill extended from beneath the building foundation/pavement to between 4 and 10 feet below grade surface (bgs) and is composed of brown, medium to fine sand with some silt, gravel, brick, concrete, wood and ash. Groundwater was encountered during the Limited Phase II Investigation at depths ranging from 8 to 10 feet bgs, and during the June-July 2021 Remedial Investigation (RI) from 1.5 to 6.5 feet below current Site grade (approximately 3.5 to 8.5 feet below original Site grade). Bedrock was encountered in Limited Phase II boring SB-03 at about 18 feet bgs and consisted of granite. Bedrock was encountered during the Interim Remedial Measures (IRM) excavation at depths of 10 feet bgs in the north area and 13 ft. bgs in the southwest corner. Based on the equipment used in previous investigations and during the IRM, the type of bedrock could not be verified. Locations and depths where bedrock was encountered during the IRM were presented in the IRM Construction Completion Report (CCR) dated June 2021. The groundwater flow direction was determined to vary between south-southwest and north-northeast across the Site.

The Site was developed with numerous residential dwellings in the 1800s and included a rail line spur, and warehouse storage facilities related to the rail lines. In 1896, the northern and western portions of the Site were occupied by the NYNH&H Railroad Company. In 1931, Rosa Coal & Oil Company was identified in the central and southern portions of the Site until 1951. Between 1931 and 1951, the southeast corner of the Site was occupied by the Westchester Coal & Oil Company. Prior to 1966, it appears that the NYNH&H Railroad Company, Rosa Coal & Oil Company and Westchester Coal & Oil Company structures were demolished. A commercial and manufacturing building was constructed on the Site between 1980 and 1985 and demolished in

2020 as part of the current Site redevelopment. After implementation and successful completion of the IRM documentd in the CCR, which remediated all on Site soils to Track 1 soil cleanup objectives (SCOs), construction of the planned residential building with ground-floor parking is currently underway at the Site.

This Remedial Action Work Plan (RAWP) includes an analysis of the remedial alternatives available to remediate any remaining contamination as determined from data gathered during the RI, performed from June 21 to July 2, 2021, and after performance of the IRM, then selects a preferred remedy for any contamination remaining after IRM implementation.

**Summary of the Remedial Investigation and Soils Investigation**

The Remedial Investigation Report (RIR) and Soil Investigation Summary Report (SISR) summarized the results of prior investigations and the RI performed on the Site. The RI and SISR were conducted in accordance with the Remedial Investigation Work Plan (RIWP) for the Site, which was approved by the NYSDEC on April 14, 2020, and in accordance with the NYSDEC's Technical Guidance for Site Investigation and Remediation (DER-10).

Five (5) monitoring wells (plus four (4) additional deeper monitoring wells) and eight (8) sub-slab vapor sampling points were installed and sampled at the Site as part of the RI, and one (1) ambient air sample was collected. Forty-nine (49) soil samples were collected to complete the SISR.

The soil and groundwater samples that were collected were analyzed for the target compound list/target analyte list (TCL/TAL+30), including metals (USEPA Methods 6010/7471), semi-volatile organic compounds (SVOCs) (USEPA Method 8270), volatile organic compounds (VOCs) (USEPA Method 8260), PCBs and pesticides (USEPA Methods 8081/8082), and Per and Polyfluoroalkyl Substances (PFAS) (USEPA Modified Method 537) and 1,4-dioxane (USEPA Method 8270). Field blanks were collected each day groundwater sampling was conducted, and trip blanks accompanied all groundwater samples analyzed for VOCs. The vapor samples were analyzed for VOCs in accordance with USEPA Method TO-15.

Soil

Based on the soil investigation, the overall depth of impacted soils extended to up 12 feet (ft) below ground surface (bgs). Refusal was encountered between 9 and 19 feet bgs during the investigation due to the relatively shallow bedrock at the Site. Polycyclic aromatic hydrocarbon (PAH) impacts exceeding both Unrestricted Use Soil Cleanup Objectives (USCOs) and Restricted

Residential Soil Cleanup Objectives (RRSCOs) were identified extending to a maximum depth of 11 feet bgs. Metals-contaminated soils exceeding the USCOs extended down to a maximum depth of 12 ft. bgs. Pesticides-impacted soils exceeding USCOs were identified in soils as deep as 11 ft. bgs at the Site. VOCs were identified exceeding the USCO in soil as deep as 9 ft. bgs. PFOS and PFOA were identified in several soil samples at the Site, and several other PFAS compounds were sporadically detected in soil samples as well. All soil exceeding USCOs at the Site was removed as an IRM performed during the fall of 2020 and concluding in January 2021.

Groundwater

The Site groundwater flow direction is variable, ranging from south-southwest to north-northeast. The groundwater table ranges from 2 to 9 ft-bgs.

Groundwater investigations during the RI detected contaminant concentrations that exceeded the NYSDEC Technical Operation and Guidance Series 1.1.1 Class GA groundwater Ambient Water Quality Standards (AWQS). Two (2) VOCs (chloroform and xylene) and several SVOCs were detected in select wells at concentrations in excess of the AWQS. Metals that exceeded AWQS included arsenic in two wells (MW-1, MW-5D), chromium, copper, and lead in one (1) well (MW-4), aluminum in two (2) wells, sodium in four (4) wells, and iron in all five (5) wells. Two pesticides (alpha-BHC and chlordane) were detected slightly above the AWQS, and PCBs were not detected in any of the groundwater samples.

In addition, emerging contaminants were evaluated as part of the groundwater investigation. PFOA and PFOS were not detected in excess of the NYSDEC Groundwater Maximum Contaminant Level of 10 ppt (parts per trillion), and 1,4-dioxane was not detected in excess of the NYSDEC Maximum Contaminant Level of 1 ppb (parts per billion).

Soil Vapor

The results of the RI showed Site soil vapor contains numerous VOCs (i.e., petroleum hydrocarbons [PHC] and chlorinated VOCs) across the Site exceeding the New York State Department of Health (NYSDOH) decision matrix screening values identified in the Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006, with updates). Tetrachloroethene (PCE) was not detected in any groundwater samples, and xylene was detected in one monitoring well (MW-1), which is located in close proximity to SV-7, but at a concentration of 5.9 ug/L, which would not be a source of VOCs in soil vapor. Ethanol, a common additive to fuels, was detected

at elevated concentrations in five soil vapor samples.

**Summary of Selected Remedial Actions**

The remedy for the Site was to achieve a Track 1 remedy throughout the Site with no Engineering or Institutional Controls. While Track 1 unrestricted soil cleanup objectives (USCOs) were achieved during the IRM, some soil vapor and minor residual groundwater contamination may remain present, which is addressed in this RAWP.

The remedial actions selected for the Site are listed below. The activities that were completed as part of the IRM are noted:

- Site preparation activities including building demolition, lead paint and asbestos abatement and historic foundation removal (Completed during IRM),
- Installation of a support of excavation (SOE) system (Completed as IRM),
- Excavation of all Site soils exceeding the USCOs and therefore achieving Track 1 for soils for the entire Site (Completed as an IRM),
- Removal and off-Site discharge of contaminated groundwater encountered during dewatering and construction through a filtered carbon dewatering system (Completed during IRM),
- Removal of six (6) 500-1,000 gallon buried orphan tanks found under the former building slab (Completed during the IRM),
- Installation of soil vapor barrier/waterproofing membrane sealing layer as a construction element in the sub slab under the enclosed portion of the building footprint that will include offices, maintenance spaces, a mailroom, a storage room, and residential apartments (Completed) that may also serve as a remedial element.,
- Installation of a sub-slab depressurization system (SSDS) under the enclosed portion of the building footprint (Completed),
- Performing a soil vapor intrusion evaluation throughout the ground floor including residential, lobby, office, maintenance, storage, and garage areas to determine if the SSDS will be required to function as an engineering control (EC). The evaluation will include the collection of multiple samples throughout the building's garage and enclosed portion of the first floor prior to occupancy. If current or potential SVI impacts are identified, active mitigation will be recommended.

- Collecting one round of groundwater samples from the existing monitoring wells to confirm the RIR results and the need for post-certificate of completion (COC) monitoring,
- Long term monitoring of the Site groundwater (up to 5 years) for any monitoring wells that exhibit Site-related contamination that exceeds the AWQS,
- Recording of an Environmental Easement (EE) for the Site. The EE will remain effective until the EC and ICs are removed if a Track 1 is accomplished within 5 years. If the Track 1 remedy is not achieved in this timeframe, the EE will continue under a Track 2 remedy for the residual groundwater and soil vapor contamination unless the soil vapor is found to be emanating on to the Site from another site;
- Preparation of a Site Management Plan, for post-remediation management of the residual groundwater and soil vapor contamination as required by the EE, particularly as they pertain to plans for: (1) Institutional and Engineering Controls, (2) groundwater monitoring/SSDS monitoring and inspections, and (3) reporting.

## 1.0 INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC) entered into a Brownfield Cleanup Agreement (BCA) with BRP 10 Commerce Drive LLC (the Volunteer) on February 5, 2020 concerning the property located at 10 Commerce Drive in New Rochelle, Westchester County, New York (the "Site"), designated BCP Site No. C360192. The Site consists of a 0.99959-acre property located 10 Commerice Drive in New Rochelle, Westchester County, New York. The Site is bound to the north by Commerce Drive and similar commercial properties to the south, east, and west. **Figure 1.1** presents a Site Location Map. **Figure 1.2** presents a Site Plan.

The following documents have previously been prepared for this Site:

- Phase II Environmental Site Assessment Report, 10 Commerce Drive, Parcel ID 1-238-0005, New Rochelle, Westchester County, New York, dated April 11, 2019, prepared by SESI Consulting Engineers, DPC (SESI)
- Remedial Investigation Work Plan, 10 Commerce Drive, Parcel ID 1-238-0005, New Rochelle, Westchester County, New York, dated April 13, 2020, prepared by SESI
- Interim Remedial Measure Work Plan, 10 Commerce Drive, Parcel ID 1-238-0005, New Rochelle, Westchester County, New York, dated May 2020, revised September 2020, prepared by SESI, approved by the NYSDEC/NYSDOH on October 7,2020
- Soil Investigation Summary Report, 10 Commerce Drive, Parcel ID 1-238-0005, New Rochelle, Westchester County, New York, dated May 2020, revised July 2020, prepared by SESI
- Interim Remedial Measure Construction Completion Report, NYSDEC BCP No. C360192, 10 Commerce Drive Rail Yard, Parcel ID 1-238-0005, New Rochelle, Westchester County, New York, dated March 2021, revised May 2021, prepared by SESI, accepted by the NYSDEC/NYSDOH on June 23,2021
- Remedial Investigation Report, 10 Commerce Drive, Parcel ID 1-238-0005, New Rochelle, Westchester County, New York, dated July 2021, prepared by SESI, submitted to NYSDEC/NYSDOH on August 2,2021

SESI Consulting Engineers (SESI) has prepared this RAWP on behalf of the Volunteer. This RAWP includes an analysis of the remedial alternatives available to remediate the nature and

extent of contamination as determined from data gathered during the Remedial Investigation (RI), and then selects a preferred remedy. The field work for the RI was performed from June 21 to July 2, 2021.

The RI was completed in accordance with the NYSDEC DER-10, to provide a systematic assessment of environmental conditions on the Site. An RIR was submitted to NYSDEC on August 2, 2020. The RI defines the nature and extent of contamination on-Site, identifies contaminant source areas, migration pathways and producing data of sufficient quantity and quality to complete an on-Site exposure assessment and a qualitative off-Site exposure assessment for purposes of designing the remedial action for the Site.

The RI for this Site did not identify fish and wildlife resources. Per DER-10 Appendix 3C, no fish and wildlife impact analysis are needed since there are no fish or wildlife resources on or near the Site.

## 1.1 SITE LOCATION AND DESCRIPTION

The Site consists of a 0.99959-acre property located at 10 Commerce Drive in New Rochelle, Westchester County, New York. A multi-story residential building with ground floor parking is currently being constructed at the Site. The Site is bound to the north by Commerce Drive and similar commercial properties to the south, east, and west.

## 1.2 PROPOSED REDEVELOPMENT PLAN

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment. The planned redevelopment of the Site entails the construction of a residential apartment building that will be constructed as slab-on-grade with a partial subgrade parking garage. The foundation will extend to between 3-10 ft.-bgs and the ground floor will include offices, residential spaces, utilities, and ventilated parking. The proposed re-development plan is included as **Appendix A.**

# 2.0 DESCRIPTION OF REMEDIAL INVESTIGATION CONCLUSIONS

The RI report (RIR) was submitted to NYSDEC and NYSDOH on August 2, 2021, and a summary of the results is included below.

## 2.1 GROUNDWATER

Based on the results of the groundwater sampling conducted after the IRM was implemented and Track 1 SCOs were achieved (**Figure 2.1**), it was concluded that:

- One (1) VOC (chloroform) was detected in most monitoring wells at a concentration in excess of the Class GA Standard and one (1) other VOC, total xylene, was also detected above the standard in one (1) monitoring well (MW-1) but not in its deeper counterpart (MW-1D). These VOCs were not detected in Phase II pre-remedial soil samples collected by SESI in March 2019, or in the post remedial end-point samples collected by SESI in November 2020, at concentrations that would impact groundwater. They were detected at concentrations below their respective USCOs. Therefore, the source of these VOCs is off-Site.
- Two (2) SVOCs, phenol and benzo(a)pyrene, were detected exceeding the standard in two (2) monitoring wells (MW-4 and MW-5), and several SVOCs were detected above standard in one additional well (MW-5D). SVOCs were detected in Phase II soil samples collected by SESI in March 2019 at concentrations exceeding the USCOs. However, the source of these SVOCs has been remediated, and the residual concentrations are expected to naturally attenuate now that the source has been removed.
- Metals that exceeded the GA standard included arsenic in two (2) monitoring wells (MW-1, MW-5D), chromium, copper, and lead in one (1) well (MW-4), and naturally-occurring metals including sodium and iron in nearly all wells. Metals were detected in Phase II soil samples collected by SESI in March 2019 at concentrations exceeding the USCOs. However, the source of these metals has been remediated, and the residual concentrations of any site-related metals are expected to naturally attenuate now that the source has been removed.
- One (1) pesticide (alpha-BHC) was detected slightly above the Class GA Standard in one (1) monitoring well (MW-4), and a second pesticide (chlordane) exceeded Class GA in the deeper adjacent well (MW-4R). Pesticides were not detected in Phase II soil samples collected by SESI in March 2019 and only detected in trace concentrations below the USCO during post remedial end-point sampling that would not impact groundwater. Therefore, the source of these pesticides is off-Site.
- PCBs were not detected in any of the groundwater samples.

- PFOA and PFOS were not detected in excess of the NYSDEC Maximum Contaminant Level of 10 ppt (parts per trillion), and 1,4-dioxane was not detected in excess of the NYSDEC Maximum Contaminant Level of 1 ppb (parts per billion).

## 2.2 SUB-SLAB VAPOR

The following conclusions were made based on the sub-slab vapor results:

- Numerous VOCs were detected in sub-slab vapor across the Site. New York State does not have standards, criteria, or guidance values for concentrations of volatile compounds detected in soil vapor. Soil vapor sampling results are evaluated as a whole, in conjunction with indoor air sampling results and the conceptual site model. Indoor air sampling could not be conducted since construction of the proposed building has not been completed to date. However, both petroleum hydrocarbon (PHC) and chlorinated VOCs were detected in the sub-slab vapor samples.

- The highest concentration of PHC was detected in vapor sample SV-7, with a total xylene concentration of 292 ug/$m^3$. Xylene was detected in one monitoring well (MW-1), which is in close proximity to SV-7, but at a concentration of 5.9 ug/L, which would not be a source of VOCs in soil vapor.

- The highest concentration of chlorinated VOCs was detected in sample SV-6, with tetrachloroethene (PCE) detected at 585 ug/$m^3$. PCE was not detected in any groundwater sample. Ethanol, a common additive to fuels, was detected at apparent elevated concentrations in samples SV-1, SV-4, SV-5, SV-6, and SV-7, with a maximum concentration of 18,800 ug/$m^3$ in SV-5. These VOCs were not detected in soil vapor samples collected during SESI's Phase II sampling. The source of these VOCs is unknown but may be related to current construction activities.

The soil vapor results are summarized on **Figure 2.2.**

## 2.3 GEOLOGICAL CONDITIONS

The stratigraphy underlying the Site consists of a surficial layer of fill material overlaying dense native fine-grained sandy soil with some clay and silt and trace amounts of fine gravel. The fill extended from beneath the building foundation/pavement to between 4 and 10 feet bgs and is composed of brown, medium to fine sand with some silt, gravel, brick, concrete, wood and ash. Groundwater was encountered during the Limited Phase II investigation at depths ranging from 8 to 10 feet bgs, and during the June-July 2021 RI from 1.5 to 6.5 feet below current Site grade (approximately 3.5 to 8.5 feet below original Site grade). Bedrock was encountered in Limited

Phase II boring SB-03 at about 18 ft. bgs and consisted of granite. Bedrock was encountered during the Interim Remedial Measures (IRM) excavation at depths of 10 ft. bgs in the north area and 13 ft. bgs in the southwest corner. Based on the equipment used in previous investigations and during the IRM, the type of bedrock could not be verified. Locations and depths where bedrock was encountered during the IRM were presented in the CCR.

Based on the well gauging event performed on July 1, 2021, groundwater was generally flowing to the south-southeast across the Site, as shown on **Figure 2.3**. The well gauging event on September 23, 2021 indicated flow generally to the north-northwest, as shown on **Figure 2.3A**. This variability indicates that groundwater conditions may be influenced by seasonal changes, precipitation, well influences and/or nearby pumping or dewatering operations.

## 2.4 CONCEPTUAL SITE MODEL OF CONTAMINATION TRANSPORT

As stated above, all Site soils exceeding USCOs have been excavated and removed from the Site, and thus no longer factor into the Conceptual Site Model (CSM).

The Site's groundwater has been slightly impacted with VOCs, including concentrations in three (3) wells exceeding the NYSDEC TOGS Class GA standard for chloroform, which is a drinking water additive that is commonly detected in groundwater from drinking water discharges. In addition, total xylene was detected in one (1) monitoring well slightly exceeding the Class GA standard (5.9 ug/l above 5.0 ug/l). Likewise, slight impacts of two (2) SVOC compounds (phenol and benzo(a)pyrene) were detected above Class GA standards in two (2) monitoring wells, with no other exceedances. Pesticides were not detected in any groundwater samples, except for one (1) compound, alpha-BHC, in excess of the Class GA standard by 0.006 ug/l in one (1) monitoring well. Metals impacts in groundwater included arsenic in one (1) monitoring well, and chromium, copper, and lead in another monitoring well. Exceedances of other metals including iron and sodium are naturally occurring and not the result of historical land uses. No impacts of PFOA, PFOS or 1,4-dioxane exceeding the NYSDEC maximum contaminant levels were noted. Overall, Site groundwater does not appear to have been significantly impacted by historical Site uses, and the recent removal of all Site soils exceeding USCOs has removed any current and future sources of groundwater contamination from the Site.

Groundwater was encountered during the June-July 2021 RI at depths between 1.5 and 6.5 ft. bgs. Based on measured depth-to-water readings from the monitoring wells, groundwater flow direction at the Site is variable and may be influenced by seasonal changes, precipitation, well influences and/or nearby pumping or dewatering operations.

The pathway of the contaminated groundwater to human receptors is limited to the ingestion of the groundwater or direct exposure through excavation work. As all excavation work at the Site has now been completed, this exposure pathway is no longer viable. In addition, groundwater in this area of New Rochelle is not used for drinking. Based upon the urban location of the Site and surrounding properties, the impacted Site groundwater is not likely to have an ecological pathway.

Finally, PHC VOCs and chlorinated VOCs were detected in sub-slab vapor and may have the potential to enter the building and impact the indoor air of the proposed on-site building as a result of soil vapor intrusion. A passive sub-slab depressurization system (SSDS) and vapor barrier have proactively been installed beneath this enclosed area of the building. The remainder of the ground floor will be a ventilated parking garage with large high-speed entrance doors that will provide frequent air exchange, and an exhaust ventilation system, and thus vapor intrusion is not expected to be a concern. Once construction of the enclosed area of the ground floor is completed, a vapor intrusion evaluation will be performed in the heating season via the collection of a sub-slab vapor sample and concurrent indoor air sample. The evaluation will include the collection of multiple samples throughout the building's garage and enclosed portion of the first floor prior to occupancy. If the results indicate that there is a potential for vapor intrusion based on the NYSDOH criteria, the SSDS will be activated and shall serve as an engineering control, and periodic inspections of the SSDS as governed by a Site Management Plan (SMP) will serve to ensure the ongoing protection of building occupants. If the results indicate that there is no potential for vapor intrusion, then the SSDS will not be required to continue to function as an engineering control, and no further remedial action for soil vapor will be required. At that time a request will be made to terminate the soil vapor provisions in the environmental easement.

## 2.5 IDENTIFICATION OF STANDARDS, CRITERIA AND GUIDANCE

The following standards and criteria typically will apply to Site Characterizations, Remedial Investigations, remedy selection, remedial actions and Site management activities:

- DER-10 / Technical Guidance for Site Investigation and Remediation
- DER-13 / Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York New York State Department of Environmental Conservation
- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
- Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (October 1994)

- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006)
- DER Interim Strategy for Groundwater Remediation at Contaminated Sites in New York State
- 6 NYCRR Part 375 - Regulations Subparts 1, 3 and 6 applicable to the Brownfield Cleanup Program
- Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.047FS Presumptive Remedies: Policy and Procedures (September 1993)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.048FS Presumptive Remedies
- 6 NYCRR 375 Table 375-6.8(a) and Table 375-6.8(b)
- 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- CP-51 Soil Cleanup Guidance
- Spill Response Guidance Manual
- NYSDOH Environmental Health Manual CSFP-530 - "Individual Water Supplies - Activated Carbon Treatment Systems"
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- TAGM 4059 - Making Changes to Selected Remedies (May 1998)
- Groundwater Effluent Limitations
- Groundwater Monitoring Well Decommissioning Procedures (May 1995)
- Sampling, Analysis and Assessment of Per and Polyfluorinated Alkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (October 2020)

## 2.6 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

### 2.6.1 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

This exposure assessment discusses potential migration routes by which chemicals in the environment may be able to reach human receptors in accordance with NYSDEC DER-10

sections 3.14(c)17, 3.3(c)4 and Appendix 3B. This discussion is based on current and hypothetical future site conditions at the investigation area.

An exposure assessment must evaluate five (5) elements that comprise an exposure pathway. A complete exposure pathway includes the following:

1. A description of the contaminant source. If the original source is unknown, then a description of the contaminated environmental medium at the point of exposure;
2. An explanation of the transport mechanism;
3. An identification of all potential exposure points;
4. A description of the exposure route at the contact point; and
5. A receptor population.

During this investigation, contaminated soil, soil vapor and groundwater were identified; however, the sources of soil vapor and groundwater contamination remain undetermined.

SVOCs, metals, pesticides and PCBs were identified at concentrations in soil exceeding the NYSDEC USCOs. However, all soils exceeding USCOs have been removed from the Site and there is no longer an exposure point or exposure route for soils.

The Site groundwater which was gauged at depths between 2 to 9 ft. bgs during the June-September 2021 RI, and has been slightly impacted with dissolved VOCs, SVOCs, pesticides, and metals at concentrations exceeding the NYSDEC Technical Operational Guidance Series (TOGS) 1.1.1 GA Ambient Water Quality Standards (AWQS).

The Site soil vapor has been impacted by various VOCs including PHC VOCs and chlorinated VOCs.

The site is currently undergoing construction of a multi-story residential building. The surrounding properties consist of commercial properties. Sensitive receptors such as childcare facilities, elder care facilities and hospitals were not identified in the properties immediately adjacent to the Site. The nearest childcare facilities are located approximately 300 feet southwest of the Site.

The proposed development consists of a 10-story structure with two levels of ground floor parking, including a partial subgrade level. The ground floor will contain car parking, mechanical spaces, and building storage. The first floor (street level) will contain a residential lobby,

residential units, offices, and additional mechanical and building storage rooms. The planned building construction will occupy the entire Site leaving no unpaved surfaces.

Groundwater

Potential groundwater exposure points include ingestion, dermal contact and inhalation of vapors. New Rochelle utilizes municipal water (not groundwater) for drinking purposes. Thus, ingestion as a potential exposure point may be eliminated from further evaluation.

Potential exposures through dermal contact would arise during future construction excavation where workers, visitors, or trespassers may be exposed to groundwater. However, since excavation work at the Site has been completed and a building slab has now been constructed, this exposure pathway is no longer viable. Further, groundwater does not contain VOCs at concentrations that would be a source of harmful vapors to residents or visitors.

Surface Water

Surface water is not present on the Site. Thus, this exposure pathway may be eliminated from further evaluation.

Soils

Potential routes of exposure to subsurface and surface soils include dermal contact, ingestion and inhalation of soil particulates. At present, potential exposure points have been eliminated by excavation of all contaminated soils and construction of a building slab covering the entire Site.

Soil Vapor

When volatile organics are detected in soil gas, it creates a potential exposure to building occupants through vapors accumulating beneath structures or impacting indoor air quality within a structure. A passive sub-slab depressurization system (SSDS) and vapor barrier have proactively been installed beneath the enclosed area of the building, and the remainder of the ground floor and 2$^{nd}$ floor will be a ventilated parking garage with large entrance doors and an active exhaust ventilation system. A soil vapor intrusion evaluation will be proposed in the RAWP for the entire ground floor to determine if additional measures, including active mitigation, will be required to address soil vapor intrusion. Periodic inspections of the SSDS as governed by a Site Management Plan (SMP) will serve to ensure the ongoing protection of building occupants.

The off-site exposure potential of Site contaminant sources include groundwater, soil vapor, and soil dust. Because groundwater is not used in New Rochelle for drinking water, a potential exposure pathway does not exist for this source. An onsite source of soil vapor has not been determined during this RI, and there are no buildings or sensitive receptors that immediately adjoin the Site in any direction, therefore off-site exposure to soil vapor is not a concern at this time. The future potential exposure of soil gas will be eliminated by the SSDS and vapor barrier, as well as the ventilated parking levels. Off-site exposure to soil dust has been eliminated by the excavation of contaminated soils and installation of the building foundation across the entire Site.

The following summary table provides an overview of the current and potential exposures for the Site:

**Table 2.1 – Potential Exposures**

| Environmental Media & Exposure Route | Human Exposure Assessment |
|---|---|
| Direct Contact with Surface Soils | No exposure since site is covered by new building footprint |
| Inhalation of Soil Dust | |
| Direct Contact with Soil Dust | |
| Direct Contact with Subsurface Soils | No exposure since contaminated soils have been removed and site is covered by new building footprint |
| Injestion of Groundwater | Groundwater is not used for drinking. New Rochelle is served by public water supply |
| Direct Contact with Groundwater | Eliminated by presence of building slab with waterproofing membrane |
| Inhalation of contaminated soil vapor | Will be mitigated by presence of a SSDS and vapor barrier under enclosed portion of the ground floor, and by a continuously ventilated parking garage that occupies the first two floors. A soil vapor intrusion evaluation will be completed once the ground floor construction is complete. |

### 2.6.2 FISH AND WILDLIFE IMPACT ANALYSIS

The Site does not contain any ecologically sensitive resources and hence the contaminated groundwater is not expected to have any impacts on any ecological resources.

## 2.7 SIGNIFICANT THREAT

The NYSDEC and NYSDOH have evaluated the RIR to discern if this Site poses a significant threat to human health and the environment. It has been determined that the Site does not pose a significant threat to human health and the environment.

## 2.8 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

### 2.8.1 GROUNDWATER

RAOs for Public Health Protection

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

### 2.8.2 SOIL

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

### 2.8.3 SOIL VAPOR

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from potential present and future soil vapor intrusion into buildings at the Site.

# 3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

## 3.1 EVALUATION OF REMEDIAL ALTERNATIVES

The objective of the remedy for the planned residential development is to achieve a conditional Track 1 cleanup, which is most protective of human health and the environment. An unconditional Track 1 soil remedy has already been achieved. However, groundwater will likely require monitoring that is expected to be shorter than five years, and a vapor intrusion assessment will be completed in the enclosed portion of the ground floor once completed to determine if an EC is required for soil vapor.

**Track 1**

A remedy pursuant to this Track requires compliance with the USCOs for soils set forth in 6 NYCRR Table 375-6.8(a) in the remaining soils on the Site after remedial excavation.

For a conditional Track 1 remedy, institutional and engineering controls are allowed only for periods of less than five years except in the limited instance where a volunteer must conduct more long term remedial groundwater activities to achieve a bulk reduction in groundwater contamination to asymptotic levels. This alternative involves the complete removal and/or remediation of the soil with exceedances to achieve the USCOs, which has been completed as an IRM.

Institutional and engineering controls (ICs and ECs) may be implemented to address contamination in groundwater. Monitored natural attenuation (MNA), which consists of periodic monitoring of the contaminant levels in the Site groundwater monitoring wells, will constitute an engineering control requirement documented in an institutional control environmental easement until the groundwater levels are below the standards or until they reach asymptotic levels that are accepted by the NYSDEC. Given the low levels of groundwater exceedances, it is expected that the groundwater will meet the AWQS or reach asymptotic levels that are accepted by the NYSDEC and NYSDOH in less than five years.

The previously installed SSDS and vapor barrier will address potential remaining soil vapor under the enclosed area of the ground floor of the Site building. The RI results indicated only one (1) detection of PCE and one detection of carbon tetrachloride in sub-slab vapor, with neither compound detected in groundwater. In addition, the planned Site development includes a parking garage occupying the rest of the ground floor that will be frequently ventilated with fresh air from large high-speed entrance doors and also will contain an active exhaust ventilation system to dissipate most potential soil vapor intrusion. A soil vapor evaluation will be conducted to

demonstrate further whether there is the potential for soil vapor intrusion. The evaluation will include the collection of multiple samples throughout the building's garage and enclosed portion of the first floor during the heating season prior to occupancy. The soil vapor intrusion evaluation, which shall need be conducted most likely after issuance of the certificate of completion (COC), will determine if the SSDS will be required to continue functioning as an EC under the SMP or not. If not, the EE and SMP will be modified to exclude the SSDS; however, the SSDS and vapor barrier will continue to passively mitigate any potential vapor intrusion for the life of the building as permanent features.

**Track 2**

A Track 2 remedy consists of achievement of the application restricted use soil cleanup objectives, which for this Site would be the Restricted Residential SCOs (RRSCOs). This Track requires the Volunteer to implement at least a soil cleanup that achieves the lower of the RRSCOs, or the protection of groundwater water SCOs from the tables in 6 NYCRR 375-6.8(b) within the top 15 feet of soil (or bedrock if less than 15 feet). Under a Track 2 remedy, the remedial program may include the use of long-term institutional or engineering controls to address residual contamination related to other media including, but not limited to groundwater and soil vapor.

Because the soils on the Site exceeding USCOs have already been excavated to achieve an unconditional Track 1 for soils, discussion of a Track 2 remedy is no longer relevant for this Site.

**Track 4**

A Track 4 remedy for a restricted residential use does not need to meet specific soil cleanup objectives but requires source removal and typically a Site-wide cover system where, as here, there is Site-wide surficial contamination. The Track 4 cleanup does not have specific soil cleanup objectives, but rather the Applicant may solely or in combination use the SCOs in Subpart 375-6.8, develop or modify Site specific SCOs, or propose Site-specific SCOs that are protective of public health and the environment. Again, because the soils on the Site exceeding USCOs have already been excavated to achieve an unconditional Track 1 for soils, discussion of a Track 4 soil remedy is no longer relevant for this Site.

Short and long-term IC and ECs are allowed to achieve protection of public health and the environment for groundwater and soil vapor. A remedy under a Track 4 alternative for this Site would include long-term groundwater monitoring and an EC for soil vapor in the form of an SSDS.

Track 4 also includes an SMP and Environmental Easement (EE) as institutional controls to ensure that all of the institutional and engineering controls, including the SSDS, are maintained. The SMP will include periodic (annual) monitoring and reporting in relation to the SSDS and reporting of groundwater results to ensure continued protection of the human health and the environment.

## No Action Alternative

The no action alternative would leave existing sources of contamination in soil, groundwater and soil vapor with no protective measures. A no action alternative is thus unacceptable and has not been compared to the factors below.

**Protection of human health and the environment:**

Although all tracks would provide adequate protection of human health and the environment, Track 1 is more protective than the other cleanup tracks because it would remove all soil contamination. A Track 2 or 4 remedy could also be protective of human health and the environment if the proper long-term engineering and institutional controls are put in place and managed in an SMP. However, a Track 1 soil remedy has already been achieved.

**Compliance with standards, criteria, and guidelines (SCGs):**

All cleanup Tracks will achieve applicable cleanup standards or criteria. However, a Track 1 cleanup achieves a more stringent set of standards than a Track 2 or 4 cleanup.

**Short-term effectiveness and impacts:**

Generally, Track 1 provides the best short-term effectiveness because it promptly removes the most contaminant mass from the Site. Track 1 is somewhat less favorable in terms of short-term impacts primarily because mass removal of the contaminated soils generates more truck trips than a Track 2 or 4 limited removal remedy. However, best management practices in relation to soil handling, the community air monitoring program (CAMP), and erosion and sediment controls, and dust control measures have been implemented during the Track 1 IRM, which minimized and controled any migration of dust on-Site and off-Site.

**Long-term effectiveness and performance:**

Because a Track 1 remedy involves removal of the greatest amount of contaminated soil, which may be impacting groundwater and soil vapor, this remedial alternative will provide the most long-term effectiveness. While the Track 1 remedy implemented is conditional on some short

term groundwater monitoring and a soil vapor evaluation through an EE and SMP, these ICs and ECs are expected to only be required short term, thus providing the best long term effectiveness.

The long-term effectiveness of the Track 4 clean-up will be ensured with adherence to the SMP and recording of an Environmental Easement but more contaminants are left in on-Site soils creating a less long term effective remedy since the ECs and ICs can fail over the long term or becoming harder to maintain.

**Reduction of toxicity, mobility, or volume of contaminated material:**

All Tracks reduce the toxicity and mobility of contaminated material but a Track 1 results in the most reduction in the volume of contaminated soils. While Track 2 and 4 provides a relatively smaller reduction in volume than the other track, it relies primarily on the decrease of contaminant mobility.

**Constructability:**

Track 1 was an implementable remedy given the location and the planned use for the Site.

While there are short-term impacts from a Track 1 remedy, the Site is located in the middle of an urban area, and, therefore, off-Site disposal of the contaminated soils in trucks were not be a problem. Moreover, these short-term impacts were mitigated through implementation of the CAMP and HASP, which employed truck washing and odor and dust control measures. Therefore, Track 1 was an implementable remedy for this Site.

**Cost effectiveness:**

The preferred alternative should provide optimal suitability of the eight accompanying evaluation factors with minimal remedial cost. The contaminated soil/fill layer extends from the surface to a maximum depth of 18 ft. bgs. Removal of the soil exceeding the USCOs to achieve Track 1 Site-wide is the most costly of the remedial alternatives. However, this mass removal results in long-term savings by eliminating the need for indefinite cap monitoring and maintenance. Therefore, a Track 1 remedy for the Site was cost effective.

The MNA groundwater monitoring remedy for groundwater after a significant quantity of groundwater was removed during dewatering was the most cost effective compared to long term in situ remediation of groundwater for all the remedial alternatives.

The capital costs of the Track 1 remedy have been approximately $2,333,500 to date including SOE installation, soil excavation, endpoint sampling, reporting, CAMP, and

consulting/management. Future costs are estimated to be $135,160 including remaining reporting (FER, SMP), conducting the soil vapor evaluation, and groundwater monitoring (estimated 2 years of quarterly sampling). These future costs have a present value of $101,000. Annual costs are estimated to be $46,000 for the remainder of 2021, and $44,580 for 2022 and 2023. Revised future costs can be provided upon issuance of the Decision Document (DD).

Since the principal component of the Track 1 remedy (removal of contaminated soils) has already been completed, costs for other alternatives are no longer relevant for this Site.

**Community Acceptance:**

A community communications program has been incorporated into all remedial alternatives, per NYSDEC Brownfield Program law and regulations and the Site-specific Citizen Participation Plan (CPP). The Site development will include an affordable housing component and is part of an area-wide transit-oriented redevelopment that includes a mix of modern residences and retail stores in downtown New Rochelle. The community should accept any of the remedies; however, the Track 1 remedy is likely preferable to the community since it will reduce the most contamination and prevent off-Site migration long-term.

**Land use:**

Track 1 would achieve remediation for the planned residential use of the Site, which is consistent with New Rochelle's proposed plans for the area. Developing the property will create short-term construction impacts, but the creation of a new downtown housing project on a remediated former brownfield site will provide significant community benefits.

Zoning: All of the proposed remedies under each track will facilitate the Site to be utilized for a proposed mixed commercial-residential development, which is consistent with applicable zoning laws and anticipated future use of the Site.

Applicable comprehensive community master plans or land use plans: Implementation of all tracks (with institutional controls) cleanup will facilitate the proposed residential development, which is consistent with current local land use plan.

Surrounding property uses: Neither cleanup approach is expected to significantly impact land use of the surrounding properties as the truck traffic and access will be on public roads. There will be short-term impacts from the remediation and construction project, but these will result in long-term benefits of converting a contaminated property into new housing uses.

Citizen Participation: Citizen participation during implementation of a remedial program will proceed in accordance with the Citizen Participation Plan included as **Appendix B** of this RAWP, and as noted above, will have minimal community impact. Any short-term impacts will be addressed by the CAMP and HASP.

Environmental justice concerns: There are no known environmental justice concerns associated with this project.

Land use designations: A Track 1 remedy will not restrict any current or future land use designations.

Population growth patterns: Any of the proposed remedies will not impact reasonably anticipated population growth patterns in the area other than to better accommodate growth by providing for new downtown, transit-oriented housing.

Accessibility to existing infrastructure: Access to existing infrastructure is present in the surrounding area, and there is access to mass transit via the Metro North train station approximately 0.4 miles away. Subsurface infrastructure will be removed during the remedy as part of Site preparation activities. However, new infrastructure will be installed subsequent to the remediation as part of the redevelopment.

Proximity to natural resources: The closest surface water body, Echo Bay, is located approximately 2,000 feet southeast of the Site. Storm water drainage patterns are influenced by the urban setting of the Site and generally flow over paved surfaces towards storm drains on private properties or in the streets.

Off-Site groundwater impacts: The bulk of contamination in the groundwater was presumably removed during dewatering, and the remaing residual groundwater contamination is minor such that there should be no off-site impacts from the Site.

Geography and geology of the Site: See Section 2.3 above.

Current Institutional Controls: There are no current institutional controls associated with the Site. An institutional control shall be temporarily required to address the short -term management of residual impacted groundwater and soil vapor remaining at the Site following remediation.

## 3.2 SELECTION OF THE PREFERRED REMEDY

The remedial alternatives analysis determined that a conditional Track 1 remedy will be the goal for the residual Site groundwater and soil vapor, and as described previously, an unconditional Track 1 has already been achieved for soil.

## 3.3 SUMMARY OF TRACK 1 SELECTED REMEDIAL ACTIONS

A summary of the selected Track 1 remedial actions to address the impacts identified is discussed below:

- Site preparation activities including building demolition, lead paint and asbestos abatement and historic foundation removal (Completed during IRM),
- Installation of a support of excavation (SOE) system (Completed as IRM),
- Excavation of all Site soils exceeding the USCOs and therefore achieving Track 1 for soils for the entire Site (Completed as an IRM),
- Removal and off-Site discharge of contaminated groundwater encountered during dewatering and construction through a filtered carbon dewatering system (Completed during IRM),
- Removal of six (6) 500-1,000 gallon buried orphan tanks discovered under the former foundation (Completed during the IRM),
- Installation of soil vapor barrier/waterproofing membrane sealing layer in the sub slab under the enclosed portion of the building footprint that will include a lobby, offices, storage rooms, and residential apartment units (Completed),
- Installation of a sub-slab depressurization system (SSDS) under the enclosed portion of the building footprint that will serve as a offices and residential/storage area (Completed),
- Performing a soil vapor intrusion evaluation throughout the ground floor including residential, lobby, storage, and garage areas to determine if the SSDS will be required to function as an engineering control (EC). The evaluation will include the collection of multiple samples throughout the building's garage and enclosed portion of the first floor prior to occupancy. If current or potential SVI impacts are identified, active mitigation will be recommended.

- Collecting one round of groundwater samples from the existing monitoring wells to confirm the RIR results and the need for post-certificate of completion (COC) monitoring,
- Short term monitoring of the Site groundwater (up to 5 years) for any monitoring wells that exhibit Site-related contamination that exceeds the AWQS,
- Recording of an Environmental Easement (EE) for the Site. The EE will remain effective until the EC and ICs are removed if a Track 1 is accomplished within 5 years. If the Track 1 remedy is not achieved in this timeframe, the EE will continue under a Track 2 remedy for the residual groundwater and soil vapor contamination;
- Preparation of a Site Management Plan, for post-remediation management of any residual groundwater and soil vapor contamination as required by the EE, particularly as they pertain to plans for: (1) Institutional and Engineering Controls, (2) groundwater monitoring/SSDS monitoring and inspections, and (3) reporting.

### 3.4 UST CLOSURE

All USTs at the Site have been removed during the building demolition and soil IRM phases, and these removals have previously been reported to NYSDEC. Therefore, UST closure is not addressed in this RAWP since it was addressed in the IRM CCR.

# 4.0 REMEDIAL ACTION PROGRAM

## 4.1 GOVERNING DOCUMENTS

### 4.1.1 SITE-SPECIFIC HEALTH AND SAFETY PLAN (HASP)

A copy of the SESI HASP is included as **Appendix C**. All remedial work performed during the IRM and under this plan will remain in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate HASP and for the appropriate performance of work according to that plan and applicable laws.

The HASP and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a COC.

### 4.1.2 QUALITY ASSURANCE PROJECT PLAN (QAPP)

A copy of the SESI QAPP is included as **Appendix D**. All field sampling procedures and analytical methods will be implemented in accordance with this QAPP.

### 4.1.3 SOIL EROSION AND SEDIMENT CONTROL PLAN

A Soil Erosion and Sediment Control (SESC) Plan has been prepared for the Site and approved by the City of New Rochelle, and was previously submitted to the NYSDEC as an attachment to the Interim Remedial Measure Work Plan (IRMWP).

### 4.1.4 COMMUNITY AIR MONITORING PLAN (CAMP)

Since no further excavation or drilling work is planned under this RAWP and the Site is now covered by a building slab, CAMP will not be required at the Site during implementation of the planned remaining monitoring-related remedial actions.

## 4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

### 4.2.1 PROJECT ORGANIZATION

BRP 10 Commerce LLC c/o BRP Companies is the BCP Volunteer and developer of the Site. SESI is the environmental consultant for all of these volunteer entities. A table summarizing the various personnel associated with the project is included as **Table 4.1** below.

**Table 4.1 – Project Personnel**

| Name | Company | Project Position | Address | Phone Number |
|---|---|---|---|---|
| Rashid A. Walker | BRP 10 Commerce LLC | Volunteer Contact | 767 Third Avenue, 33rd Floor New York, NY 10017 | (917) 620-5168 |
| Jesse Mausner, PG | SESI Consulting Engineers, P.C. | Environmental Consultant's Project Manager | 12A Maple Avenue Pine Brook, NJ 07058 | (973) 808-9050 |
| Fuad Dahan, PE | SESI Consulting Engineers, P.C. | Remedial Engineer | 12A Maple Avenue Pine Brook, NJ 07058 | (973) 808-9050 |
| Parag Amin, PE | NYSDEC | Project Manager | NYSDEC 625 Broadway Albany, NY 12233 | (518) 402-9648 |
| Shaun Surani | NYSDOH | Project Manager | NYSDOH Empire State Plaza, Corning Tower, Room 1787 Albany, New York 12237 | (518) 402-1338 |

### 4.2.2 REMEDIAL ENGINEER

The Remedial Engineer for this project will be Fuad Dahan, PE. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the 10 Commerce Drive Site. The Remedial Engineer will certify the Final Engineering Report (FER) that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in this RAWP and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this RAWP and will certify compliance in the Final Engineering Report.

The Remedial Engineer will also provide the certifications listed in the Final Engineering Report.

### 4.2.3 REMEDIAL ACTION CONSTRUCTION SCHEDULE

A remedial action construction schedule is included as **Table 4.2** below. The schedule includes estimates of time required to complete the activities associated with the remedial action. It is based on elapsed time from receipt of NYSDEC approval.

**Table 4.2--Remedial Action Schedule**

| Activity | Date |
|---|---|
| NYSDEC approves RAWP and issues decision document | September 2021 |
| Start of remedial work (GW and SV intrusion sampling) | September 2021 |
| Completion of sampling activities | October 2021 |
| Draft final engineering report (FER), submit FER to NYSDEC | October 2021 |
| Submit SMP to NYSDEC (if required) | October 2021 |
| Certificate of Completion | December 2021 |

### 4.2.4 WORK HOURS

The hours for operation of remedial construction will conform to the City of New Rochelle Department of Buildings construction code requirements or according to specific variances issued by that agency. NYSDEC will be notified by the Applicant of any variances issued by the Department of Buildings.

### 4.2.5 SITE SECURITY

The Site is secured with fences and locked gates. Access to Site will be controlled by the local police patrolling the area.

### 4.2.6 EMERGENCY CONTACT INFORMATION

An emergency contact sheet with names and phone numbers is included in **Table 4.3** below. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

**Table 4.3--Emergency and Contact Numbers**

| Agency/Individual | Contact Number |
|---|---|
| Medical, Fire, and Police: | 911 |
| One Call Center: | (800) 272-4480<br>(3-day notice required for utility markout) |
| Poison Control Center: | (800) 222-1222 |
| Pollution Toxic Chemical Oil Spills: | (800) 424-8802 |

| Agency/Individual | Contact Number |
|---|---|
| NYSDEC Spills Hotline | (800) 457-7362 |
| Fuad Dahan – Remedial Engineer<br>(SESI Consulting Engineers) | (973) 808-9050 |
| Director of Construction<br>Rich Wooley | (212) 488-1750 |

* Note: Contact numbers subject to change and will be updated as necessary.

## 4.3 SITE PREPARATION

The Site is currently an active construction Site with a building foundation in place, with elements of the remedy, including monitoring wells and an SSDS/vapor barrier, which have already been installed. Thus, no additional site preparation is required in order to implement the planned remedy. All site preparation activities were described in the CCR.

## 4.4 REPORTING

### 4.4.1 DAILY REPORTS

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers following each day when elements of the remedy (groundwater sampling, vapor intrusion assessment) are completed and will include:

- Activities relative to the Site during the previous day and those anticipated for the next reporting day, including a quantitative presentation of work performed (i.e. number of wells sampled, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling, when applicable, results received following internal data review and validation, as applicable;
- Photographs of remedial program elements;

- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays; and
- Information regarding any complaints made.

### 4.4.2 OTHER REPORTING

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

### 4.4.3 COMPLAINT MANAGEMENT PLAN

A public information board will be constructed at the perimeter of the Site. This information board will contain the phone number of the Volunteer where complaints may be directed. General information notices to the public will also be posted on this board for their benefit. The NYSDEC and NYSDOH project managers will be notified of an odor, dust, or health-related public complaint within 24 hours of the occurrence, or sooner, depending on the severity of the complaint.

### 4.4.4 DEVIATIONS FROM THE REMEDIAL ACTION WORKPLAN

If there are any deviations from the RAWP, the following steps will be taken:

- Reasons for deviating from the approved RAWP will be identified and communicated directly to the NYSDEC Project Manager;
- All deviations will be communicated verbally and in writing (by letter or email) to the NYSDEC Project Manager;
- The deviations will be implemented based on verbal or written approval of the NYSDEC Project Manager. All verbal approvals will be followed-up in writing.
- The effect of the deviations on the overall remedy will be described/addressed in the Final Engineering Report.

# 5.0 REMEDIAL ACTION

Removal of all contaminated soils as an IRM has been implemented in accordance with the IRMWP and has been documented in the CCR, as described above and shall be attached to and incorporated into the FER.

A plan showing the location the groundwater wells is included as **Figure 2.1**. The plans and specifications for the SSDS and vapor barrier are included in **Appendix A**.

## 5.1 CLEANUP OBJECTIVES

Groundwater cleanup objectives will be the NYSDEC TOGS Ambient Water Quality Standards (AWQS).

Soil vapor mitigation objectives will be the NYSDOH Guideline Values and Decision Matrices for the specific COCs in both sub-slab vapor and indoor air.

## 5.2 REMEDIAL PERFORMANCE EVALUATION

### 5.2.1 GROUNDWATER SAMPLING

Additonal groundwater sampling will be conducted in order to verify the AWQS exceedances from the RI and the need for post-COC groundwater monitoring. The wells will be gauged for groundwater depth to determine the groundwater elevation. The Site-specific groundwater flow direction and gradient will be determined based on the latest elevation data. The wells will be sampled and analyzed for the same constituents as the RI including VOCs (US EPA Method 8260D), SVOCs (US EPA Method 8270D), metals (US EPA Method 6010B/Mercury 7470A), PCBs (US EPA Method 8082), pesticides (US EPA Method 8081B), PFAS compounds (US EPA Method 537) and 1,4-dioxane (US EPA Method 8270-SIM). Based on the results, the scope of the ground water monitoring program may be reduced for site management.

One groundwater sampling round will be collected from the existing wells upon issuance of the decision document. The goal of the groundwater remedy is to achieve the TOGS AWQS standards or to reach asymptotic levels for Site-related contaminants since it may not be possible given the surrounding urban environment in the City of New Rochelle to achieve the TOGS AWQS standards for every contaminant, particularly chloroform and naturally occurring metals (iron, sodium). If five-year short-term monitoring is determined to be a necessary component of the groundwater remedy, then the wells will be sampled at a frequency that will be specified in the SMP.

### 5.2.2 SOIL VAPOR INTRUSION EVALUATION

A passive SSDS and vapor barrier that have proactively been installed beneath this enclosed area of the building. The remainder of the ground floor will be a parking garage which will be ventilated by large high=speed entrance doors and an active exhaust ventilation system where vapor intrusion is not expected to be a concern. Once construction of the enclosed area of the ground floor is completed, a vapor intrusion evaluation will be performed throughout the ground floor including residential, lobby, storage, and garage areas via the collection of a sub-slab vapor sample and concurrent indoor air sample. The evaluation will include the collection of multiple samples throughout the building's garage and enclosed portion of the first floor during the heating season prior to occupancy. If current or potential SVI impacts are identified, active mitigation will be recommended. If the results indicate that there is a potential for vapor intrusion based on the NYSDOH criteria, the SSDS will serve as an EC, and periodic inspections of the SSDS as governed by an SMP will serve to ensure the ongoing protection of building occupants. If the results indicate that there is no potential for vapor intrusion, then the SSDS will not be required to function as an EC, and no further remedial action for soil vapor will be required. A revised SMP may be submitted after the evaluation that does not include the SSDS as an EC and the EE may be terminated.

## 5.3 METHODOLOGY

Groundwater samples will be collected in accordance with the QAPP using the low-flow purging and sampling (LFPS) method and associated decontamination and quality control procedures. Vapor and air samples will be collected in accordance with the QAPP and the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006). Specifically, samples will be collected in 6-liter Summa canisters over a 2-hour duration, and analyzed for VOCs via EPA Method TO-15.

## 5.4 REPORTING OF RESULTS

Groundwater and vapor/air samples will be submitted to a NYSDOH ELAP certified laboratory. The results will be reported in accordance with NYSDEC requirements for Category B data deliverables (as outlined in DER-10).

## 5.5 QA/QC

Collection of QA/QC samples to evaluate potential cross-contamination from sampling equipment and during shipment of samples and repeatability of laboratory analytical practices will

be in accordance with the QAPP included as **Appendix D**. Field blanks, trip blanks and duplicate samples associated with daily sampling activities will be collected as a part of the QA/QC practices.

### 5.6 DUSR

To ensure that the field sampling and laboratory analytical practices are acceptable, the data associated with all the samples will be validated by a third party (in accordance with requirements of DER-10). The validation approach and results will be presented in a DUSR to be included in the FER.

### 5.7 REPORTING OF PERFORMANCE EVALUATION DATA IN FER

The FER will include results of all groundwater, sub slab vapor, and indoor air sampling proposed in this RAWP, unless the construction of the enclosed portion of the ground floor is not completed in time to perform the vapor intrusion evaluation prior to FER submittal. If this is the case, the vapor intrusion evaluation will be performed after issuance of the COC and will be governed by the SMP.

The FER will provide a tabular and map summary of all sample results. Chemical labs used for all sample results will be NYSDOH ELAP certified.

# 6.0 ENGINEERING CONTROLS

## 6.1 GROUNDWATER MONITORING

The excavation of the soils has removed any on-Site sources that may have resulted in groundwater contamination. If the proposed round of groundwater sampling confirms the results from the RI, short-term monitoring will be performed for a period of two (2) years, as permitted under a conditional Track 1 cleanup. Details regarding the proposed short-term monitoring are provided below.

### 6.1.1 GROUNDWATER MONITORING SYSTEM

Monitoring wells MW-1, MW-4, and MW-5 (see Figures 2.1 and 2.3), which exhibited apparent Site-related impacts of specific VOCs, SVOCs, and pesticides in excess of AWQS, will be sampled periodically to monitor the groundwater quality and demonstrate the reduction in groundwater contamination to asymptotic levels subsequent to the implementation of the Track 1 soil removal remedy. As the dissolved groundwater impacts detected during the remedial investigation are relatively low, a short-term monitoring program with associated institutional controls will be a cost-effective remedial alternative to address any residual groundwater impacts.

Specifically, the groundwater samples are proposed to be collected quarterly for a period of two (2) years, in accordance with requirement outlined in DER-10. MW-1D will be analyzed for one metal (arsenic), MW-4R will be analyzed for two pesticides (alpha-BHC and chlordane), and MW-5D will be analyzed for SVOCs and arsenic. Wells MW-2 and MW-3/3D did not exhibit any Site-related contamination and as such will be excluded from monitoring. Water quality parameters such as dissolved oxygen (DO), oxidation reductive potential (ORP), acidity, (pH), and other parameters will be collected and evaluated to determine the degradation/attenuation effectiveness on the Site. This monitoring protocol will be described in the SMP.

### 6.1.2 CRITERIA FOR COMPLETION OF REMEDIATION/TERMINATION OF GROUNDWATER MONITORING

Groundwater monitoring activities to assess groundwater concentrations will continue, as determined by the NYSDEC, until residual groundwater contaminant concentrations are found to be consistently below NYSDEC standards or have become asymptotic at levels accepted by the NYSDEC and NYSDOH over a period of time. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional treatment and/or control

measures will be evaluated. These monitoring activities will be outlined in the Monitoring Plan of the SMP.

If the groundwater monitoring evaluation does not result in effective reduction of groundwater contamination, in-situ treatment technologies may be designed and proposed to attain the groundwater quality standards within less than a five year period of time post Certificate of Completion to the extent such technology is feasible to address the minor residual contamination remaining.

## 6.2 SUB-SLAB DEPRESSURIZATION SYSTEM

The SSDS was installed at the Site underneath the enclosed potion of the ground floor in June 2021, and is overlain by a certified vapor barrier (**Appendix A**). The SSDS may function as an EC pending the results of the soil vapor intrusion evaluation outlined in Section 5.2.2. If the SSDS is required to function as an EC, vapor intrusion conditions will be re-evaluated within the initial five-year timeframe to determine if the EC can be terminated and the criteria for a conditional Track 1 can be met.

# 7.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site may have residual groundwater and sub-slab vapor contamination remaining in place.

## 7.1 ENVIRONMENTAL EASEMENT

An institutional control (IC) for Monitored Natural Attenuation will be incorporated into a Site Management Plan and will be enforceable through an Environmental Easement. An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. Because groundwater is expected to reach class GA AWQS or asymptotic levels within less than five years, this IC is allowed as part of a Track 1 remedy. In addition, an SSDS and a soil vapor barrier sealing layer have been incorporated into the foundation of the new building to prevent any potential soil vapor intrusion into the enclosed portion of the ground floor of the building. The SSDS may function as a temporary EC for less than five years, which is also allowed as part of a conditional Track 1 remedy.

As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the Westchester County Clerk before the Certificate of Completion is issued by NYSDEC. The Environmental Easement renders the Site a temporarily Controlled Property. Groundwater monitoring will be performed as defined in the SMP, as well as periodic inspections of the SSDS.

## 7.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the FER and issuance of the Certificate of Completion for the Remedial Action. If an SMP is needed because of the residual groundwater and/or sub-slab vapor contamination, it will be submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management may continue in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual groundwater and soil vapor contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1)

development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of a Monitoring Plan; (3) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (4) defining criteria for termination of monitoring. The SMP for this Site at this time will not require the development of a plan to operate and maintain treatment, collection, containment, or recovery systems because the only potential on-going remedies will be groundwater monitoring and soil vapor mitigation. The SMP may be modified if the SSDS needs to be activated. Prior to activation of the SSDS, a sub-slab vacuum reading will be obtained to confirm that the area under the slab is adequately depressurized.

To address these needs, this SMP will include three plans as applicable: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; and (3) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The Site Management Plan will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

The SMP will include a monitoring plan for groundwater to evaluate if MNA is occurring and implementation of a soil vapor evaluation one the enclosed portion of the building is fully enclseod and can be sampled. If the contaminants in groundwater do not attenuate below the Class GA AWQS concentrations or reach an asymptotic level that is accepted by the NYSDEC, an active treatment (e.g. oxidant injection) may be proposed and designed based on the monitoring data within the 5 year period post receipt of the Certificate of Completion.

## 8.0 FINAL ENGINEERING REPORT

A FER and Site Management Plan will be submitted to NYSDEC following implementation of the conditional Track 1 Remedial Action defined in this RAWP. The FER provides the documentation that the conditional Track 1 remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will include the previously-submitted CCR as an attachment which provides a comprehensive account of the locations and characteristics of the site preparation demolition activities, SOE installation and all material removed from the Site including the surveyed map(s) of all sources. The FER will include as-built drawings for all constructed remedial elements, certifications, manifests, bills of lading as well as the complete Site Management Plan. The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easement. This determination will be made by NYSDEC in the context of the FER review.

The FER will include written and photographic documentation of all remedial work performed under this remedy.

The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The FER will include the CCR as an attachment, which includes an accounting of the destination of all material that was removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material and fluids. Documentation associated with disposal of all material in the CCR also includes records and approvals for receipt of the material.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

## 8.1 CERTIFICATIONS

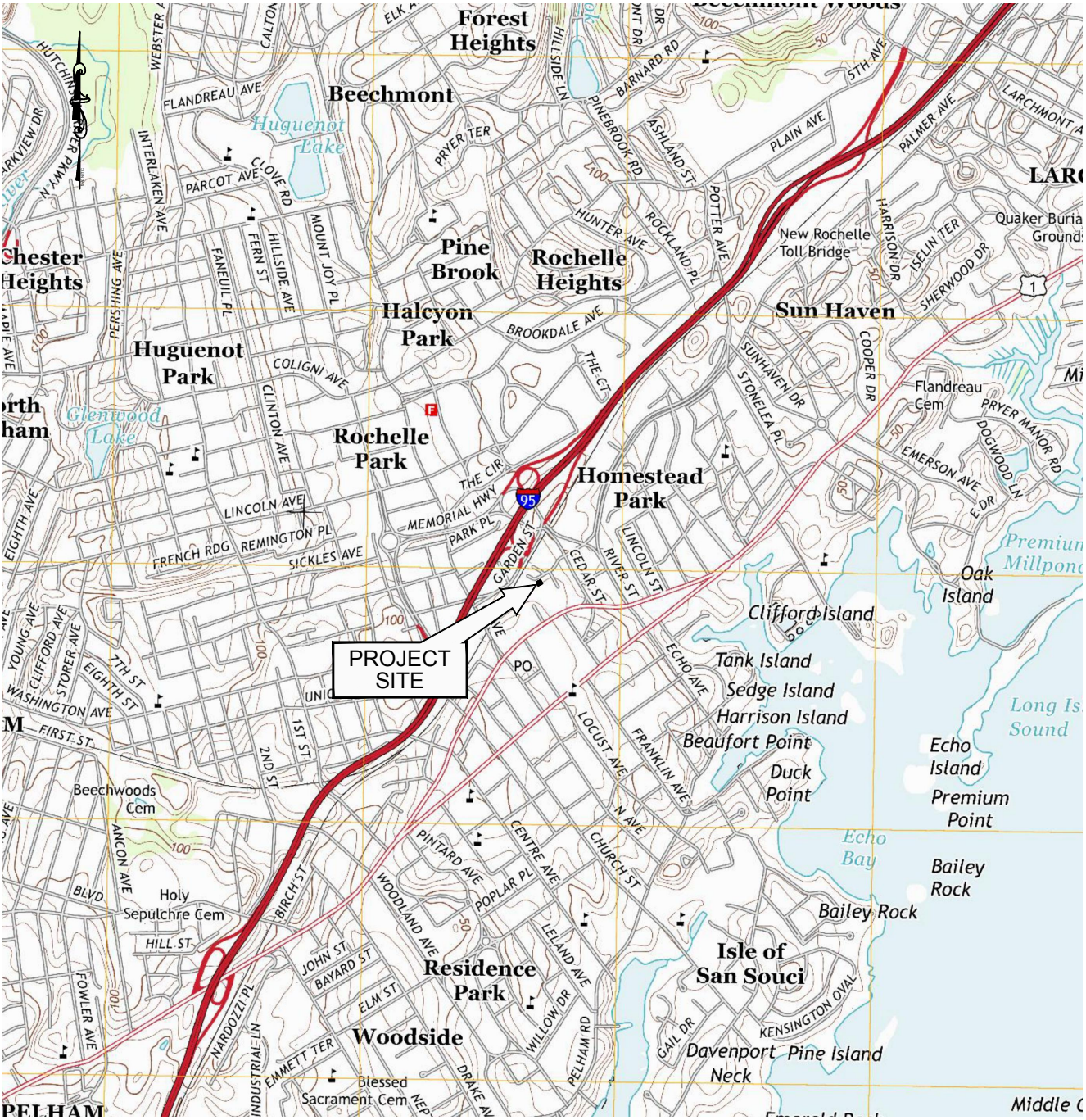
The following certification will appear in front of the Executive Summary of the Final Engineering Report. The certification will be signed by the Remedial Engineer Fuad Dahan who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan.

I certify that all use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.

# Figures




REFERENCE:
INFORMATION TAKEN FROM MOUNT VERNON, HISTORICAL TOPO MAP, 2013
7.5 MINUTE SERIES

Scale 1"=2000'

0 2000 4000

FIG-1.1

10 COMMERCE DRIVE
NEW ROCHELLE, N.Y.

SITE LOCATION MAP

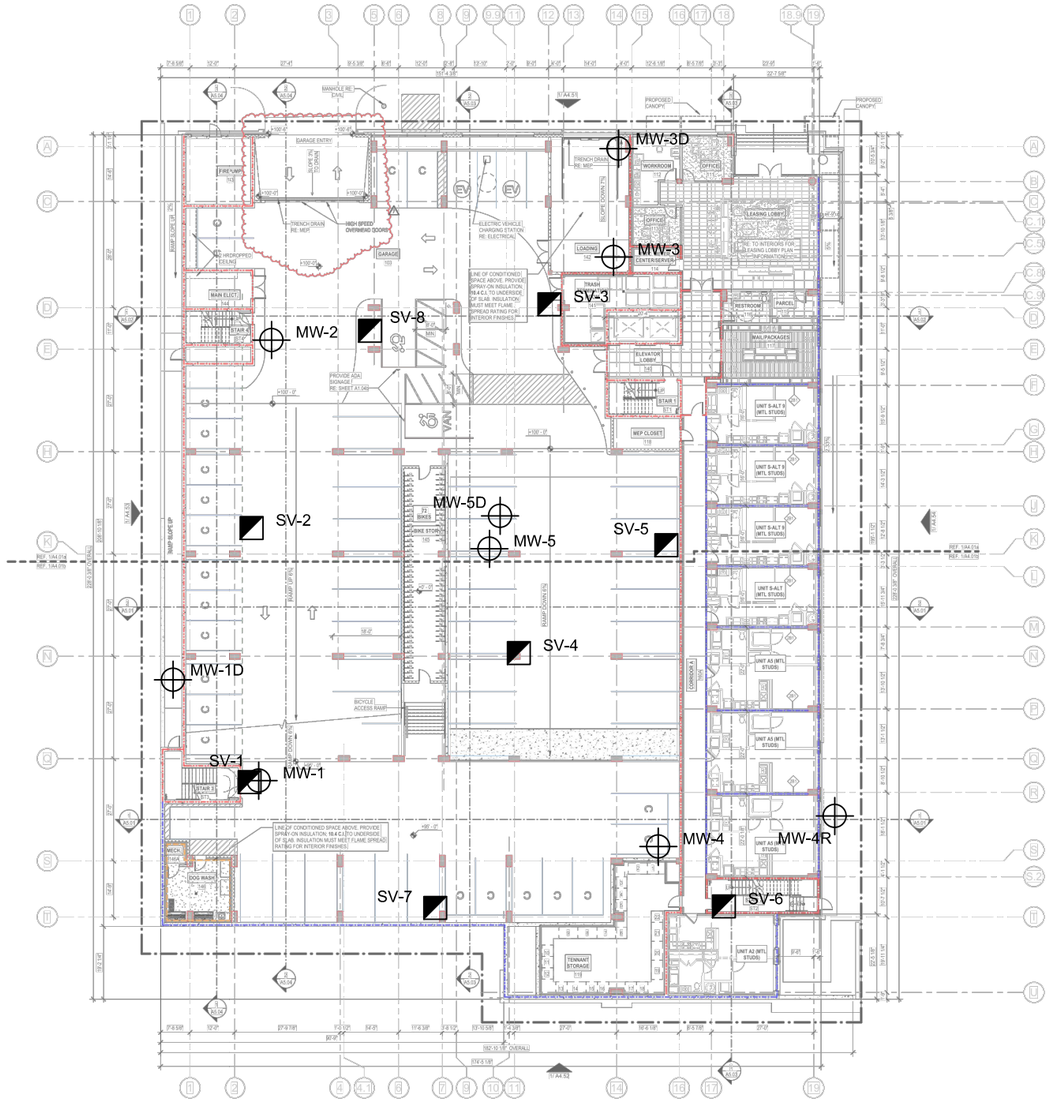
SESI CONSULTING ENGINEERS D.P.C.

SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL

12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

DRAWN BY: RDM
CHECKED BY: TK
SCALE: AS NOTED
DATE: 4/11/19
JOB NO.: 10658

N:\ACAD\10658\CAD\10658 SITE LOCATION PLAN.DWG 06/14/19 12:57:13PM, jenny, LAYOUT:LETTER-USGS




LEGEND:

MW-4 - MONITORING WELL LOCATION AND DESIGNATION

SV-1 - SUB-SLAB VAPOR SAMPLE POINT AND DESIGNATION

— — — - SITE PROPERTY BOUNDARY

Scale 1"=40'±

0 40 80

REFERENCE

1. BUILDING INFORMATION TAKEN FROM "OVERALL BUILDING PLAN - LEVEL 1" PREPARED BY HUMPHREY'S URBAN ARCHITECTURE, DATED SEPTEMBER 20, 2020.

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SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: aas
chk by: TK
scale: AS NOTED
date: 10/15/2021

project: 10 COMMERCE STREET NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

drawing title: SITE PLAN

job no: 10790
drawing no: FIG-1.2

N:\ACAD\10790\CAD\10790 SITE PLAN - MW & SV.DWG 10/15/21 04:36:40PM, yelena.zolotova, LAYOUT:FIG-1.2

| Client Sample ID: | NY TOGS Class | MW-2 | MW-2 |
|---|---|---|---|
| Date Sampled: | GA GW Standards | 6/23/2021 | 9/23/2021 |
| Chloroform | 7 | **44.4** | **55** |
| Iron | 300 | **8030** | **449** |
| Sodium | 20000 | **31800** | **29500** |

| Sample ID: | NY TOGS Class | MW-3D |
|---|---|---|
| Date Sampled: | GA GW Standards | 9/23/2021 |
| Chloroform | 7 | **52** |
| Sodium | 20000 | **27100** |

| Client Sample ID: | NY TOGS Class | MW-3 |
|---|---|---|
| Date Sampled: | GA GW Standards | 6/23/2021 |
| Chloroform | 7 | **33.3** |
| Iron | 300 | **4490** |

| Client Sample ID: | NY TOGS Class | MW-5 |
|---|---|---|
| Date Sampled: | GA GW Standards | 7/1/2021 |
| Phenol | 1 | **1.7 J** |
| Benzo(a)pyrene | ND | **0.74 J** |
| Iron | 300 | **3300** |
| Sodium | 20000 | **26100** |

| Sample ID: | NY TOGS Class | MW-5D |
|---|---|---|
| Date Sampled: | GA GW Standards | 9/23/2021 |
| Chloroform | 7 | **34** |
| Benzo(a)anthracene | 0.002 | **0.07** |
| Benzo(a)pyrene | 0.002 | **0.02** |
| Benzo(b)fluoranthene | 0.002 | **0.04** |
| Benzo(k)fluoranthene | 0.002 | **0.01** |
| Chrysene | 0.002 | **0.06** |
| Indeno(1,2,3-cd)pyrene | 0.002 | **0.02** |
| Aluminum | 2000 | **5170** |
| Arsenic | 25 | **71.16** |
| Iron | 300 | **12000** |
| Sodium | 20000 | **81900** |

| Sample ID: | NY TOGS Class | MW-1D |
|---|---|---|
| Date Sampled: | GA GW Standards | 9/23/2021 |
| Chloroform | 7 | **45** |
| Aluminum | 2000 | **4970** |
| Iron | 300 | **5410** |
| Sodium | 20000 | **53400** |

| Client Sample ID: | NY TOGS Class | MW-4 |
|---|---|---|
| Date Sampled: | GA GW Standards | 7/1/2021 |
| Phenol | 1 | **10.9** |
| Benzo(a)pyrene | ND | **0.39 J** |
| alpha-BHC | 0.01 | **0.016** |
| Chromium | 50 | **344** |
| Copper | 200 | **299** |
| Iron | 300 | **157000** |
| Lead | 25 | **213** |
| Manganese | 300 | **4050** |
| Nickel | 100 | **291** |
| Sodium | 20000 | **474000** |

| Client Sample ID: | NY TOGS Class | MW-1 |
|---|---|---|
| Date Sampled: | GA GW Standards | 6/23/2021 |
| Chloroform | 7 | **35.2** |
| Xylene (total) | 5 | **5.9** |
| Arsenic | 25 | **66** |
| Iron | 300 | **15300** |
| Sodium | 20000 | **113000** |

| Sample ID: | NY TOGS Class | MW-4R |
|---|---|---|
| Date Sampled: | GA GW Standards | 9/23/2021 |
| Chloroform | 7 | **10** |
| Chlordane | 0.05 | **0.292** |
| Iron | 300 | **1060** |
| Sodium | 20000 | **183000** |

MW-3D
MW-3
MW-2
MW-5D
MW-5
MW-1D
MW-1
MW-4
(Destroyed)
MW-4R

NOTES:
1. THIS PLAN IS FOR LOCATING MONITORING WELLS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.
2. ALL CONCENTRATIONS ARE IN ug/l (PARTS PER BILLION).
3. NYSDEC TECHNICAL OPERATIONAL GUIDANCE SERIES (TOGS) CLASS GA GROUNDWATER STANDARDS (2004).

NYS Education Law
Unauthorized alterations or additions to this plan are a violation of section 7209 (2) of the New York State Education Law. Copies of this map not having the seal of the engineer shall not be valid.

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LEGEND:

MW-4 - MONITORING WELL LOCATION AND DESIGNATION

— — — - SITE PROPERTY BOUNDARY

REFERENCE
1. BUILDING INFORMATION TAKEN FROM "OVERALL BUILDING PLAN - LEVEL 1" PREPARED BY HUMPHREY'S URBAN ARCHITECTURE, DATED SEPTEMBER 20, 2020.

Scale 1"=40'±
0 40 80

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SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
12A MAPLE AVE, PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: aas
chk by: TK
scale: AS NOTED
date: 10/05/2021

project: 10 COMMERCE STREET NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

drawing title: GROUNDWATER SAMPLING RESULTS PLAN

job no: 10790
drawing no: FIG-2.1

N:\ACAD\10790\CAD\10790 PROPOSED SOIL VAPOR & MONITORING WELL PLAN 2021-10-05.DWG 10/05/21 04:18:57PM, yelena.zolotova, LAYOUT:FIG-3

| Client Sample ID: | SV-3 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 22 |
| 1,3-Butadiene | 0.62 |
| Benzene | 3.5 |
| Chloroform | 0.35 J |
| Chloromethane | 1.2 |
| Cyclohexane | 4.1 |
| Dichlorodifluoromethane | 2 |
| Ethanol | 38.8 |
| Ethylbenzene | 3 |
| Ethyl Acetate | 2.6 |
| 4-Ethyltoluene | 5.9 |
| Heptane | 4.1 |
| Hexane | 9.2 |
| Isopropyl Alcohol | 4.4 |
| Methylene chloride | 0.9 |
| Methyl ethyl ketone | 3.2 |
| Propylene | 4.1 |
| Styrene | 0.43 J |
| 1,2,4-Trimethylbenzene | 6.9 |
| 1,3,5-Trimethylbenzene | 1.9 |
| 2,2,4-Trimethylpentane | 9.8 |
| Tertiary Butyl Alcohol | 2.1 |
| Tetrachloroethylene | 0.57 |
| Tetrahydrofuran | 2.9 |
| Toluene | 15 |
| Trichlorofluoromethane | 1.0 J |
| m,p-Xylene | 11 |
| o-Xylene | 4.2 |
| Xylenes (total) | 16 |

| Client Sample ID: | SV-2 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 22 |
| 1,3-Butadiene | 12 |
| Benzene | 25 |
| Carbon disulfide | 1.2 |
| Chloroform | 8.3 |
| Chloromethane | 1.2 |
| Carbon tetrachloride | 0.34 J |
| Cyclohexane | 7.9 |
| Dichlorodifluoromethane | 1.9 |
| cis-1,2-Dichloroethylene | 0.38 J |
| Ethanol | 19 |
| Ethylbenzene | 8.3 |
| Ethyl Acetate | 11 |
| 4-Ethyltoluene | 7.9 |
| Heptane | 6.1 |
| Hexane | 15 |
| Isopropyl Alcohol | 5.2 |
| Methylene chloride | 0.83 |
| Methyl ethyl ketone | 4.1 |
| Propylene | 24.2 |
| Styrene | 5.1 |
| 1,2,4-Trimethylbenzene | 8.8 |
| 1,3,5-Trimethylbenzene | 2.5 |
| 2,2,4-Trimethylpentane | 19 |
| Tetrachloroethylene | 0.66 |
| Tetrahydrofuran | 4.7 |
| Toluene | 23 |
| Trichlorofluoromethane | 1.0 J |
| m,p-Xylene | 30 |
| o-Xylene | 11 |
| Xylenes (total) | 41 |

| Client Sample ID: | SV-1 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 31.8 |
| 1,3-Butadiene | 56.4 |
| Benzene | 40.3 |
| Bromodichloromethane | 109 |
| Carbon disulfide | 13 |
| Chloroform | 2250 |
| Cyclohexane | 317 |
| Ethanol | 1730 E |
| Ethylbenzene | 44.7 |
| Heptane | 16 J |
| Isopropyl Alcohol | 15 |
| Tertiary Butyl Alcohol | 21 |
| Toluene | 36 |
| m,p-Xylene | 116 |
| o-Xylene | 42 |
| Xylenes (total) | 157 |

| Client Sample ID: | SV-7 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 43.5 |
| Bromodichloromethane | 103 |
| Chloroethane | 6.1 J |
| Chloroform | 3020 |
| Ethanol | 1580 E |
| Ethylbenzene | 76 |
| Ethyl Acetate | 14 J |
| Isopropyl Alcohol | 12 |
| Propylene | 278 |
| Tertiary Butyl Alcohol | 24 |
| Trichloroethylene | 6.4 |
| m,p-Xylene | 228 |
| o-Xylene | 64.3 |
| Xylenes (total) | 292 |

| Client Sample ID: | SV-5 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 706 |
| Benzene | 8.3 J |
| Carbon disulfide | 34.3 |
| Chloroform | 59.1 |
| Cyclohexane | 321 |
| Ethanol | 18800 E |
| Ethylbenzene | 16 J |
| Heptane | 18 |
| Isopropyl Alcohol | 38.3 |
| Methyl ethyl ketone | 34.5 |
| Propylene | 253 |
| Tertiary Butyl Alcohol | 181 |
| Tetrachloroethylene | 47 |
| Tetrahydrofuran | 6780 |
| Toluene | 27 |
| m,p-Xylene | 43 |
| o-Xylene | 19 |
| Xylenes (total) | 62.1 |

| Client Sample ID: | SV-6 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 75.8 |
| Benzene | 6.7 |
| Carbon disulfide | 27 |
| Chloroform | 72.3 |
| Carbon tetrachloride | 7.5 |
| Cyclohexane | 434 |
| Dichlorodifluoromethane | 2.0 J |
| Ethanol | 3580 E |
| Ethylbenzene | 59.9 |
| Heptane | 20 |
| Hexane | 52.5 |
| Isopropyl Alcohol | 14 |
| Methyl ethyl ketone | 5 |
| Propylene | 81.6 |
| Styrene | 3.5 |
| 1,2,4-Trimethylbenzene | 2.8 J |
| 2,2,4-Trimethylpentane | 286 |
| Tertiary Butyl Alcohol | 25 |
| Tetrachloroethylene | 585 |
| Tetrahydrofuran | 69.3 |
| Toluene | 38.1 |
| m,p-Xylene | 80.4 |
| o-Xylene | 26 |
| Xylenes (total) | 107 |

| Client Sample ID: | SV-4 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 91 |
| Benzene | 3.5 |
| Bromodichloromethane | 8 |
| Carbon disulfide | 34.3 |
| Chloroform | 393 |
| Cyclohexane | 246 |
| Dichlorodifluoromethane | 2.2 J |
| cis-1,2-Dichloroethylene | 0.91 J |
| Ethanol | 2490 E |
| Ethylbenzene | 36 |
| Ethyl Acetate | 8.6 |
| Heptane | 4.1 |
| Isopropyl Alcohol | 12 |
| Methyl ethyl ketone | 12 |
| Propylene | 436 |
| Styrene | 2.0 J |
| 1,2,4-Trimethylbenzene | 2.7 J |
| 2,2,4-Trimethylpentane | 8.4 |
| Tertiary Butyl Alcohol | 24 |
| Tetrachloroethylene | 2.6 |
| Tetrahydrofuran | 4.1 |
| Toluene | 22 |
| Trichloroethylene | 6.4 |
| m,p-Xylene | 76.9 |
| o-Xylene | 29 |
| Xylenes (total) | 106 |

| Client Sample ID: | SV-8 |
|---|---|
| Date Sampled: | 7/2/2021 |
| Acetone | 29.9 |
| 1,3-Butadiene | 1.3 |
| Benzene | 6.1 |
| Chloroform | 0.68 J |
| Chloromethane | 1.1 |
| Cyclohexane | 8.9 |
| Dichlorodifluoromethane | 1.9 |
| Ethanol | 38.1 |
| Ethylbenzene | 6.5 |
| 4-Ethyltoluene | 9.8 |
| Heptane | 8.6 |
| Hexane | 18 |
| Isopropyl Alcohol | 4.2 |
| Methylene chloride | 1.1 |
| Methyl ethyl ketone | 11 |
| Propylene | 8.6 |
| Styrene | 0.51 J |
| 1,2,4-Trimethylbenzene | 13 |
| 1,3,5-Trimethylbenzene | 3.3 |
| 2,2,4-Trimethylpentane | 20 |
| Tetrachloroethylene | 0.61 |
| Tetrahydrofuran | 7.4 |
| Toluene | 27 |
| Trichlorofluoromethane | 1.1 J |
| m,p-Xylene | 23 |
| o-Xylene | 9.6 |
| Xylenes (total) | 33 |

LEGEND:

SV-1 - SUB-SLAB VAPOR SAMPLE POINT AND DESIGNATION

\- - - - - - SITE PROPERTY BOUNDARY

19 - CONSTITUENT DETECTED IN SAMPLE

NOTES:

THIS PLAN IS FOR LOCATING SUB-SLAB VAPOR POINTS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

REFERENCE

1. BUILDING INFORMATION TAKEN FROM "OVERALL BUILDING PLAN - LEVEL 1" PREPARED BY HUMPHREY'S URBAN ARCHITECTURE, DATED SEPTEMBER 20, 2020.

Scale 1"=40'±

0 40 80

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ENVIRONMENTAL
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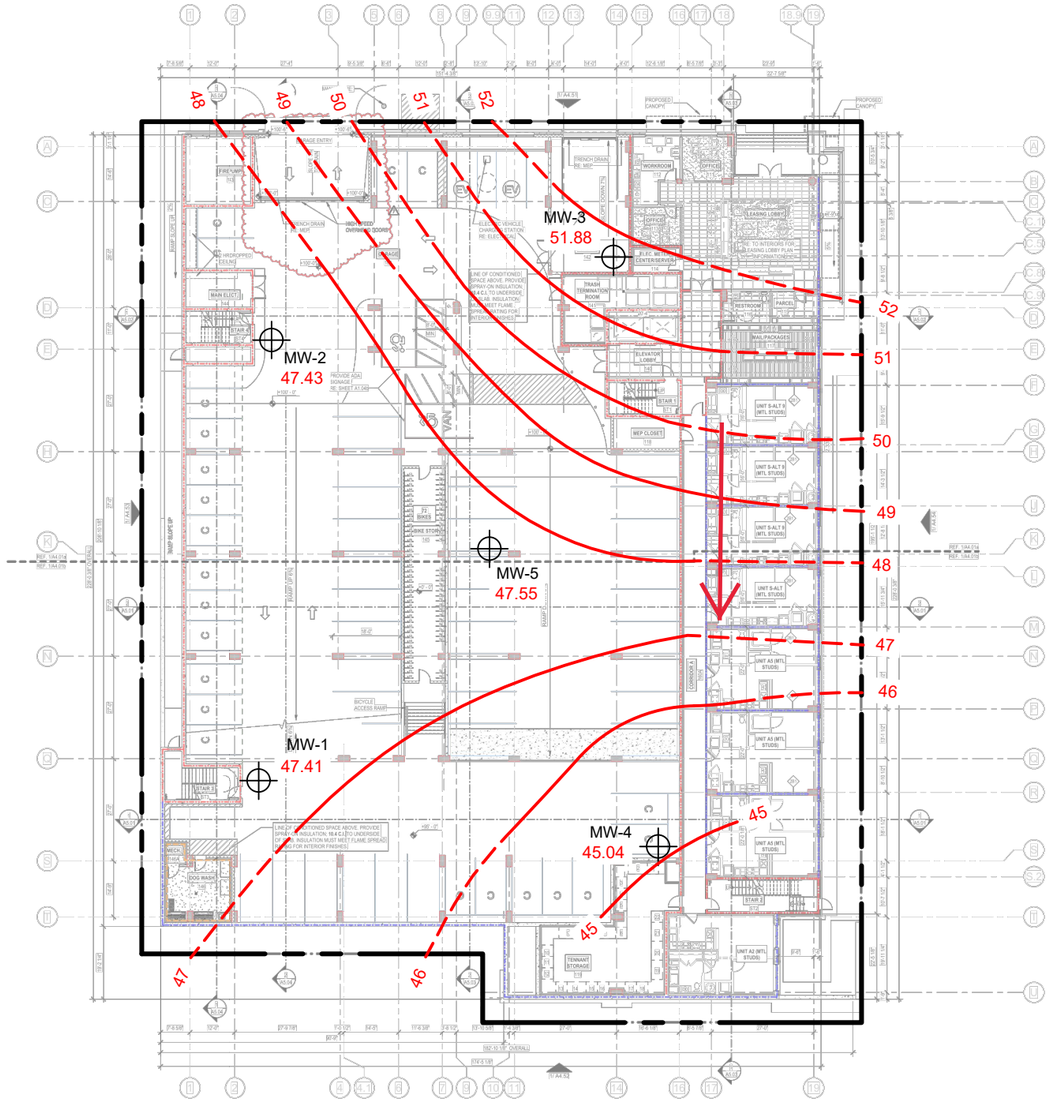
dwg by: aas
chk by: TK
scale: AS NOTED
date: 09/02/2021

project: 10 COMMERCE STREET NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

drawing title: SUB-SLAB VAPOR SAMPLE LOCATIONS & RESULTS PLAN

job no: 10790
drawing no: FIG-2.2

N:\ACAD\10790\CAD\10790 VAPOR SAMPLE LOCATION & RESULTS PLAN.DWG 09/02/21 01:29:08PM, aas, LAYOUT:FIG-5




NOTES:

1. THIS PLAN IS FOR LOCATING MONITORING WELLS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.
2. CONTOUR INTERVAL = 1 FT

LEGEND:

MW-4 45.25' - MONITORING WELL LOCATION AND DESIGNATION WITH GROUNDWATER ELEVATION IN FT AMSL

\- SITE PROPERTY BOUNDARY

\- GROUNDWATER CONTOUR IN FT AMSL

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REFERENCE

1. BUILDING INFORMATION TAKEN FROM "OVERALL BUILDING PLAN - LEVEL 1" PREPARED BY HUMPHREY'S URBAN ARCHITECTURE, DATED SEPTEMBER 20, 2020.
2. GROUNDWATER ELEVATIONS DERIVED FROM WELL SURVEY PERFORMED BY CONTRATORS LINE & GRADE AND SESI FIELD MEASUREMENTS (JULY 2, 2021).

SCALE: 1"=40'

0 40 80

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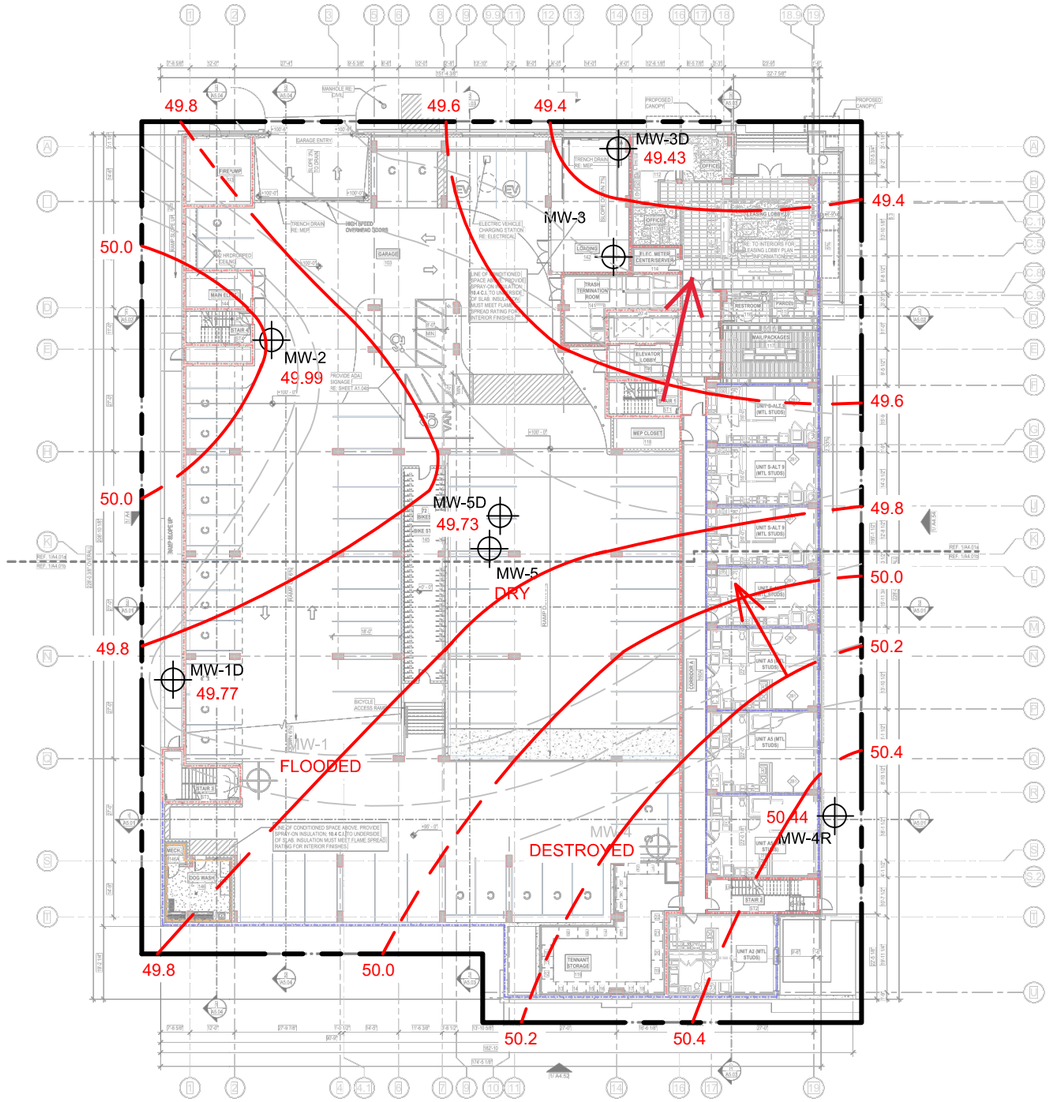
dwg by: aas
chk by: TK
scale: AS NOTED
date: 07/29/2021

project: 10 COMMERCE DRIVE
NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

drawing title: GROUNDWATER CONTOUR MAP

job no: 10790
drawing no: FIG-2.3

N:\ACAD\10790\CAD\10790 GW CONTOUR MAP 2021-07-29.DWG 07/29/21 11:52:25AM, jenny, LAYOUT:FIG-4




| | ELEV. | DTW | GWE |
|---|---|---|---|
| MW-1D | 54.27 | 4.50 | 49.77 |
| MW-2 | 54.10 | 4.11 | 49.99 |
| MW-3D | 52.08 | 2.65 | 49.43 |
| MW-4R | 53.09 | 2.65 | 50.44 |
| MW-5D | 52.85 | 3.12 | 49.73 |

LEGEND:

- MW-4 45.25' - MONITORING WELL LOCATION AND DESIGNATION WITH GROUNDWATER ELEVATION IN FT AMSL
- SITE PROPERTY BOUNDARY
- GROUNDWATER ELEVATION CONTOUR IN FT AMSL (DASHED WHERE INFERRED)
- INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

1. THIS PLAN IS FOR LOCATING MONITORING WELLS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.
2. CONTOUR INTERVAL = 0.2 FEET

REFERENCE

1. BUILDING INFORMATION TAKEN FROM "OVERALL BUILDING PLAN - LEVEL 1" PREPARED BY HUMPHREY'S URBAN ARCHITECTURE, DATED SEPTEMBER 20, 2020.
2. GROUNDWATER ELEVATIONS DERIVED FROM WELL SURVEY PERFORMED BY CONTRATORS LINE & GRADE AND SESI FIELD MEASUREMENTS (SEPTEMBER 23, 2021)

SCALE: 1"=40'

0 40 80

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date: 10/07/2021

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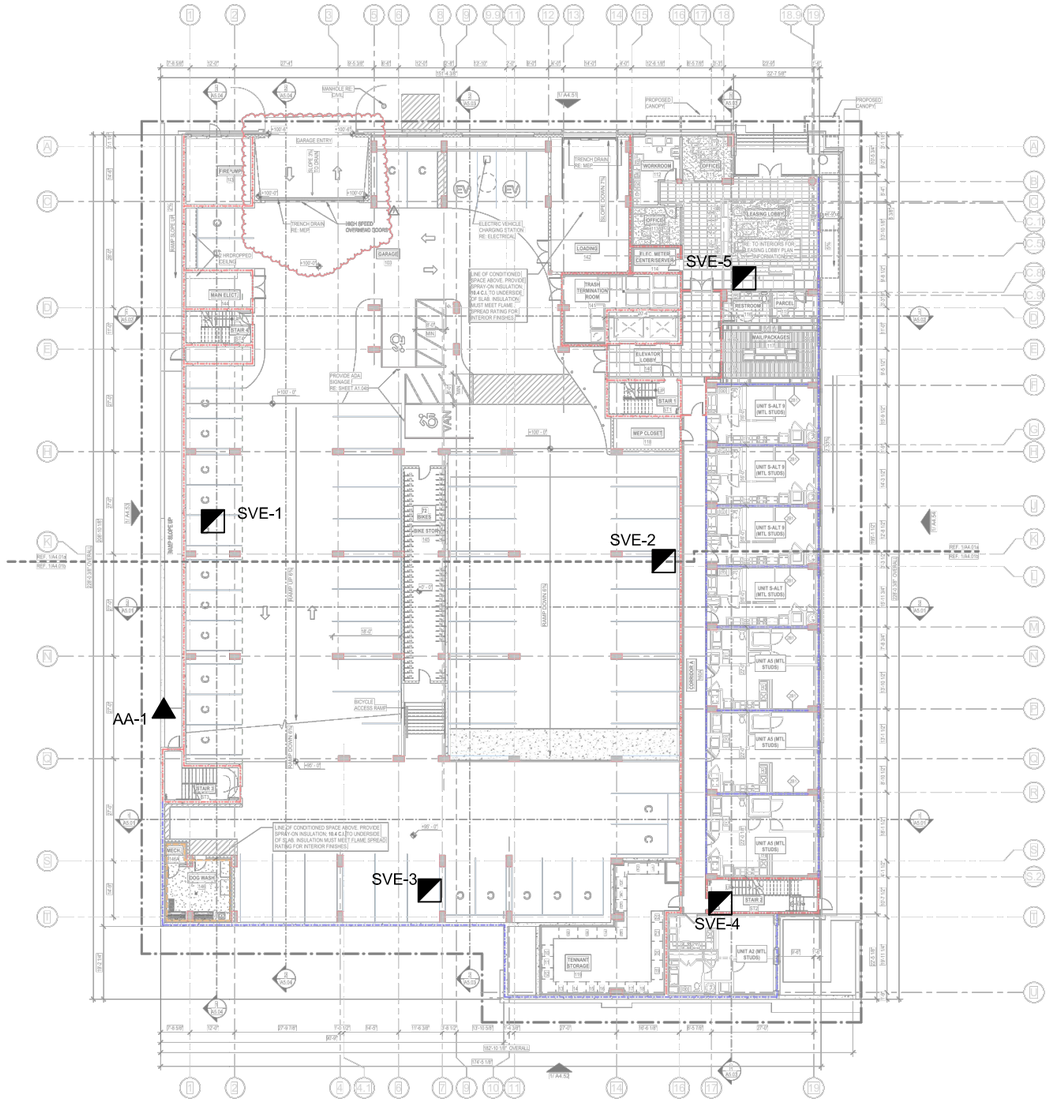
project: 10 COMMERCE DRIVE
NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

drawing title: GROUNDWATER CONTOUR MAP

job no: 10790
drawing no:

FIG-2.3A

N:\ACAD\10790\CAD\10790 GW CONTOUR MAP 2021-10-05.DWG 10/07/21 02:23:20PM, yelena.zolotova, LAYOUT:FIG-4




NOTES:
THIS PLAN IS FOR LOCATING SUB-SLAB VAPOR POINTS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

LEGEND:

SVE-1 - PROPOSED SUB-SLAB VAPOR/INDOOR AIR SAMPLE LOCATION

\- - - - - - SITE PROPERTY BOUNDARY

AA-1 - PROPOSED AMBIENT AIR SAMPLE LOCATION

Scale 1"=40'±

0 40 80

REFERENCE
1. BUILDING INFORMATION TAKEN FROM "OVERALL BUILDING PLAN - LEVEL 1" PREPARED BY HUMPHREY'S URBAN ARCHITECTURE, DATED SEPTEMBER 20, 2020.

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scale: AS NOTED
date: 10/15/2021

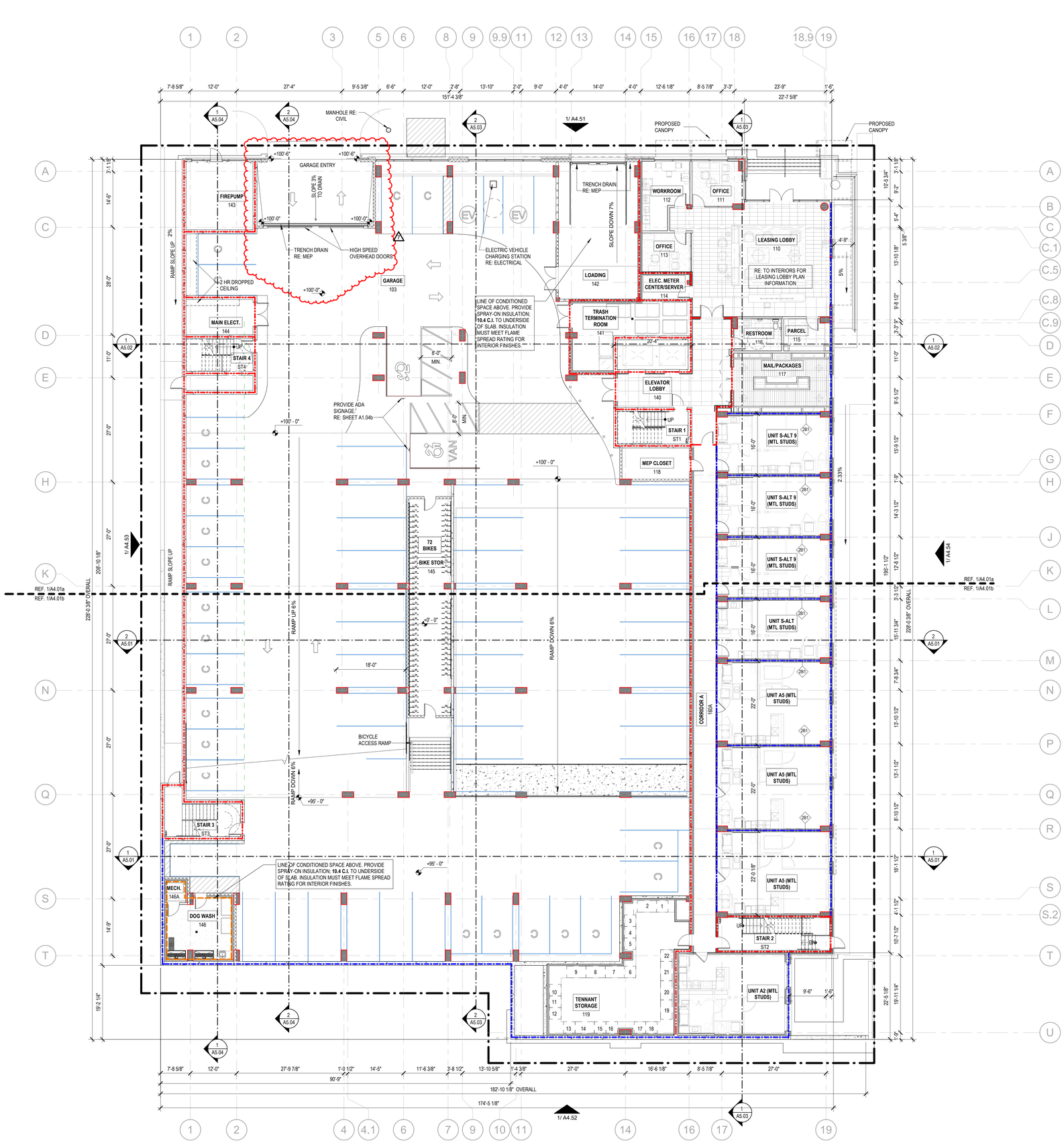
project: 10 COMMERCE STREET
NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

drawing title: SOIL VAPOR EVALUATION PLAN

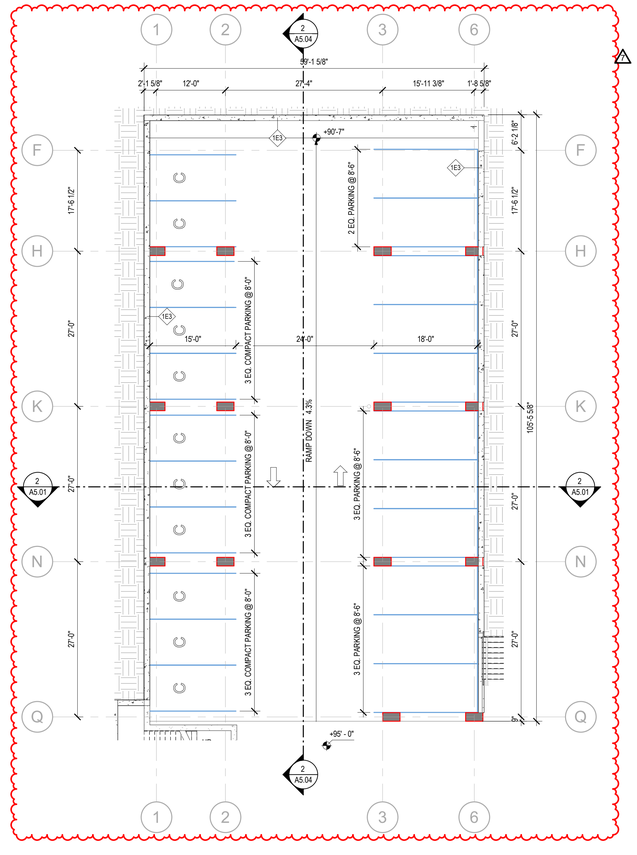
job no: 10790
drawing no: FIG-5.1

N:\ACAD\10790\CAD\10790 SOIL VAPOR EVALUATION PLAN 2021-10-15.DWG 10/15/21 04:33:57PM, yelena.zolotova, LAYOUT:FIG-5.1

# Appendix A:
# Site Development and SSDS Plans




## 1 LEVEL 1 - OVERALL BUILDING PLAN
3/32" = 1'-0"




## 2 LEVEL 1 - LOWER PARKING AREA
3/32" = 1'-0"

**BIKE COUNT CALCULATION:**

| | |
|---|---|
| TOTAL BIKES: | 72 BIKES |
| BIKES W/ ACCESIBLE SPACE REQUIRED: | 3.65 |
| BIKES W/ ACCESIBLE SPACE PROVIDED: | 4 |

**PARKING TABULATIONS - LEVEL 01**

| | | |
|---|---|---|
| COMPACT SPACE | COMPACT SPACE - 8'-0"x15'-0" | 33 |
| COMPACT SPACE | EV SPACE - 8'-0"x15'-0" | 2 |
| HANDICAP VAN SPACE | HANDICAP VAN SPACE - 9'-0"x18'-0" | 2 |
| STANDARD SPACE | STANDARD SPACE - 8'-6"x18'-0" | 47 |
| LEVEL 01 PARKING TOTAL: | | 84 |

**NOTES:**
1. PARKING STALL GROUPINGS TO BE CENTERED BETWEEN COLUMNS, U.N.O.

## GENERAL BUILDING NOTES

1. PROVIDE A BROOM FINISH AT ALL SLOPED CONCRETE SURFACES. ALL FLAT CORRIDOR SURFACES TO BE TROWELED SMOOTH AND SEALED.
2. ALL ACCESSIBLE ENTRANCES SHALL HAVE NO MORE THAN A 2% SLOPE FOR A DISTANCE OF 60" PERPENDICULAR TO THE DOOR.
3. ALL EXTERIOR COMMON USE DOOR THRESHOLDS TO BE ACCESSIBLE. REF A2.12 FOR TYPICAL DOOR THRESHOLD FOR COMMON AREAS.
4. NOTES, DIMENSIONS, AND TAGS ARE INCLUDED ON THE ENLARGED A4.00s PLANS. REFER TO A8.00 SHEETS FOR AMENITIES; AND A6.00s SHEETS FOR STAIRS, ELEVATORS, AND TRASH ROOMS.
5. FOR UNIT INTERIOR WALL TYPES REFER TO A300s UNIT SHEETS.
6. METER, RISER, AND TELECOM ARE LOCATED ON THE BUILDING PLANS FOR REFERENCE ONLY. REFER TO CIVIL, MEP AND TELECOM PLANS FOR THE ACTUAL METER AND EQUIPMENT SIZE AND LOCATION.
7. A MINIMUM RATED 1A:10B:C FIRE EXTINGUISHER TO BE PROVIDED IN EACH UNIT. FIRE EXTINGUISHERS ARE TO BE LOCATED EVERY 75' IN CORRIDORS. MAXIMUM TRAVEL DISTANCE TO EXTINGUISHER.
8. REFER TO EGRESS PLANS FIRE EXTINGUISER SCHEDULE
9. CONTROL JOINTS SHOULD BE SPACED IN GYPSUM WALL BOARD TO LIMIT EXPANSES TO 30' MAXIMUM. CONTROL JOINTS ARE RECOMMENDED AT DOOR JAMBS, EXTENDING FROM DOOR HEAD TO CEILING. CEILING GYPSUM BOARD CONTROL JOINTS SHOULD LIMIT THE CEILING AREA TO 2,500 SF MAX. AND 50' IN EITHER DIRECTION. CONTROL JOINTS SHOULD BE INSTALLED WHERE THERE IS A CHANGE IN DIRECTION IN CEILING FRAMING, FURRING OR SPACE CONTROL JOINTS AT THE CEILING AND WALL PER THE MANUFACTURER'S RECOMMENDED INSTALLATION GUIDELINES. CEILING AND WALL CONTROL JOINTS ARE TO ALIGN AT ALL INTERSECTIONS WHERE APPLICABLE TO FORM A CONTINUOUS CONTROL JOINT. ENSURE THAT CONTROL JOINTS ARE LOCATED AT STRUCTURAL CONSTRUCTION JOINTS AND AT THE TOP AND BOTTOM OF ALL INTERIOR RAMPS.
10. NOT USED
11. REFER TO SHEET A4.07 FOR ROOF NOTES AND LEGENDS

## SYMBOL LEGEND - FLOOR PLANS

- GRID LINE REF. TAG
- DETAIL / ENLARGED PLAN CALLOUT TAG
- WINDOW / STOREFRONT TAG; REF. A2.20
- COMMON AREA DOOR TAG; REF. A2.10
- UNIT AREA DOOR TAG; REF. A2.10
- BUILDING SECTION TAG
- WALL / DETAIL SECTION TAG
- EXTERIOR ELEVATION TAG
- PARTITION WALL TAG; REF. A1.05 & A1.05a
- FINISH FLOOR ELEVATION; REF. CIVIL
- ROOM NAME TAG / ROOM NUMBER
- UNIT TYPE / SHEET CALLOUT / ADDRESS NUMBER
- SEMI-RECESSED FIRE EXTINGUISHER, CABINETS MAX. 5'-0" A.F.F. TO TOP OF CABINET; MAX. 75 FT. TRAVEL DISTANCE-LEADING EDGE MUST BE BELOW 2"
- FLOOR DRAIN LOCATIONS; REF. MEP FOR SIZE AND DETAILS
- OVERFLOW DRAIN LOCATIONS; REF. MEP FOR SIZE AND DETAILS
- DOOR MANEUVERING CLEARANCE; REF. A1.03 & A1.04
- CAST-IN-PLACE CONCRETE WALL
- CMU WALL
- INSULATED WALL
- INDICATES SHEAR WALL. REFER STRUCTURAL DRAWINGS
- 3 HR FIREWALL
- 2 HR FIRE BARRIER
- 1 HR FIRE BARRIER
- 1 HR FIRE PARTITION AT CORRIDOR & UNIT SEPERATION
- MATCHLINE
- PROPERTY LINE
- SETBACK LINE

| | |
|---|---|
| DESIGNED BY: | SB |
| DRAWN BY: | SO/SB |
| AOR: | MC |
| PLOT DATE | 09-20-2020 |

| ISSUE |
|---|
| ISSUE FOR PRICING / BIDDING: JULY 30, 2018 |
| ISSUE FOR PERMIT APPLICATION: SEPTEMBER 14, 2018 |
| ISSUE FOR PERMIT / CONSTRUCTION: FEBRUARY 15, 2019 |

REVISION SCHEDULE

| NO: | DATE: | DESCRIPTION: |
|---|---|---|
| 1 | NOV 09, 2018 | BLDG DEPT COMMENTS |
| 4 | APR 24, 2020 | REVISION 01 |
| 7 | DEC 02, 2020 | ASI 003 |

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10 COMMERCE DRIVE
New Rochelle, NY
BRP Companies

REGISTERED ARCHITECT MICHAEL D. COOK 026056 STATE OF NEW YORK
12/01/2020

HUMPHREYS URBAN ARCHITECTURE/NEW YORK, PLLC
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BLDG DEPT REVISION (09-20-2020)

SHEET CONTENTS
LEVEL 1 - OVERALL BUILDING PLAN

SHEET NUMBER
A4.01

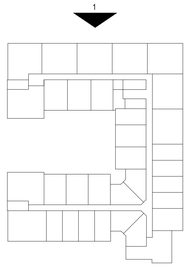
SCALE As indicated

17290

| KEYNOTES | |
|---|---|
| KEYNOTE | DESCRIPTION |

| | |
|---|---|
| ASW | ALUMINUM STOREFRONT WINDOW |
| BC | MASONRY BRICK COLOR WHITE OVER CMU |
| BM | MASONRY BRICK COLOR WHITE OVER METAL STUDS WALL |
| BS | BUILDING SIGNAGE UNDER ANOTHER PERMIT; BY OTHERS |
| BW | MASONRY BRICK COLOR DARK GRAY OVER CMU |
| CM | METAL CANOPY SYSTEM; BY OTEHRS. RE: STRUCTURAL |
| CON | CONCRETE WALL TO BE PAINTED - |
| GB | GLASS BALCONY W/ALUMINUM FRAME |
| MC | PRE-FINISHED METAL COPING |
| MG | METAL PANEL SYSTEM (DARK GRAY) |
| MGC | METAL PANEL SYSTEM (DARK GRAY) OVER CMU |
| ML | METAL LOUVER; BY OTHERS |
| MW | METAL PANEL SYSTEM (WOOD FINISH) |
| RM | RAILING MESH METAL |
| SC | STONE METAL CAP. RE: STONE PROFILES ON SHEETS A7.10 |
| SW | STUCCO FINISH WHITE |
| TG | TINTED GLASS WINDOWS |
| VW | VINYL WINDOW |

## KEY PLAN




## SYMBOL LEGEND - ELEVATIONS

- 0 — COLUMN GRID OR REFERENCE BUBBLE
- 1 / AX.XX SIM — REFERENCE PLAN OR DETAIL CALLOUT / SHEET FOR ADDITIONAL INFORMATION
- 1t — WINDOW TAG. SEE SCHEDULE STARTING ON SHEET A2.20
- D-11 — DOOR TAG UNITS. SEE SCHEDULE STARTING ON SHEET A2.10
- 101 — DOOR TAG. SEE SCHEDULE STARTING ON SHEET A2.10
- AX.XX SIM — BUILDING SECTION.
- 1 / AX.XX SIM — WALL SECTION.
- Name / Elevation — LEVEL / ELEVATION TAG
- T.O.D. — TOP OF DECK
- T.O.P. — TOP OF PLATE
- T.O.S. — TOP OF SLAB
- F.F. — FINISH FLOOR
- ? — ELEVATION KEYNOTE; REF. KEYNOTE LEGEND
- BRICK - GRAPHICAL REPRESENTATION ONLY
- METAL PANEL SYSTEM - WOOD FINISH
- METAL PANEL SYSTEM - DARK GRAY
- STUCCO FINISH
- CMU WALL
- 1 — UNIT EXHAUST VENT RE: MECHANICAL

## GENERAL ELEVATION NOTES

1. PROVIDE 1/2" MINIMUM OF SLOPE AWAY FROM WALL ON TOP SURFACE OF WALL PROJECTIONS.
2. MOUNT ALL EXTERIOR WALL LIGHT FIXTURES MINIMUM 6'-8" A.F.F. TO BOTTOM OF FIXTURE, WHERE THEY PROJECT MORE THAN 4" FROM FACE OF WALL.
3. REFER TO CIVIL AND STRUCTURAL DRAWINGS FOR F.F.E. AND SLAB BREAKS
4. FLASHING, WATERPROOF MEMBRANES, PROPER CAULKS AND SEALANTS (BACKER RODS AS REQUIRED) SHALL BE INSTALLED AROUND ALL WINDOWS, DOORS, ROOF OPENINGS, HORIZONTAL AND VERTICAL JOINTS OF DISSIMILAR MATERIALS, MATERIAL TRANSITIONS, TRIMS AND OTHER WEATHER EXPOSED AREAS.
5. PROVIDE A WATER TIGHT BUILDING(S), ROOF AND EXTERIOR ENVELOPE THAT SHEDS WATER PROPERLY.
6. ALL PATIOS, PORCHES, AND SIDEWALKS TO BE SLOPED 1/4" PER 1'-0" MINIMUM IN DIRECTION INDICATED ON PLANS AND AWAY FROM EXTERIOR WALLS.
7. GRADES AROUND ALL EXTERIOR WALLS OF THE BUILDING TO BE 8 INCHES MINIMUM BELOW THE FINISHED FLOOR AND IS TO SLOPE AWAY FROM THE BUILDING 5% MIN FOR 10' PER IBC 1804.3.
8. GRADE ELEVATIONS ARE APPROXIMATE. REFER TO CIVIL & HARDSCAPE DRAWINGS FOR FINE GRADING.
9. PROJECT ADDRESS SIGNAGE TO BE 12" HT. INDIVIDUAL MOUNT, METAL REVERSE PAN CHANNEL NUMBER, STREET NUMBERS ONLY OR AS DIRECTED BY OWNER.
10. SIGNS ARE FOR REFERENCE ONLY. ALL SIGNS SHALL BE REVIEWED AND INSTALLED UNDER SEPARATE PERMIT.
11. ALL EXTERIOR COLORS, FINISHES, AND DECORATIVE TRIM BANDS TO TERMINATE AT AN INSIDE CORNER, U.N.O.
12. ALIGN ALL MECHANICAL VENTS BOTH HORIZONTALLY AND VERTICALLY.
13. PER 2015 IBC SECTION 1406.2.2(2), COMBUSTIBLE ARCHITECTURAL TRIM SHALL BE LIMITED TO 40'-0" IN HEIGHT ABOVE GRADE; ARCHITECTURAL TRIM ABOVE 40'-0" IN HEIGHT ABOVE GRADE SHALL BE OF APPROVED, NON-COMBUSTIBLE MATERIALS AND SHALL BE SECURED TO THE WALL WITH METAL OR OTHER APPROVED, NON-COMBUSTIBLE BRACKETS.




**1 NORTH ELEVATION**
1/8" = 1'-0"

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DESIGNED BY: SB
DRAWN BY: SO/SB
AOR: MC
PLOT DATE 09-20-2020

ISSUE FOR PRICING / BIDDING: JULY 30, 2018

ISSUE FOR PERMIT APPLICATION: SEPTEMBER 14, 2018

ISSUE FOR PERMIT / CONSTRUCTION: FEBRUARY 15, 2019

REVISION SCHEDULE

| NO: | DATE: | DESCRIPTION: |
|---|---|---|
| 3 | DEC 17, 2019 | ASI 001 |
| 4 | APR 24, 2020 | REVISION 01 |

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9/21/2020

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SHEET CONTENTS
EXTERIOR ELEVATIONS

SHEET NUMBER
A4.51

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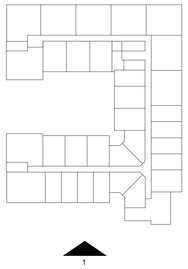
17290

BLDG DEPT REVISION (09-20-2020)

| KEYNOTES | |
|---|---|
| KEYNOTE | DESCRIPTION |

| | |
|---|---|
| AD | ALUMINUM SLIDER DOOR SYSTEM |
| CMU | CMU WALL TO BE PAINTED - |
| CON | CONCRETE WALL TO BE PAINTED - |
| GB | GLASS BALCONY W/ALUMINUM FRAME |
| MC | PRE-FINISHED METAL COPING |
| MG | METAL PANEL SYSTEM (DARK GRAY) |
| MGC | METAL PANEL SYSTEM (DARK GRAY) OVER CMU |
| MW | METAL PANEL SYSTEM (WOOD FINISH) |
| RM | RAILING MESH METAL |
| SC | STONE METAL CAP. RE: STONE PROFILES ON SHEETS A7.10 |
| SW | STUCCO FINISH WHITE |
| VW | VINYL WINDOW |

## KEY PLAN



1

## SYMBOL LEGEND - ELEVATIONS

- 0 / SIM / 1 / AX.XX — COLUMN GRID OR REFERENCE BUBBLE
- 1 / AX.XX / SIM — REFERENCE PLAN OR DETAIL CALLOUT / SHEET FOR ADDITIONAL INFORMATION
- 1t — WINDOW TAG. SEE SCHEDULE STARTING ON SHEET A2.20
- D-11 — DOOR TAG UNITS. SEE SCHEDULE STARTING ON SHEET A2.10
- 101 — DOOR TAG. SEE SCHEDULE STARTING ON SHEET A2.10
- SIM / 1 / AX.XX — BUILDING SECTION.
- SIM / 1 / AX.XX — WALL SECTION.
- Name / Elevation — LEVEL / ELEVATION TAG
- T.O.D. — TOP OF DECK
- T.O.P. — TOP OF PLATE
- T.O.S. — TOP OF SLAB
- F.F. — FINISH FLOOR
- ? — ELEVATION KEYNOTE: REF KEYNOTE LEGEND
- BRICK - GRAPHICAL REPRESENTATION ONLY
- METAL PANEL SYSTEM - WOOD FINISH
- METAL PANEL SYSTEM - DARK GRAY
- STUCCO FINISH
- CMU WALL
- UNIT EXHAUST VENT RE: MECHANICAL

## GENERAL ELEVATION NOTES

1. PROVIDE 1/2" MINIMUM OF SLOPE AWAY FROM WALL ON TOP SURFACE OF WALL PROJECTIONS.
2. MOUNT ALL EXTERIOR WALL LIGHT FIXTURES MINIMUM 6'-8" A.F.F. TO BOTTOM OF FIXTURE, WHERE THEY PROJECT MORE THAN 4" FROM FACE OF WALL.
3. REFER TO CIVIL AND STRUCTURAL DRAWINGS FOR F.F.E. AND SLAB BREAKS.
4. FLASHING, WATERPROOF MEMBRANES, PROPER CAULKS AND SEALANTS (BACKER RODS AS REQUIRED) SHALL BE INSTALLED AROUND ALL WINDOWS, DOORS, ROOF OPENINGS, HORIZONTAL AND VERTICAL JOINTS OF DISSIMILAR MATERIALS, MATERIAL TRANSITIONS, TRIMS AND OTHER WEATHER EXPOSED AREAS.
5. PROVIDE A WATER TIGHT BUILDING(S), ROOF AND EXTERIOR ENVELOPE THAT SHEDS WATER PROPERLY.
6. ALL PATIOS, PORCHES, AND SIDEWALKS TO BE SLOPED 1/4" PER 1'-0" MINIMUM IN DIRECTION INDICATED ON PLANS AND AWAY FROM EXTERIOR WALLS.
7. GRADES AROUND ALL EXTERIOR WALLS OF THE BUILDING TO BE 8 INCHES MINIMUM BELOW THE FINISHED FLOOR AND IS TO SLOPE AWAY FROM THE BUILDING 5% MIN FOR 10' PER IBC 1804.3.
8. GRADE ELEVATIONS ARE APPROXIMATE. REFER TO CIVIL & HARDSCAPE DRAWINGS FOR FINE GRADING.
9. PROJECT ADDRESS SIGNAGE TO BE 12" HT. INDIVIDUAL MOUNT, METAL REVERSE PAN CHANNEL NUMBER, STREET NUMBERS ONLY OR AS DIRECTED BY OWNER.
10. SIGNS ARE FOR REFERENCE ONLY. ALL SIGNS SHALL BE REVIEWED AND INSTALLED UNDER SEPARATE PERMIT.
11. ALL EXTERIOR COLORS, FINISHES, AND DECORATIVE TRIM BANDS TO TERMINATE AT AN INSIDE CORNER, U.N.O.
12. ALIGN ALL MECHANICAL VENTS BOTH HORIZONTALLY AND VERTICALLY.
13. PER 2015 IBC SECTION 1406.2.2(2), COMBUSTIBLE ARCHITECTURAL TRIM SHALL BE LIMITED TO 40'-0" IN HEIGHT ABOVE GRADE; ARCHITECTURAL TRIM ABOVE 40'-0" IN HEIGHT ABOVE GRADE SHALL BE OF APPROVED, NON-COMBUSTIBLE MATERIALS AND SHALL BE SECURED TO THE WALL WITH METAL OR OTHER APPROVED, NON-COMBUSTIBLE BRACKETS.




**1 SOUTH ELEVATION**
1/8" = 1'-0"

DESIGNED BY: SB
DRAWN BY: SO/SB
AOR: MC
PLOT DATE 09-20-2020

| ISSUE FOR PRICING / BIDDING: JULY 30, 2018 |
|---|
| ISSUE FOR PERMIT APPLICATION: SEPTEMBER 14, 2018 |
| ISSUE FOR PERMIT / CONSTRUCTION: FEBRUARY 15, 2019 |

REVISION SCHEDULE

| NO: | DATE: | DESCRIPTION: |
|---|---|---|
| 3 | DEC 17, 2019 | ASI 001 |

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10 COMMERCE DRIVE
New Rochelle, NY
BRP Companies

REGISTERED ARCHITECT MICHAEL D. CONTI 026654 STATE OF NEW YORK
9/21/2020

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SHEET CONTENTS
EXTERIOR ELEVATIONS

SHEET NUMBER
A4.52

SCALE As indicated

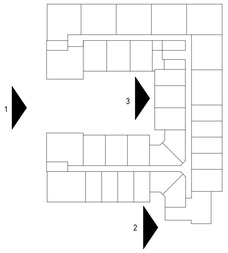
17290

BLDG DEPT REVISION (09-20-2020)

| KEYNOTES | |
|---|---|
| KEYNOTE | DESCRIPTION |

| | |
|---|---|
| AD | ALUMINUM SLIDER DOOR SYSTEM |
| ASW | ALUMINUM STOREFRONT WINDOW |
| CMU | CMU WALL TO BE PAINTED - |
| CON | CONCRETE WALL TO BE PAINTED - |
| DS | DOWNSPOUT |
| GB | GLASS BALCONY W/ALUMINUM FRAME |
| GT | GUTTER |
| MC | PRE-FINISHED METAL COPING |
| MG | METAL PANEL SYSTEM (DARK GRAY) |
| MGC | METAL PANEL SYSTEM (DARK GRAY) OVER CMU |
| ML | METAL LOUVER; BY OTHERS |
| MW | METAL PANEL SYSTEM (WOOD FINISH) |
| RM | RAILING MESH METAL |
| SC | STONE METAL CAP. RE: STONE PROFILES ON SHEETS A7.10 |
| SW | STUCCO FINISH WHITE |
| VW | VINYL WINDOW |

## KEY PLAN

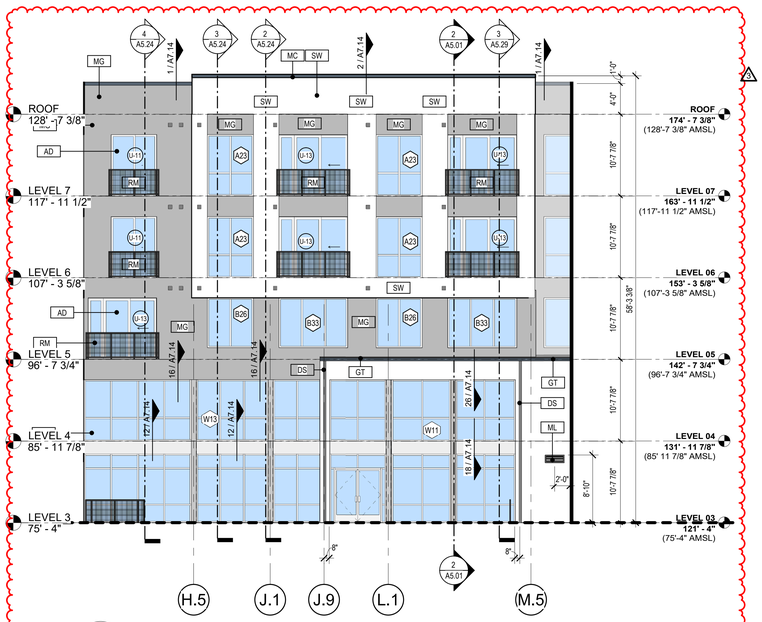



## SYMBOL LEGEND - ELEVATIONS

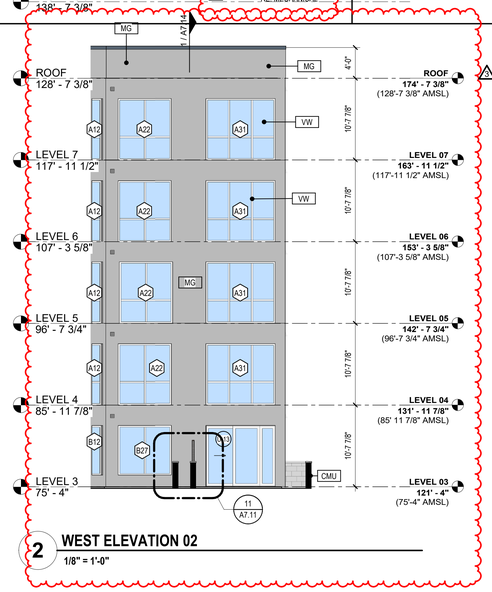
- COLUMN GRID OR REFERENCE BUBBLE
- REFERENCE PLAN OR DETAIL CALLOUT / SHEET FOR ADDITIONAL INFORMATION
- WINDOW TAG. SEE SCHEDULE STARTING ON SHEET A2.20
- DOOR TAG UNITS. SEE SCHEDULE STARTING ON SHEET A2.10
- DOOR TAG. SEE SCHEDULE STARTING ON SHEET A2.10
- BUILDING SECTION.
- WALL SECTION.
- LEVEL / ELEVATION TAG
- TOP OF DECK
- TOP OF PLATE
- TOP OF SLAB
- FINISH FLOOR
- ELEVATION KEYNOTE: REF. KEYNOTE LEGEND
- BRICK - GRAPHICAL REPRESENTATION ONLY
- METAL PANEL SYSTEM - WOOD FINISH
- METAL PANEL SYSTEM - DARK GRAY
- STUCCO FINISH
- CMU WALL
- UNIT EXHAUST VENT RE: MECHANICAL

## GENERAL ELEVATION NOTES

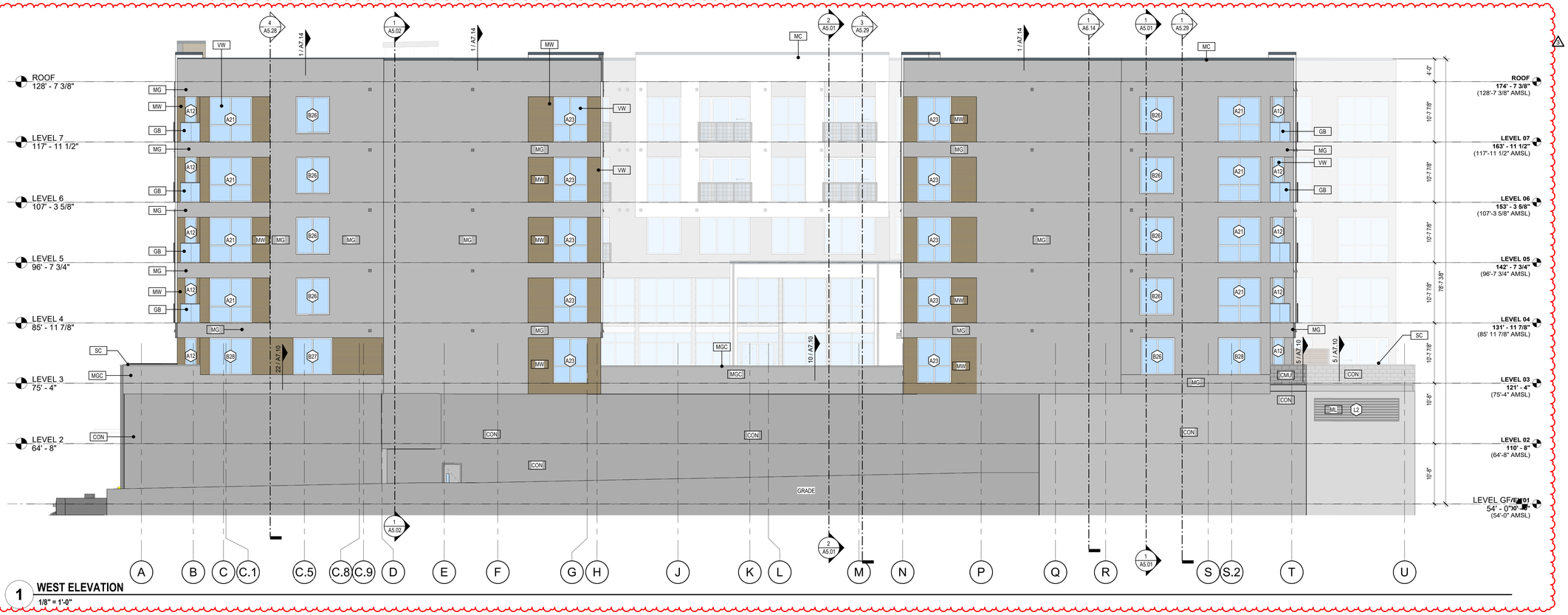
1. PROVIDE 1/2" MINIMUM OF SLOPE AWAY FROM WALL ON TOP SURFACE OF WALL PROJECTIONS.
2. MOUNT ALL EXTERIOR WALL LIGHT FIXTURES MINIMUM 6'-8" A.F.F. TO BOTTOM OF FIXTURE, WHERE THEY PROJECT MORE THAN 4" FROM FACE OF WALL.
3. REFER TO CIVIL AND STRUCTURAL DRAWINGS FOR F.F.E. AND SLAB BREAKS
4. FLASHING, WATERPROOF MEMBRANES, PROPER CAULKS AND SEALANTS (BACKER RODS AS REQUIRED) SHALL BE INSTALLED AROUND ALL WINDOWS, DOORS, ROOF OPENINGS, HORIZONTAL AND VERTICAL JOINTS OF DISSIMILAR MATERIALS, MATERIAL TRANSITIONS, TRIMS AND OTHER WEATHER EXPOSED AREAS.
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12. ALIGN ALL MECHANICAL VENTS BOTH HORIZONTALLY AND VERTICALLY.
13. PER 2015 IBC SECTION 1406.2.2(2) COMBUSTIBLE ARCHITECTURAL TRIM SHALL BE LIMITED TO 40'-0" IN HEIGHT ABOVE GRADE; ARCHITECTURAL TRIM ABOVE 40'-0" IN HEIGHT ABOVE GRADE SHALL BE OF APPROVED, NON-COMBUSTIBLE MATERIALS AND SHALL BE SECURED TO THE WALL WITH METAL OR OTHER APPROVED, NON-COMBUSTIBLE BRACKETS.




**3 WEST ELEVATION - COURTYARD**
1/8" = 1'-0"




**2 WEST ELEVATION 02**
1/8" = 1'-0"




**1 WEST ELEVATION**
1/8" = 1'-0"

DESIGNED BY: SB
DRAWN BY: SO/SB
AOR:
PLOT DATE 09-20-2020

| ISSUE FOR PRICING / BIDDING: JULY 30, 2018 |
|---|
| ISSUE FOR PERMIT APPLICATION: SEPTEMBER 14, 2018 |
| ISSUE FOR PERMIT / CONSTRUCTION: FEBRUARY 15, 2019 |

REVISION SCHEDULE

| NO: | DATE: | DESCRIPTION: |
|---|---|---|
| 3 | DEC 17, 2019 | ASI 001 |

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10 COMMERCE DRIVE
New Rochelle, NY
BRP Companies

REGISTERED ARCHITECT MICHAEL D. CONTE 026054 STATE OF NEW YORK
9/21/2020

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BLDG DEPT REVISION (09-20-2020)

SHEET CONTENTS
EXTERIOR ELEVATIONS

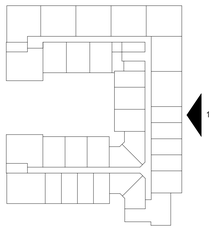
SHEET NUMBER
A4.53

SCALE As indicated
17290

| KEYNOTES | |
|---|---|
| KEYNOTE | DESCRIPTION |

| | |
|---|---|
| ASW | ALUMINUM STOREFRONT WINDOW |
| BC | MASONRY BRICK COLOR WHITE OVER CMU |
| BM | MASONRY BRICK COLOR WHITE OVER METAL STUDS WALL |
| BW | MASONRY BRICK COLOR DARK GRAY OVER CMU |
| CON | CONCRETE WALL TO BE PAINTED - |
| GB | GLASS BALCONY W/ALUMINUM FRAME |
| MC | PRE-FINISHED METAL COPING |
| MG | METAL PANEL SYSTEM (DARK GRAY) |
| MH | METAL HANDRAIL/GUARDRAIL |
| MW | METAL PANEL SYSTEM (WOOD FINISH) |
| RM | RAILING MESH METAL |
| SC | STONE METAL CAP. RE: STONE PROFILES ON SHEETS A7.10 |
| SW | STUCCO FINISH WHITE |
| VW | VINYL WINDOW |

## KEY PLAN




## SYMBOL LEGEND - ELEVATIONS

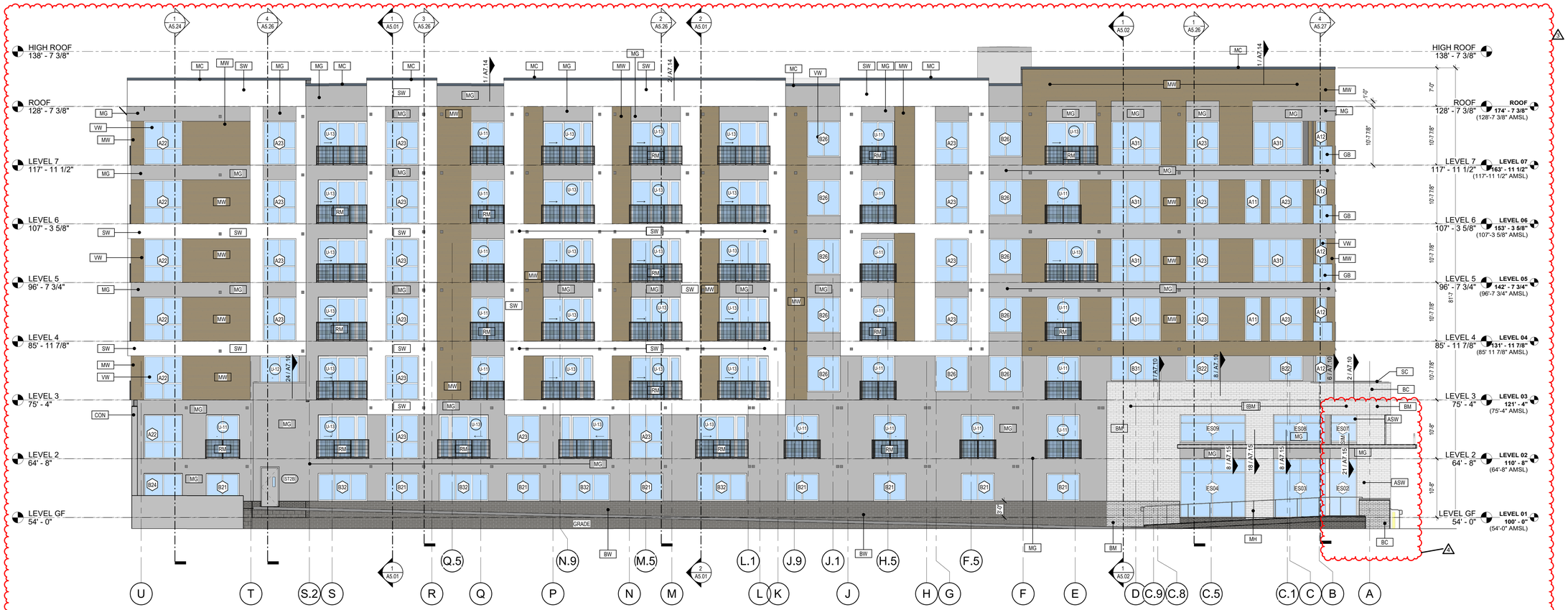
- 0 — COLUMN GRID OR REFERENCE BUBBLE
- 1 / AX.XX (SIM) — REFERENCE PLAN OR DETAIL CALLOUT / SHEET FOR ADDITIONAL INFORMATION
- 1t — WINDOW TAG. SEE SCHEDULE STARTING ON SHEET A2.20
- (U-11) — DOOR TAG UNITS. SEE SCHEDULE STARTING ON SHEET A2.10
- 101 — DOOR TAG. SEE SCHEDULE STARTING ON SHEET A2.10
- 1 / AX.XX (SIM) — BUILDING SECTION.
- 1 / AX.XX (SIM) — WALL SECTION.

| Name Elevation | LEVEL / ELEVATION TAG |
|---|---|
| T.O.D. | TOP OF DECK |
| T.O.P. | TOP OF PLATE |
| T.O.S. | TOP OF SLAB |
| F.F. | FINISH FLOOR |

- ? — ELEVATION KEYNOTE: REF. KEYNOTE LEGEND
- BRICK - GRAPHICAL REPRESENTATION ONLY
- METAL PANEL SYSTEM - WOOD FINISH
- METAL PANEL SYSTEM - DARK GRAY
- STUCCO FINISH
- CMU WALL
- UNIT EXHAUST VENT RE: MECHANICAL

## GENERAL ELEVATION NOTES

1. PROVIDE 1/2" MINIMUM OF SLOPE AWAY FROM WALL ON TOP SURFACE OF WALL PROJECTIONS.
2. MOUNT ALL EXTERIOR WALL LIGHT FIXTURES MINIMUM 6'-8" A.F.F. TO BOTTOM OF FIXTURE, WHERE THEY PROJECT MORE THAN 4" FROM FACE OF WALL.
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11. ALL EXTERIOR COLORS, FINISHES, AND DECORATIVE TRIM BANDS TO TERMINATE AT AN INSIDE CORNER. U.N.O.
12. ALIGN ALL MECHANICAL VENTS BOTH HORIZONTALLY AND VERTICALLY.
13. PER 2015 IBC SECTION 1406.2.2(2), COMBUSTIBLE ARCHITECTURAL TRIM SHALL BE LIMITED TO 40'-0" IN HEIGHT ABOVE GRADE. ARCHITECTURAL TRIM ABOVE 40'-0" IN HEIGHT ABOVE GRADE SHALL BE OF APPROVED, NON-COMBUSTIBLE MATERIALS AND SHALL BE SECURED TO THE WALL WITH METAL OR OTHER APPROVED, NON-COMBUSTIBLE BRACKETS.




**1 EAST ELEVATION**
1/8" = 1'-0"


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DESIGNED BY: SB
DRAWN BY: SO/SB
AOR:
PLOT DATE 09-20-2020

| ISSUE FOR PRICING / BIDDING: JULY 30, 2018 |
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| ISSUE FOR PERMIT APPLICATION: SEPTEMBER 14, 2018 |
| ISSUE FOR PERMIT / CONSTRUCTION: FEBRUARY 15, 2019 |

REVISION SCHEDULE

| NO: | DATE: | DESCRIPTION: |
|---|---|---|
| 3 | DEC 17, 2019 | ASI 001 |
| 4 | APR 24, 2020 | REVISION 01 |

9/21/2020


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DALLAS * NEWPORT BEACH * NEW ORLEANS * ORLANDO * CHENNAI * MONTEVIDEO
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SHEET CONTENTS
EXTERIOR ELEVATIONS

SHEET NUMBER
A4.54

SCALE As indicated

17290

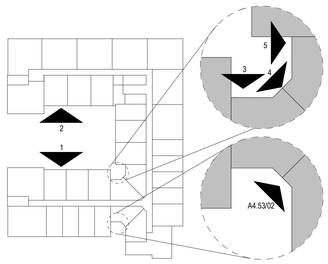
10 COMMERCE DRIVE
New Rochelle, NY
BRP Companies

BLDG DEPT REVISION (09-20-2020)

| KEYNOTES | |
|---|---|
| KEYNOTE | DESCRIPTION |

| | |
|---|---|
| AD | ALUMINUM SLIDER DOOR SYSTEM |
| MC | PRE-FINISHED METAL COPING |
| MG | METAL PANEL SYSTEM (DARK GRAY) |
| MW | METAL PANEL SYSTEM (WOOD FINISH) |
| RM | RAILING MESH METAL |
| SW | STUCCO FINISH WHITE |
| VW | VINYL WINDOW |

## KEY PLAN



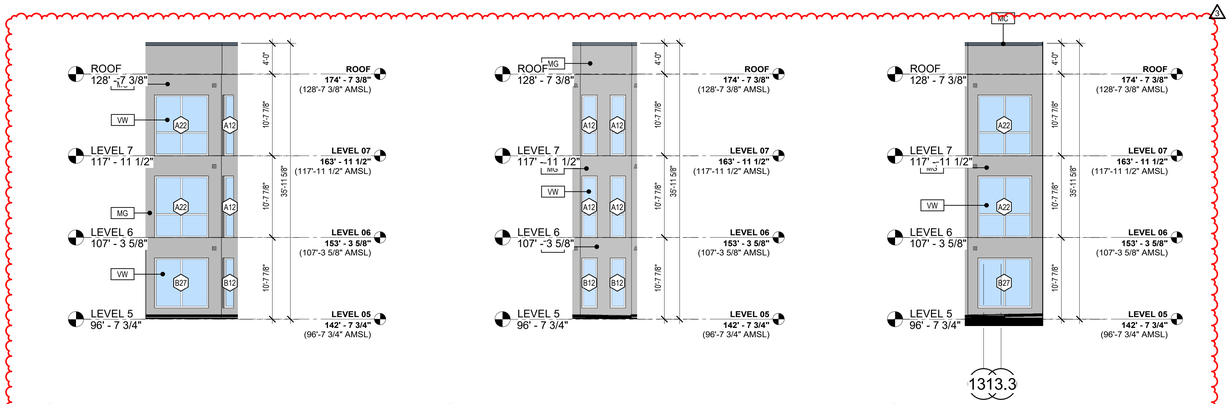

## SYMBOL LEGEND - ELEVATIONS

- COLUMN GRID OR REFERENCE BUBBLE
- REFERENCE PLAN OR DETAIL CALLOUT / SHEET FOR ADDITIONAL INFORMATION
- WINDOW TAG. SEE SCHEDULE STARTING ON SHEET A2.20
- DOOR TAG UNITS. SEE SCHEDULE STARTING ON SHEET A2.10
- DOOR TAG. SEE SCHEDULE STARTING ON SHEET A2.10
- BUILDING SECTION.
- WALL SECTION.

- Name / Elevation — LEVEL / ELEVATION TAG
- T.O.D. — TOP OF DECK
- T.O.P. — TOP OF PLATE
- T.O.S. — TOP OF SLAB
- F.F. — FINISH FLOOR
- ELEVATION KEYNOTE; REF. KEYNOTE LEGEND
- BRICK - GRAPHICAL REPRESENTATION ONLY
- METAL PANEL SYSTEM - WOOD FINISH
- METAL PANEL SYSTEM - DARK GRAY
- STUCCO FINISH
- CMU WALL
- UNIT EXHAUST VENT. RE: MECHANICAL

## GENERAL ELEVATION NOTES

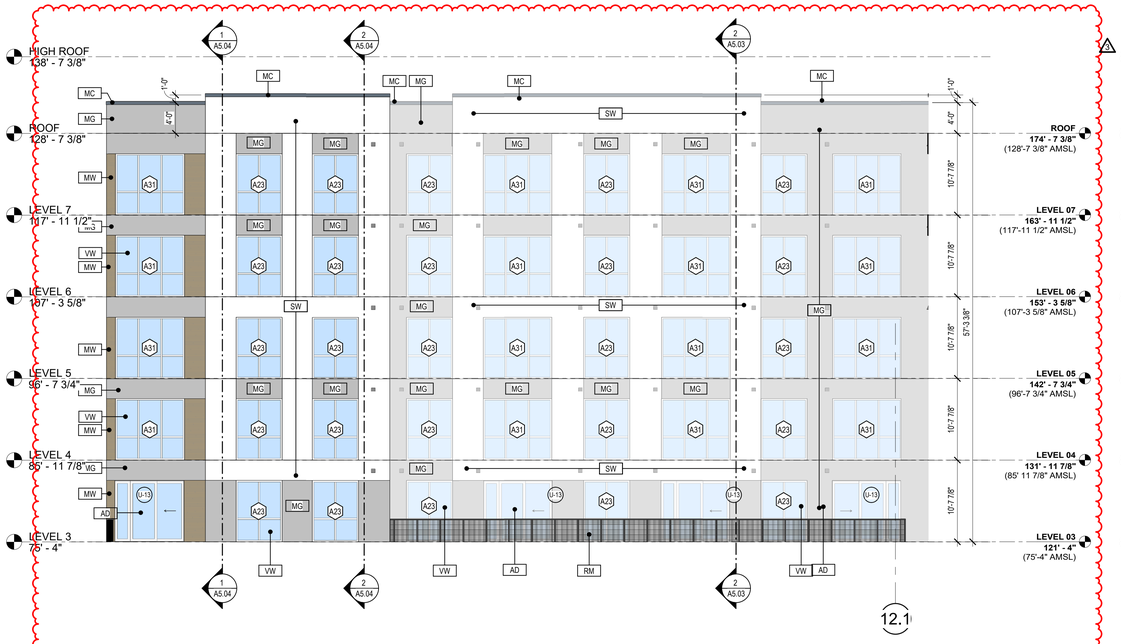
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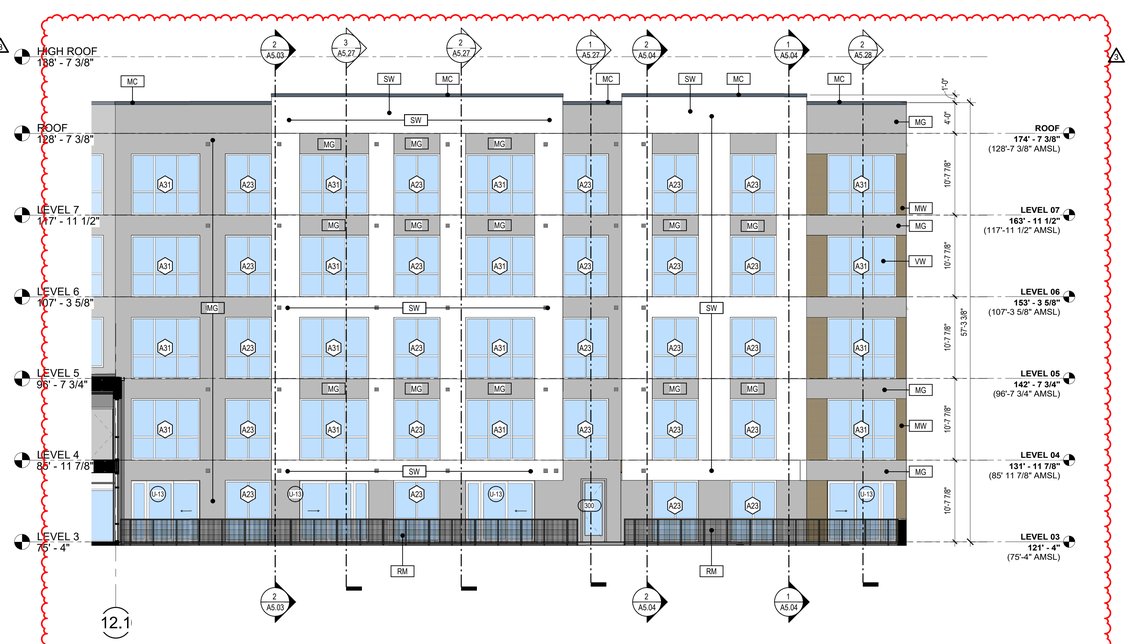

**5 WEST ELEVATION - COURTYARD CORNER** 1/8" = 1'-0"

**4 NORTH/WEST ELEVATION - COURTYARD CORNER** 1/8" = 1'-0"

**3 NORTH ELEVATION - COURTYARD CORNER** 1/8" = 1'-0"




**2 SOUTH ELEVATION - COURTYARD** 1/8" = 1'-0"




**1 NORTH ELEVATION - COURTYARD** 1/8" = 1'-0"

DESIGNED BY: SB
DRAWN BY: SO/SB
AOR:
PLOT DATE 09-20-2020

| ISSUE FOR PRICING / BIDDING: JULY 30, 2018 |
|---|
| ISSUE FOR PERMIT APPLICATION: SEPTEMBER 14, 2018 |
| ISSUE FOR PERMIT / CONSTRUCTION: FEBRUARY 15, 2019 |

REVISION SCHEDULE

| NO: | DATE: | DESCRIPTION: |
|---|---|---|
| 3 | DEC 17, 2019 | ASI 001 |

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10 COMMERCE DRIVE
New Rochelle, NY
BRP Companies

REGISTERED ARCHITECT MICHAEL D. GONZALEZ 026054 STATE OF NEW YORK
9/21/2020

HUMPHREYS URBAN ARCHITECTURE/NEW YORK, PLLC
5339 ALPHA ROAD * SUITE 300* DALLAS, TX 75240
T: (972) 701-9636 F: (972) 701-9639
DALLAS * NEWPORT BEACH * NEW ORLEANS *
ORLANDO * CHENNAI * MONTEVIDEO
www.humphreys.com

SHEET CONTENTS
EXTERIOR ELEVATIONS

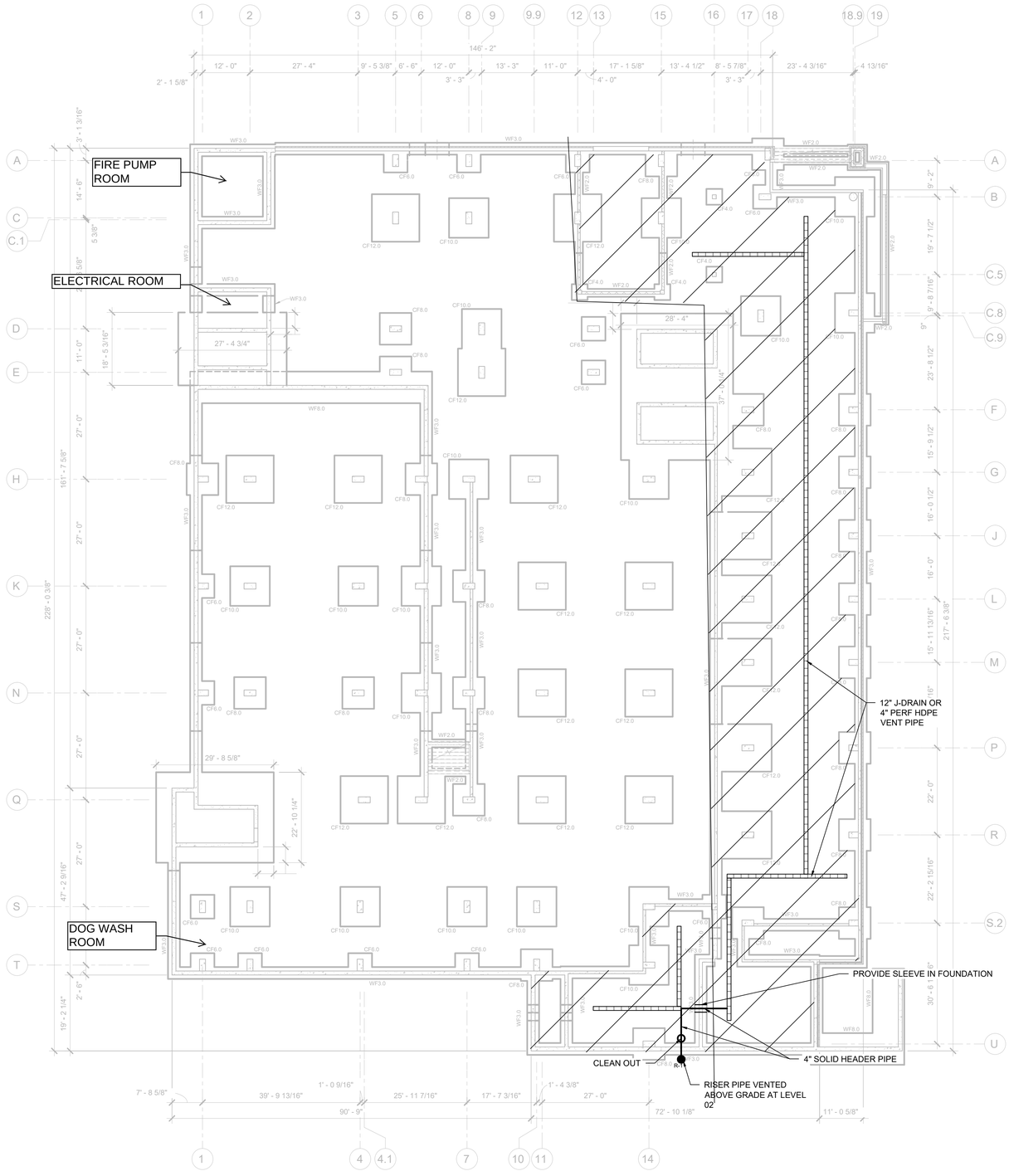
SHEET NUMBER
A4.55

SCALE As indicated

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BLDG DEPT REVISION (09-20-2020)






LEGEND:

- 4" SOLID HEADER PIPE
- RISER PIPE
- 12" 'J' DRAIN GEOVENT OR 4" PERF HDPE VENT PIPE
- LIMITS OF INSTALLED VAPOR BARRIER
- CLEAN OUT
- VP - VAPOR PIN

1. THE FOUNDATION PLANS INCLUDED IN THIS DRAWING ARE ILLUSTRATIVE AND MAY CHANGE AS WE PROCEED IN DESIGN. THIS MAY REQUIRE VAPOR PIPES TO SHIFT OR FOR ADDITIONAL SLEEVES TO BE USED BASED ON THE FINAL DESIGN.
2. 6" SLEEVES SHALL BE PROVIDED AT ALL 4" CPVC PIPE CROSSINGS AT FOUNDATION WALLS UNLESS OTHERWISE NOTED. ALL SLEEVES SHALL BE AT THE SAME ELEVATION.
3. ALL J-DRAIN SHALL BE RUN THROUGH BLOCK FOUNDATION THROUGH FRAMED 3"x13" OPENINGS ADEQUATE TO ALSO PASS THE 2" CONDUIT WHERE NECESSARY.
4. PROVIDE NON-SHRINK GROUT TO SEAT EXTERIOR SLEEVES.

NYS Education Law
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Scale 1"=15'

0 8 15 30 45 60

| rev | date | description | by |
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| | | | |

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chk by: FL
scale: AS NOTED
date: 01/12/2021

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FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

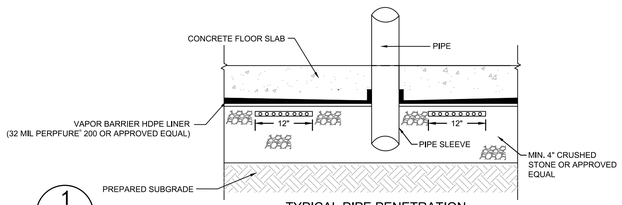
10 COMMERCE STREET
NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

title: VAPOR MITIGATION PLAN

job no. 10790
drawing no. V-1

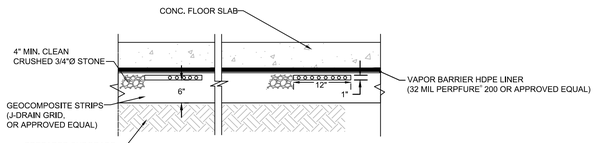


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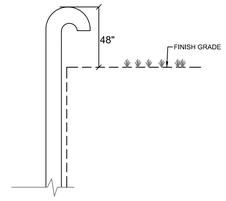

1 D-1

TYPICAL PIPE PENETRATION
NTS



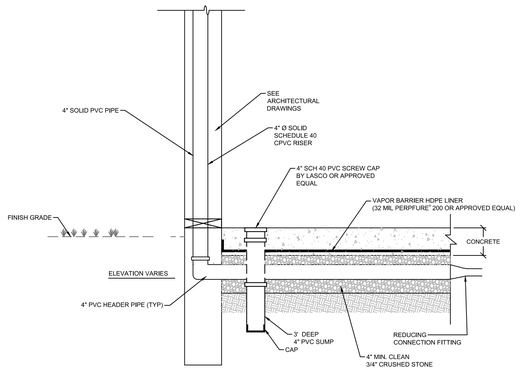

2 D-1

GAS VAPOR BARRIER
TYPICAL SLAB ON-GRADE DETAIL
NTS



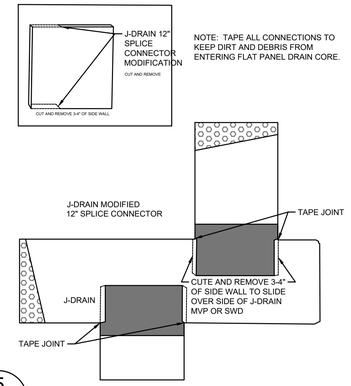

3 D-1

VENT RISER TERMINATION ON
SECOND FLOOR GRADE (R1)
NTS



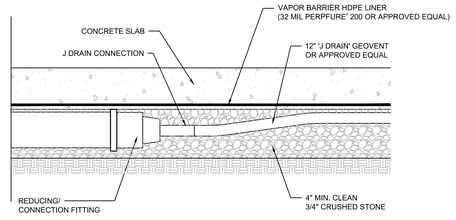

4 D-1

SECTION B-B - TYPICAL SECTION: SUBSLAB RISERS
SCALE: N.T.S.



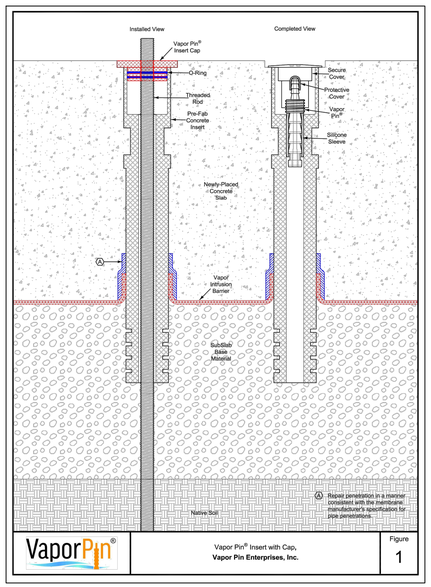

5 D-1

3 AND 4 WAY J DRAIN
CONNECTION
SCALE: N.T.S.




6 D-1

ENLARGED SOLID PIPE AND J DRAIN CONNECTION
SCALE: N.T.S.




7 D-1

**GENERAL NOTES**

1. THE PLANNED SUB-SLAB VAPOR INTRUSION (VI) MITIGATION SYSTEM WILL BE PLACED BENEATH THE CONCRETE SLAB IN THE ENCLOSED AREAS. THE VI MITIGATION SYSTEM INCLUDES THE FOLLOWING ELEMENTS:
   - VAPOR BARRIER - A CONTINUOUS 20-MIL HDPE LINER (OR APPROVED EQUAL) SHALL BE PLACED AND SEALED AROUND ALL PENETRATIONS (E.G. UTILITIES, RISER PIPERS, ETC.).
   - GRAVEL VENTING LAYER - A MINIMUM, 4-INCH THICK, CRUSHED STONE VENTING LAYER WILL BE PLACED BELOW THE SLAB AND LINER.
   - SUB-SLAB COLLECTION PIPING - A NETWORK OF VENTING PIPES (J-DRAIN OR HDPE PIPE) WILL BE PLACED WITHIN THE GRAVEL VENTING LAYER. THE VENTING PIPES WILL BE MANIFOLDED AS SHOWN IN THE DRAWING.
   - RISER - CONVEYANCE RISER PIPES WILL BE INSTALLED FROM THE SUB-SLAB HEADER PIPE TO THE OUTSIDE OF THE BUILDING
2. THE VAPOR BARRIER SHALL BE INSTALLED BY A CERTFIED CONTRACTOR AND BE INSTALLED UNDER THE OVERSIGHT OF SESI CONSULTING ENGINEERS. THE CONTRACTOR AND SESI SHALL INSPECT ALL SEAMS, JOINTS, AND PENETRATIONS IN THE VAPOR BARRIER AND DOCUMENT IN AN INSPECTION REPORT. THE CONTRACTOR SHALL REPAIR OR REPLACE ALL DEFECTIVE SEAMS, JOINTS, AND PENETRATIONS PRIOR TO COVERING VAPOR BARRIER.
3. ALL CONDUITS AND/OR PIPE PENETRATIONS INTO THE SLAB SHOULD BE GAS TIGHT - REFER TO PIPE OR CONDUIT PENETRATION DETAIL ON THIS DRAWING
4. OPERATION OF THE VI MITIGATION SYSTEM IS DESIGNED TO BE PASSIVE. THERE ARE NO MOVING OR MECHANICAL PARTS. ALL VENT RISERS SHALL BE FREE OF OBSTRUCTIONS AND VENT VALVES SHALL BE SET IN A FULLY OPEN POSITION.
5. ALL SUB-SLAB COLLECTION LATERALS AND VERTICAL VENT RISERS SHALL BE FREE OF OBSTRUCTIONS, NOT INUNDATED WITH WATER, AND ABLE TO VENT AIR FREELY FROM BELOW THE BUILDING SLAB TO THE ATMOSPHERE.
6. THE CONTRACTOR SHALL COORDINATE INSTALLATION OF VI MITIGATION SYSTEM WITH OTHER TRADES.
7. ARCHITECTURAL AND ENGINEERING CONSTRUCTION DOCUMENTS SHALL BE COORDINATED WITH THESE DRAWINGS. THE GENERAL CONTRACTOR SHALL NOT DEVIATE FROM THESE DOCUMENTS WITHOUT APPROVAL FROM THE RESPECTIVE DESIGN PROFESSIONALS.

**TESTING AND INSPECTION**

1. THE VAPOR BARRIER SHALL BE SMOKE TESTED FOR QUALITY ASSURANCE. SMOKE TESTING SHALL BE CONDUCTED BY SESI OR AN APPROVED VAPOR BARRIER APPLICATOR. THE SMOKE TESTING PROCUDRE IS AS FOLLOWS:
2. THE VAPOR BARRIER SHALL BE VISUALLY INSPECTED. ANY APPARENT DEFICIENCIES AND/OR INSTALLATION PROBLEMS SHALL BE CORRECTED PRIOR TO SMOKE TESTING.
3. THE DATE, TIME, TESTING REFERENCE AREA, TEMPERATURE, WIND SPEED/DIRECTION, AND CLOUD COVER SHALL BE RECORDED ON THE SMOKE TESTING RECORD. THE AMBIENT AIR TEMPERATURE AT THE TIME OF TESTING SHOULD BE IN EXCESS OF 45° F AND THE WIND SPEED AT GROUND LEVEL SHOULD BE 15 MPH OR LESS. (NOTE: VISUAL IDENTIFICATION OF LEAKS BECOMES MORE DIFFICULT WITH INCREASING WIND SPEED.)
4. DELINEATE A SMOKE TESTING AREA. ASSEMBLE AND SITUATE SMOKE TESTING SYSTEM TO INJECT SMOKE BENEATH VAPOR BARRIER. ONLY INERT, NON-TOXIC SMOKE IS TO BE UTILIZED FOR VAPOR BARRIER SMOKE TEST.
5. DESIGNATE TESTING CONTROL AREAS BY CUTTING OPENINGS IN AN "X" PATTERN (MINIMUM 4" X 4") IN THE VAPOR BARRIER AT SELECTED LOCATIONS. MARK TESTING CONTROL AREAS FOR IDENTIFICATION PRIOR TO CONDUCTING THE SMOKE TEST.
6. ACTIVATE SMOKE GENERATOR/BLOWER SYSTEM (NOMINAL 150-950 CFM). APPLY SUFFICIENT PRESSURE AS TO ENSURE THAT SMOKE WILL PERMEATE THE DESIGNATED TESTING AREA. FOR VERIFICATION, ENSURE THAT SMOKE IS LEAKING THROUGH TESTING CONTROL AREAS.
7. PUMP SMOKE BENEATH THE VAPOR BARRIER FOR A MINIMUM PERIOD OF 1-2 MINUTES. OBSERVE FOR LEAKS IN THE VAPOR BARRIER. REDUCE PRESSURE/FLOW RATE IF EXCESSIVE LIFTING OF THE VAPOR BARRIER OCCURS.
8. THOROUGHLY INSPECT ENTIRE VAPOR BARRIER SURFACE WITHIN AREA DELINEATED FOR TESTING. USE MARKING DEVICE TO MARK/LABEL ANY LEAK LOCATIONS. MARK/LABEL LEAK LOCATIONS ON FLOOR PLAN AND CORRESPONDING TESTING REFERENCE AREA.
9. REPAIR LEAK LOCATIONS MARKED IN STEP G BY CUTTING PATCHES OF VAPOR BARRIER, OVERLAPPING DAMAGED AREA BY 6 INCHES MINIMUM, AND TAPING ALL FOUR SIDES.

REPEAT STEPS F AND G, AS NECESSARY TO CONFIRM INTEGRITY OF THE VAPOR BARRIER.

NYS Education Law
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scale: AS NOTED
date: 01/12/2021

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FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

10 COMMERCE STREET
NEW ROCHELLE, WESTCHESTER COUNTY, N.Y.

title:
VAPOR INTRUSION DETAILS

job no. 10790
drawing no.

D-1

# Appendix B:
## Citizens Participation Plan

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

# Brownfield Cleanup Program

## Citizen Participation Plan
**for**
## 10 Commerce Drive Rail Yard

February 2020

C360192
10 Commerce Drive
New Rochelle, NY
Westchester County, New York

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* * * * *

**Note:** The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **BRP 10 Commerce LLC**
Site Name: **10 Commerce Drive Rail Yard**
Site Address: **10 Commerce Drive, New Rochelle, NY**
Site County: **Westchester**
Site Number: **C360192**

## 1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:
http://www.dec.ny.gov/chemical/8450.html .

## 2. Citizen Participation Activities

*Why NYSDEC Involves the Public and Why It Is Important*

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

*Project Contacts*

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

*Locations of Reports and Information*

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

*Site Contact List*

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- residents, owners, and occupants of the site and properties adjacent to the site;
- the public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

**Note:** The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html .

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

*CP Activities*

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The

flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

*Technical Assistance Grant*

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, the significant threat determination for the site had not yet been made.

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at
http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

| Citizen Participation Activities | Timing of CP Activity(ies) |
|---|---|
| **Application Process:** | |
| • Prepare site contact list<br>• Establish document repository(ies) | At time of preparation of application to participate in the BCP. |
| • Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period<br>• Publish above ENB content in local newspaper<br>• Mail above ENB content to site contact list<br>• Conduct 30-day public comment period | When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time. |
| **After Execution of Brownfield Site Cleanup Agreement (BCA):** | |
| • Prepare Citizen Participation (CP) Plan | Before start of Remedial Investigation<br>**Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA. |
| **Before NYSDEC Approves Remedial Investigation (RI) Work Plan:** | |
| • Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan<br>• Conduct 30-day public comment period | Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet. |
| **After Applicant Completes Remedial Investigation:** | |
| • Distribute fact sheet to site contact list that describes RI results | Before NYSDEC approves RI Report |
| **Before NYSDEC Approves Remedial Work Plan (RWP):** | |
| • Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period<br>• Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager)<br>• Conduct 45-day public comment period | Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period. |
| **Before Applicant Starts Cleanup Action:** | |
| • Distribute fact sheet to site contact list that describes upcoming cleanup action | Before the start of cleanup action. |
| **After Applicant Completes Cleanup Action:** | |
| • Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report<br>• Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC) | At the time the cleanup action has been completed.<br>**Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC. |

## 3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

There will be areas on the Site where soil excavation is necessary. Old creosote railroad ties may be encountered, which may have an odor. Therefore, once the remediation commences, there may be concerns regarding odors, dust noise or truck traffic coming from the Site. However, these impacts will be mitigated through implementation of an Odor Control Plan, Health and Safety Plan and Soil Management Plan approved by the Department, which will be designed to minimize these impacts. A Community Air Monitoring Plan will also be implemented to monitor dust and vapors to ensure the community is not impacted. If odors are encountered, odor mitigation measures will be implemented to eliminate the odors.

## 4. Site Information

Appendix C contains a map identifying the location of the site.

*Site Description*

- **location –** 10 Commerce Drive, New Rochelle, NY Westchester County
- **setting -** urban, suburban or rural
- **site size -** 0.99959 acres
- **adjacent properties** – predominately commercial and urban

*History of Site Use, Investigation, and Cleanup*

The site housed a former railroad freight yard, complete with sidings and freight houses as well as coal piles. The Westchester Coal & Oil Company also occupied the southeastern portion of the Site and off-Site property as observed on historical Sanborn maps dated 1931 and 1951. Based on a review of Sanborn Maps, it appears the railyard structures and buildings were demolished in the mid-1960's and the Site was vacant until the current building on the Site was constructed in or about 1981-1982. From at least 1992 to 2003, an electronics manufacturer and generator of hazardous waste, known as MF Electronics Corporation, was present at the Site. This manufacturer is described as both a circuit board manufacturer and manufacturer of quartz chips used in electronic timing devices.

Based on the investigations conducted to date, the primary contaminants of concern are semi-volatile organic compounds (SVOCs) known as polyaromatic hydrocarbons

(PAHs) and metals in soil and groundwater, which are likely the result of creosote coated railroad ties that have been buried at this former rail yard site and volatile organic compounds (VOCs) in soil vapor that are also likely the result of former railroad operations and petroleum. The initial Limited Phase II investigation performed in 2017 included a geophysical survey, 4 soil borings, 2 temporary groundwater wells and 2 subsurface soil vapor samples 6 feet below ground surface. The more extensive recent April 2019 investigation conducted included 25 soil samples, 3 soil vapor samples and one sample of railroad tie wood timbers found buried at the Site. Buried railroad ties were identified throughout the site, and soil staining and petroleum/creosote odors were also noted at various locations. Additional evidence of railroad operations debris was observed in a number of soil borings where drilling hit refusal from apparent railroad tie debris, and petroleum/creosote odors were noted. As a result, a large part of the remediation work will be removal of this former railroad source material from the site.

## 5. Investigation and Cleanup Process

*Application*

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a Volunteer that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the site will be used for unrestricted or restricted residential purposes depending on the level of remediation achieved.

To achieve this goal, the Applicant will conduct investigation activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

*Investigation*

The Applicant will conduct an investigation of the site officially called a "remedial investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

1) define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) identify the source(s) of the contamination;
3) assess the impact of the contamination on public health and the environment; and
4) provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant submitted a draft “Remedial Investigation Work Plan” to NYSDEC for review and approval with the application. NYSDEC made the draft plan available to the public review during a 30-day public comment period.

When the investigation report is approved and the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a “significant threat,” it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

*Interim Remedial Measures*

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

*Remedy Selection*

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a “Certificate of Completion” (described below) to the Applicant.

**or**

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a “Remedial Work Plan”. The Remedial Work Plan describes the Applicant’s proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

*Cleanup Action*

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

*Certificate of Completion*

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

*Site Management*

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the

remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

## Appendix A -
## Project Contacts and Locations of Reports and Information

### Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

**New York State Department of Environmental Conservation (NYSDEC):**

Parag Amin
Project Manager
NYSDEC
Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, NY 12233-7014
Parag.amin@dec.ny.gov

Stephanie L. Mossey
Public Participation Specialist, Region 3
New York State Department of
Environmental Conservation
21 South Putt Corners Road,
New Paltz, NY 12561
Stephanie.mossey@dec.ny.gov

**New York State Department of Health (NYSDOH):**

Shaun J Surani
Bureau of Environmental Exposure Investigation
New York State Department of Health
Empire State Plaza
Corning Tower, Room 1787
Albany, New York, 12237
shaun.surani@health.ny.gov

### Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

New Rochelle Public Library
1 Library Plaza
New Rochelle, NY 10801
Attn: Tom Geoffino, Director
Phone: (914) 632-7878

Hours: Monday, Thursday 10a-6p
Tues, Wed, Fri 10a-5p
Sat, Sun Closed

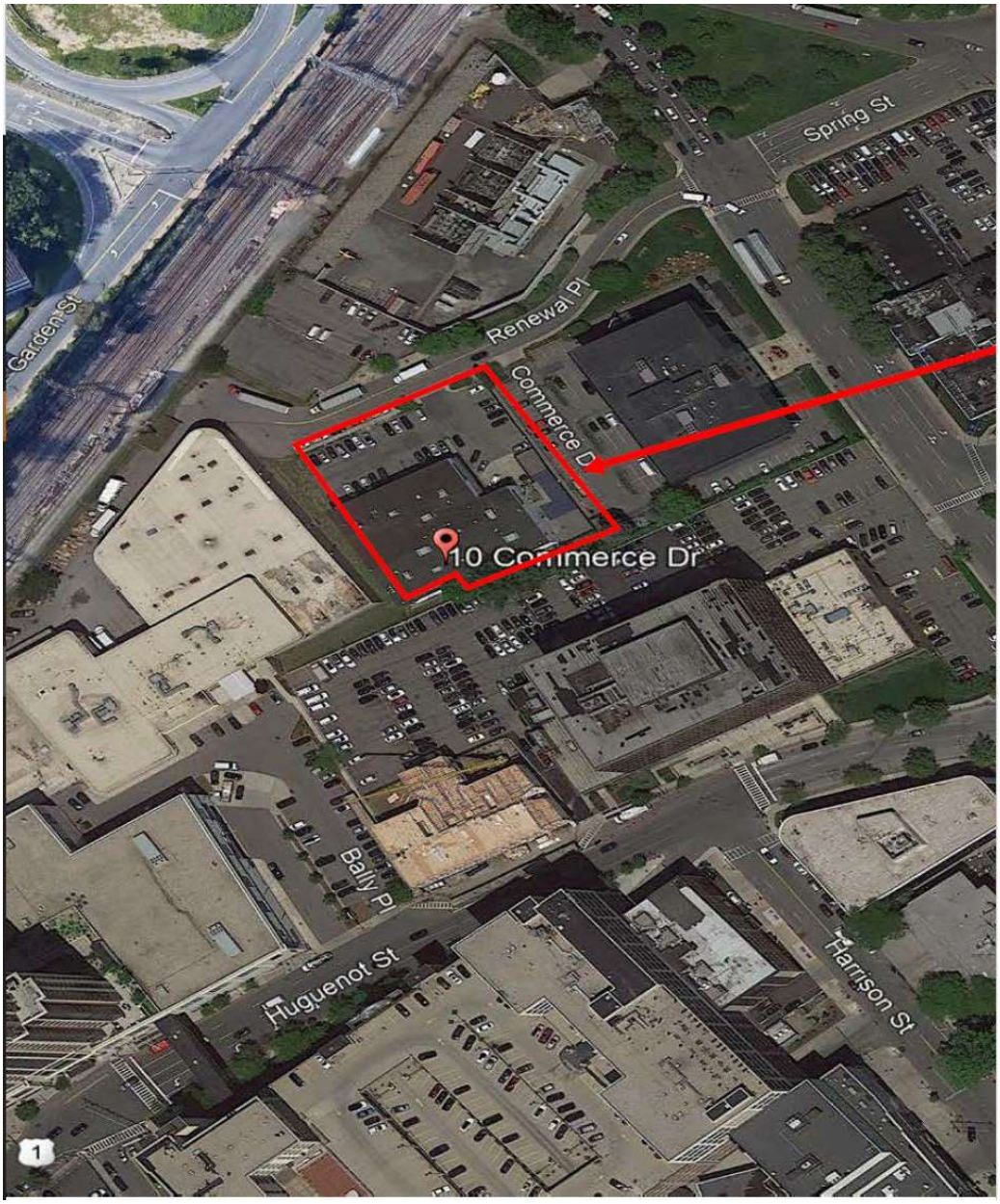
## Appendix B - Site Contact List

| | |
|---|---|
| Chuck E. Schumer<br>U.S. Senator<br>780 Third Avenue<br>New York, NY 10017 | Kirsten Gilliband<br>U.S. Senator<br>780 Third Avenue<br>New York, NY 10017 |
| Eileen O'Rourke<br>New Rochelle City Zoning Board of Appeals Chairperson<br>90 Beaufort Place/City Hall Annex, Rm B1<br>New Rochelle, NY 10801 | Nita Lowery<br>17th District U.S. House of Representatives<br>222 Mamaroneck Avenue<br>White Plains, NY 10605 |
| Andrea Stewart-Cousins<br>35th Senate District New York State Senator<br>28 Wells Avenue, Building #3<br>Yonkers, NY 10701 | Robert P. Astorino<br>Westchester County Executive<br>PO Box 100<br>Salem, NY 10590 |
| Edward Buroughs<br>Westchester County Commissioner of Planning<br>148 Martine Avenue<br>White Plains, NY 10601 | Sarah C. Dodds-Brown<br>New Rochelle Planning Board Chairperson<br>515 North Avenue<br>New Rochelle, NY 10801 |
| Noam Bramson<br>Mayor of the City of New Rochelle<br>515 North Avenue<br>New Rochelle, NY 10801 | |
| **Media** | |
| The Journal News<br>1133 Westchester Avenue, Suite N110<br>White Plains, NY 10604 | New Rochelle Daily Voice<br>Media Outlet<br>104 Main Street<br>Mount Kisco, NY 10549 |
| News 12 Westchester<br>Media Outlet<br>6 Executive Plaza<br>Yonkers, NY 10701 | |
| **Water Supplier** | |
| Katie Marino<br>Mount Kisco Water Bureau, Public Water Supplier<br>Village Hall (1st Floor), 104 Main Street | Westchester Joint Water Works<br>Westchester Public Water Supplier<br>1625 Mamaroneck Ave<br>Mamaroneck, NY 10543 |

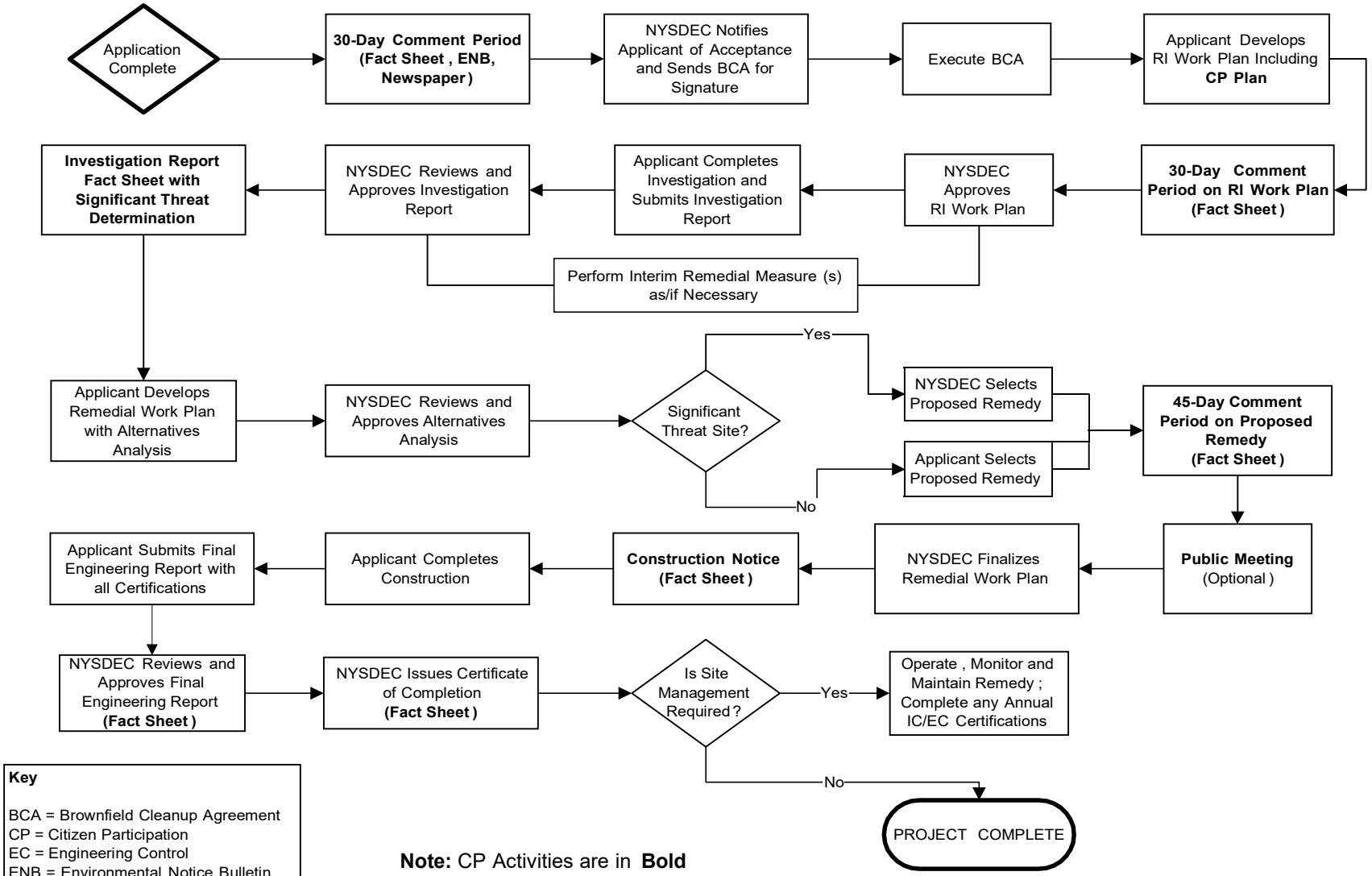
| | |
|---|---|
| Mount Kisco, NY 10549 | |
| **Schools, Daycare and Religious Organizations** | |
| Fr. John Serio, SDB<br>President of Salesian High School<br>148 East Main Street<br>New Rochelle, NY 10801 | Fr. Michael Challiner<br>Pastor of Holy Name of Jesus<br>70 Petersville Road<br>New Rochelle, NY 10801 |
| Jennifer DiCosimo<br>Executive Director of Hallen School<br>97 Centre Avenue<br>New Rochelle, NY 10801 | Rani Rangraj<br>Religious Leader of Trinity Cooperative Nursery<br>311 Huguenot Street<br>New Rochelle, NY 10801 |
| Camille Edwards Thomas<br>House Principal of Campus Alternative School<br>50 Washington Avenue<br>New Rochelle, NY 10801 | Michael Hilderbrand<br>Principal of Trinity Elementary School<br>180 Pelham Road<br>New Rochelle, NY 10801 |
| Anthony Bongo<br>Principal of Isaac E. Young Middle School<br>270 Centre Avenue<br>New Rochelle, NY 10801 | Gregory Middleton<br>Principal of Daniel Webster Elementary School<br>95 Glenmore Drive<br>New Rochelle, NY 10801 |
| Trenton R. Hamidan<br>Principal of Westchester Area School<br>456 Webster Avneue<br>New Rochelle, NY 10801 | Joanne Kelly<br>Principal of Holy Family School<br>100 Mount Joy Place<br>New Rochelle, NY 108010 |
| Michael Galland<br>Principal of Columbus Elementary School<br>275 Washington Avenue<br>New Rochelle, NY 10801 | Lynn Ann Zazzali<br>Owners of the Learning Experience<br>1 Bally Place<br>New Rochelle, NY 10801 |
| Amy Gelles<br>Chief Executive Officer of Creative Learning Center<br>256 Washington Street<br>New Rochelle, NY 10801 | Carmen M. Youngs<br>Chief Executive Officer of Little Rascals Daycare<br>18 Badeau Place<br>New Rochelle, NY 10801 |
| Jennifer E. Jones<br>Owner/Director of Growing Minds of NY Inc.<br>466 Main Street, Suite LL20<br>New Rochelle, NY 10801 | Deloris Hogan<br>Owner of Dee's Tots Childcare<br>166 Lincoln Avenue<br>New Rochelle, NY 10801 |
| Beth Byrnes<br>Director of Children's Care of Presbyterian Church | |

| | |
|---|---|
| 50 Pintard Avenue<br>New Rochelle, NY 10801 | |
| **Adjacent Property Owners** | |
| Somnia Holding LLC<br>Adjacent Property Owner of Commerce Drive<br>Commerce Drive<br>New Rochelle, NY 10801 | Cedar Place Associates LLC<br>Adjacent Property Owner of Commerce Drive<br>Commerce Drive<br>New Rochelle, NY 10801 |
| Con Edison Co of NY<br>Adjacent Property Owner of 2 Commerce Drive<br>2 Commerce Drive<br>New Rochelle, NY 10801 | Cedar Plaza Associates LLC<br>Adjacent Property Owner of 20 Cedar Street<br>20 Cedar Drive<br>New Rochelle, NY 10801 |
| Christine Feery, LMSW<br>Adjacent Property Operator of 20 Cedar Street<br>20 Cedar Drive<br>New Rochelle, NY 10801 | GHP 145 Huguenot Delaware<br>Adjacent Property Owner of 145 Huguenot Street<br>145 Huguenot Street<br>New Rochelle, NY 10801 |
| Monroe College<br>Adjacent Property Operator of 145 Huguenot Street<br>145 Huguenot Street<br>New Rochelle, NY 10801 | Steiner Sports<br>Adjacent Property Operator of 145 Huguenot Street<br>145 Huguenot Street<br>New Rochelle, NY 10801 |
| Westchester County Health Department<br>Adjacent Property Operator of 145 Huguenot Street<br>145 Huguenot Street<br>New Rochelle, NY 10801 | Silwis<br>Adjacent Property Owner of 171 Huguenot Street<br>171 Huguenot Street<br>New Rochelle, NY 10801 |

## Appendix C - Site Location Map



# Appendix D– Brownfield Cleanup Program Process




**Key**

BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation

**Note:** CP Activities are in **Bold**

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

**Division of Environmental Remediation**

# Remedial Programs
## Scoping Sheet for Major Issues of Public Concern (see instructions)

**Site Name:** 10 Commerce Drive Rail Yard

**Site Number:** C360192

**Site Address and County:** 10 Commerce Dr., New Rochelle, NY Westchester County

**Remedial Party(ies):** BRP 10 Commerce LLC

**Part 1.** List major issues of public concern and information the community wants. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and information needs.
Since there will be areas on the Site where soil excavation is necessary and old creosote railroad ties may be encountered, once the remediation commences, there may be concerns regarding odors, dust noise or truck traffic coming from the Site. However, these impacts will be mitigated through implementation of an Odor Control Plan, Health and Safety Plan and Soil Management Plan approved by the Department, which will be designed to minimize these impacts. A Community Air Monitoring Plan will also be implemented to monitor dust and vapors to ensure the community is not impacted. If odors are encountered, odor mitigation measures will be implemented to eliminate the odors. This list of major issues was developed based on the common impacts created by remediation projects and due to the presence of creosote railroad ties, which may cause odors and dust when excavated.

How were these issues and/or information needs identified?
See response above.

**Part 2.** List important information needed **from** the community, if applicable. Identify individuals, groups, organizations, businesses and/or units of government related to the information needed.
No information is needed from the community at this time.

How were these information needs identified?
See response above.

**Part 3.** List major issues and information that need to be communicated **to** the community. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and/or information.
The Fact Sheets can include the potential impacts and provide information about how they can report any off-site impacts if they occur.

How were these issues and/or information needs identified?
See response to Part 1 above.

**Part 4.** Identify the following characteristics of the affected/interested community. This knowledge will help to identify and understand issues and information important to the community, and ways to effectively develop and implement the site citizen participation plan (mark all that apply):

**a.** Land use/zoning at and around site:
☒ **Residential** ☐ **Agricultural** ☐ **Recreational** ☒ **Commercial** ☐ **Industrial**

**b.** Residential type around site:
☒ **Urban** ☐ **Suburban** ☐ **Rural**

**c.** Population density around site:
☒ **High** ☐ **Medium** ☐ **Low**

**d.** Water supply of nearby residences:
☒ **Public** ☐ **Private Wells** ☐ **Mixed**

**e.** Is part or all of the water supply of the affected/interested community currently impacted by the site?
☐ **Yes** ☒ **No**

Provide details if appropriate:
NA

**f.** Other environmental issues significantly impacted/impacting the affected community?
☒ **Yes** ☐ **No**

Provide details if appropriate:
There appears to be an area-wide chlorinated solvent plume in downtown New Rochelle. However, there are also a large number of brownfield projects that should collective help to reduce this area-wide plume.

**g.** Is the site and/or the affected/interested community wholly or partly in an Environmental Justice Area?
☒ **Yes** ☐ **No**

**h.** Special considerations:
☒ **Language** ☐ **Age** ☐ **Transportation** ☐ **Other**

Explain any marked categories in **h:**
Large Hispanic Population

**Part 5.** The site contact list must include, at a minimum, the individuals, groups, and organizations identified in Part 2. of the Citizen Participation Plan under 'Site Contact List'. Are *other* individuals, groups, organizations, and units of government affected by, or interested in, the site, or its remedial program? (Mark and identify all that apply, then adjust the site contact list as appropriate.)

☐ **Non-Adjacent Residents/Property Owners:** Click here to enter text.

☐ **Local Officials:** Click here to enter text.

☐ **Media:** Click here to enter text.

☐ **Business/Commercial Interests:** Click here to enter text.

☐ **Labor Group(s)/Employees:** Click here to enter text.

☐ **Indian Nation:** Click here to enter text.

☐ **Citizens/Community Group(s):** Click here to enter text.

☐ **Environmental Justice Group(s):** Click here to enter text.

☐ **Environmental Group(s):** Click here to enter text.

☐ **Civic Group(s):** Click here to enter text.

☐ **Recreational Group(s):** Click here to enter text.

☐ **Other(s):** Click here to enter text.

**Prepared/Updated By:** Linda R. Shaw, Esq. **Date:** 2/21/2020

**ReviewedApproved By:** **Date:** Click here to enter text.

# Appendix C:
## Health and Safety Plan

# SITE-SPECIFIC HEALTH AND SAFETY PLAN

## 10 Commerce Drive
## Parcel ID 1-238-0005

**Prepared For:**

**BRP 10 Commerce LLC**
**767 3rd Avenue, 33rd floor**
**New York, New York 10017**

**Prepared By:**

**SESI CONSULTING ENGINEERS**
**12A Maple Avenue**
**Pine Brook, NJ 07058**

**Project No.: 10790**

**August 2021**

***Disclaimer:*** *This Health and Safety Plan (HASP) is based upon information provided [and, if applicable, conditions discovered during a site visit], and is limited by the project scope. The HASP should be periodically reviewed and updated based on a number of factors, including but not limited to: (1) changes in applicable governmental requirements; (2) changes in procedures at the site; and (3) site conditions which were unknown to SESI Consulting Engineers (SESI) as of the time the HASP was prepared.* This HASP has been prepared for the sole and exclusive use of BRP 10 Commerce LLC, and may not be relied upon by any other person without the express written consent and authorization of SESI.

**SITE-SPECIFIC HEALTH AND SAFETY PLAN**

**For**

**10 Commerce Drive**
**Parcel ID 1-238-0005**
**New Rochelle, Westchester County, New York**

Prepared by:  Date: 08/03/21

Jesse Mausner
SESI- Project Manager

Approved by:  Date: 08/03/21

Fuad Dahan
SESI-Principal

**..... 0**

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## LIST OF ATTACHMENTS


| | |
|---|---|
| Attachment 1 | Air Monitoring Log |
| Attachment 2 | OSHA Poster |
| Attachment 3 | HASP Field Change Request Form |
| Attachment 4 | Accident/Incident Report |
| Attachment 5 | Signatory Page |
| Attachment 6 | Material Safety Data Sheets |

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| COC | Constituent(s) of Concern |
| CRZ | Contamination Reduction Zone |
| EZ | Exclusion Zone |
| FS | Field Supervisor |
| GFCI | Ground Fault Circuit Interrupter |
| HASP | Health and Safety Plan |
| HSM | Health and Safety Manager |
| LEL | Lower Explosive Limit |
| MSDS | Material Safety Data Sheet |
| OSHA | Occupational Safety and Health Administration |
| PCB | Polychlorinated Biphenyls |
| PEL | Permissible Exposure Limit |
| PID | Photoionization Detector |
| PM | Project Manager |
| PO | Project Officer |
| PPE | Personal Protective Equipment |
| SESI | SESI Consulting Engineers |
| SSO | Site Safety Officer |
| SVOC | Semi-Volatile Organic Compound |
| SZ | Support Zone |
| TLV | Threshold Limit Value |
| USCG | United States Coast Guard |
| USEPA | United States Environmental Protection Agency |
| VOC | Volatile Organic Compound |

## HEALTH AND SAFETY PLAN SUMMARY

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site Chemicals of Concern (COCs). COCs at the site include PAHs and metals in soil, tetrachloroethene (PCE), tetrachloroethene (TCE) in groundwater and VOCs in soil vapor. Concentrations of airborne COCs during site tasks may be measurable and will require air monitoring during certain operations.

The potential for inhalation of site COCs is moderate. The potential for dermal contact with soils containing site COCs during remedial operations is moderate.

The following table summarizes airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

| Parameter | Reading | Action |
|---|---|---|
| Dust | 0 to .5 mg/m3 | Normal operations |
| | 0.5 to 1 mg/m3 | Begin soil wetting procedure (Level C protection would be needed beyond this point) |
| | > 1 mg/m3 | Stop work, fully implement dust control plan |
| Oxygen | $\leq$ 19.5% | Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area |
| | > 19.5% to < 23.5% | Normal operations |
| | $\geq$ 23.5% | Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area |
| Carbon Monoxide | 0 ppm to $\leq$ 20 ppm | Normal operations |
| | > 20 ppm | Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area |

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the Field Supervisor and Site Safety Officer. The following table presents a selection matrix to determine appropriate Personal Protective Equipment.

| Task | Anticipated Level of Protection |
|---|---|
| Mobilization | Level D |
| Subsurface Intrusive Activities (Mass Excavation, Drilling, Soil Grouting) | Modified Level D/Level C |
| Earthwork/Grading | Level D/Level C |
| Additional Chemical Sampling / Delineation | Modified Level D/Level C |
| Decontamination | Modified Level D |
| Demobilization | Level D |

## 1.0 INTRODUCTION

### 1.1 Objective

The objective of this Health and Safety Plan (HASP) is to provide a mechanism for establishing safe working conditions during activities at the 10 Commerce Drive, New Rochelle, New York 10801 (Site). The safety organization, procedures, and protective equipment have been established based on an analysis of potential physical, chemical and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of injury, illness, or other hazardous incident.

The HASP was written to meet the requirements of all applicable Federal, State, and local health and safety regulations, including 29 CFR 1910.120. The HASP is based on current knowledge regarding the specific chemical and physical hazards that are known or anticipated at the Site. This HASP is a dynamic document, for which changes and/or revisions may be realized as changes in scope and/or site conditions are encountered. Should revised documents be produced, said revised documents will refer to the specific changes and why they were made.

### 1.2 Site and Facility Description

The property is improved by a two-story vacant office building, associated asphalt parking areas, and landscaping. The Site consists of a 0.96-acre commercial lot located at 10 Commerce Drive, New Rochelle, Westchester County, New York. The Site is located in a commercial area with similar commercial properties to the east, south, and west of the Site. The closest surface water body is Echo Bay and its associated tributaries located approximately 0.5 miles east of the Site. The Site is bound to the north by Renewal Place, beyond which lies commercial property and railroad property; and to the east, south and west by commercial properties and associated asphalt parking areas. The Site topography is generally flat and slopes gently downward from the northwest to the southeast.

The planned new construction for the Site will be a multi-story residential apartment building.

### 1.3 Policy Statement

The policy of SESI Consulting Engineers (SESI) is to provide a safe and healthful work environment. No aspect of operations is of greater importance than injury and illness prevention. A fundamental principle of safety management is that all injuries, illnesses, and incidents are preventable. SESI will take every reasonable step to eliminate or control hazards in order to minimize the possibility of injury, illness, or incident.

This HASP prescribes the procedures that must be followed by SESI personnel during activities at the site. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager (PM) and the Health and Safety Manager (HSM). This document will be reviewed periodically by the HSM to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will require a review and modification to this HASP. Such changes will be completed in the form of an addendum or a revision to the plan.

The provisions of this plan are mandatory for all SESI personnel and are advisory for all contractors, and subcontractors assigned to the project. ***Subcontractors will be responsible for preparing their own site-specific HASPs that meet the basic requirements outlined in this HASP.*** All visitors to SESI work areas at the site must abide by the requirements of this plan.

### 1.4 References

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, United States Environmental Protection Agency (USEPA) regulations, and SESI health and safety policies and procedures. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guides*, USEPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH, OSHA, USCG, USEPA (86116, October 1985).
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1910.
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, DHHS, PHS, CDC, NIOSH (2004).
- *Threshold Limit Values*, ACGIH (2005).
- *Guide to Occupational Exposure Values*, ACGIH (2005).
- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).

### 1.5 Definitions

The following definitions (listed alphabetically) are applicable to this HASP:

- *Contamination Reduction Zone (CRZ)* - Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- *Exclusion Zone (EZ)* - Any portions of the site where hazardous substances are, or are reasonably suspected to be present, and pose an exposure hazard to on-site personnel.
- *Incident* - All losses, including first aid cases, injuries, illnesses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- *On-Site Personnel* - All SESI and subcontractors involved with the project.
- *Project* - All on-site work performed under the scope of work.
- *Site* - The area described in Section 1.2, Site and Facility Description, where the work is to be performed by SESI personnel and subcontractors.
- *Support Zone (SZ)* - All areas of the site except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- *Subcontractor* - Includes contractor personnel hired by SESI.
- *Visitor* - All other personnel, except the on-site personnel.
- *Work Area* - The portion of the site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ, CRZ, and EZ. If the work area is located in an area on the site that is not

contaminated, or suspected of being contaminated, the entire work area may be a SZ.

## 2.0 PROJECT SCOPE OF WORK

This HASP contains information for the following tasks that SESI is anticipated to conduct at the Site. Should additional and/or different tasks be identified, amendments to this HASP will be required to address these changed items.

- Mobilization/Sample location stakeout;
- Soil Borings, vapor points and Monitoring Well Installation;
- Excavation of contaminated soil “hot spots”;
- Earthwork and grading;
- Chemical sampling of soil, soil vapor and groundwater; and
- Decontamination and demobilization/site restoration.

## 3.0 ROLES AND RESPONSIBILITIES

### 3.1 All Personnel

All SESI project personnel must adhere to the procedures outlined in this HASP during the performance of their work. Each person is responsible for completing tasks safely and reporting any unsafe acts or conditions to their supervisor. No person may work in a manner that conflicts with these procedures. After due warnings, the PM will dismiss from the site any SESI employee or subcontractor who violates safety procedures.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all SESI personnel will attend an initial hazard briefing prior to beginning work at the site.

The roles of key safety personnel and subcontractors are outlined in the following sections. Key project personnel and contacts are summarized in Table 1.

### 3.2 Key Safety Personnel

#### 3.2.1 Project Officer (PO)

The PO is responsible for providing resources to assure project activities are completed in accordance with this HASP, and for meeting all regulatory and contractual requirements.

#### 3.2.2 Project Manager (PM)

The PM is responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The PM is responsible for confirming that the Field Supervisor (FS) has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or that subcontractors assigned to this project meet the requirements established by SESI. It is also the responsibility of the PM to:

- Consult with the HSM on site health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work;

- Verify that all incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications of this HASP; and
- Suspend work or modify work practices, as necessary, for personal safety, protection of property, and regulatory compliance.

### 3.2.3 Health and Safety Manager (HSM)

The HSM or his designee, the health and safety manager (HSM), has overall responsibility for the technical health and safety aspects of the project, including review and approval of this HASP. Inquiries regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSM or his designee must approve changes or addenda to this HASP.

### 3.2.4 Site Safety Officer (SSO)

The SSO is responsible for field health and safety issues, including the execution of this HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The SSO will advise the PM on health and safety issues and will establish and coordinate the project air-monitoring program if one is deemed necessary (see Section 5.1, Air Monitoring). The SSO is the primary site contact on health and safety matters. It is the responsibility of the SSO to:

- Provide on-site technical assistance, if necessary;
- Participate in all accident/incident reports and ensure that they are reported to the HSM, client, and PM within 24 hours;
- Coordinate site and personal air monitoring as required, including equipment maintenance and calibration;
- Conduct site safety orientation training and daily safety meetings;
- Verify that project personnel have received the required physical examinations, medical certifications and training;
- Review site activities with respect to compliance with this HASP;
- Maintain required health and safety documents and records; and
- Assist the FS in instructing field personnel on project hazards and protective procedures.

### 3.2.5 Field Supervisor (FS)

The FS is responsible for implementing this HASP, including communicating requirements to on-site personnel and subcontractors. The FS will be responsible for informing the PM of changes in the work plan, procedures, or site conditions so that those changes may be addressed in this HASP. Other responsibilities are to:

- Consult with the SSO on site health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a site map and determine and post routes to medical facilities and emergency telephone numbers;
- Notify local public emergency representatives (as appropriate) of the nature of the site operations, and post their telephone numbers (i.e., local fire department personnel who would respond for a confined space rescue);
- Observe on-site project personnel for signs of ill health effects;

- Investigate and report any incidents to the SSO;
- Verify that all on-site personnel have had applicable training;
- Verify that on-site personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control the hazards; and
- Issue/obtain any required work permits (hot work, confined space, etc.).

### 3.2.6 Field Personnel (FP)

All SESI field personnel are responsible for following the Health and Safety procedures specified in this HASP and work practices specified in applicable operation procedures. Some specific responsibilities include, but are not limited to:

- Reading and understanding the HASP;
- Reporting all accidents, incidents, injuries, or illnesses to the FS;
- Complying with the requests of the SSO;
- Immediately communicating newly identified hazards or noncompliance issues to the FS or SSO; and
- Stopping work in cases of immediate danger.

## 3.3 Subcontractors

Subcontractors and their personnel must understand and comply with applicable regulations and site requirements established in this HASP. Subcontractors will prepare their own site-specific HASP that must be consistent with the requirements of this HASP.

All subcontractor personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. All subcontractor personnel will attend an initial hazard briefing prior to beginning work at the site. Additionally, on-site subcontractor personnel must conduct daily site safety meetings.

Subcontractors must designate individuals to function as the PM, HSM, SSO, and FS. In some firms the HSM to be carried out by the PM. This is acceptable provided the PM has the required knowledge, training, and experience to properly address all hazards associated with the work, and to prepare, approve, and oversee the execution of the site-specific HASP. A subcontractor may designate the same person to perform the duties of both the SSO and the FS. However, depending on the level of complexity of a contractor's scope of work, it may be infeasible for one person to perform both functions satisfactorily.

## 3.4 Stop Work Authority

Every SESI employee and subcontractor is empowered, expected, and has the responsibility to stop the work of another co-worker if the working conditions or behaviors are considered unsafe.

## 3.5 All On-Site Personnel

All on-site SESI personnel (including SESI subcontractors) must read and acknowledge their understanding of their respective HASPs before commencing work and abide by the requirements of the plans. All on-site SESI personnel shall sign their HASP Acknowledgement Form following their review of their HASP.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all on-site personnel will attend an initial hazard briefing provided by the SSO prior to beginning work at the site and conduct daily safety meetings thereafter.

On-site personnel will immediately report the following to the FS or SSO:

- Personal injuries and illnesses no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Symptoms of chemical exposure;
- Unsafe or hazardous situations;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;
- Damage to equipment or property; and
- Situations or activities for which they are not properly trained.

### 3.6 Visitors

All SESI personnel and subcontractors visiting the Site must check in with the FS. Visitors will be cautioned to avoid skin contact with surfaces, soils, groundwater, or other materials that may impacted or be suspected to be impacted by constituents of concern (COCs).

Visitors requesting to observe work at the site must don appropriate personal protective equipment (PPE) prior to entry to the work area and must have the appropriate training and medical clearances to do so. If respiratory protective devices are necessary, visitors who wish to enter the work area must have been respirator-trained and fit tested for a respirator within the past 12 months.

**Table 1 – Key Safety Personnel**

| **SESI Personnel** | | |
|---|---|---|
| **Role** | **Name** | **Address/Telephone No.** |
| Project Officer (PO) | Jesse Mausner | Pine Brook / (973) 809-6809 |
| Project Manager (PM) | Jesse Mausner | Pine Brook / (973) 809-6809 |
| Senior Project Engineer (SPE) | Fuad Dahan | Pine Brook / (973) 747-9567 |
| Health and Safety Manager (HSM) | Joe Scardino | Pine Brook / (973) 809-0835 |
| Site Safety Officer (SSO) | Jon Stuart | Pine Brook / (973) 809-8979 |
| Field Supervisor (FS) | Joseph Noonan | Pine Brook / (973) 518-8188 |
| Field Personnel | TBD | |
| Field Personnel | TBD | |
| **Subcontractors** | | |
| **Company/Role** | **Name** | **Address/Telephone No.** |
| TBD | TBD | TBD |

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

### 4.1 Levels of Protection

PPE is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the levels of COCs and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level. A summary of the levels is presented in Table 2 in this section.

#### 4.1.1 Level D Protection

The minimum level of protection that will be required of project personnel at the site will be Level D, which will be worn when site conditions or air monitoring indicates no inhalation hazard exists. The following equipment will be used:

- Work clothing as prescribed by weather;
- Steel toe work boots, meeting American National Standards Institute (ANSI) Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Leather work gloves and/or nitrile surgical gloves;
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

#### 4.1.2 Modified Level D Protection

Modified Level D will be used when airborne contaminants are not present at levels of concern, but site activities present an increased potential for skin contact with contaminated materials. Modified Level D consists of:

- Nitrile gloves worn over nitrile surgical gloves;
- Latex/polyvinyl chloride (PVC) overboots when contact with COC-impacted media is anticipated;
- Steel toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Face shield in addition to safety glasses or goggles when projectiles or splash hazards exist (e.g. during Power Washing activities);
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used);
- Tyvek® suit (polyethylene coated Tyvek® suits for handling liquids) when body contact with COC-impacted media is anticipated; and
- PFD if working on or near the water.

#### 4.1.3 Level C Protection

Level C protection will be required when the airborne concentration of COC reaches one-half of the OSHA Permissible Exposure Limit or ACGIH TLV. The following equipment will be used for Level C protection:

- Full-face, air-purifying respirator with combination organic vapor/HEPA cartridges;

- Polyethylene-coated Tyvek® suit, with ankles and cuffs taped to boots and gloves;
- Nitrile gloves worn over nitrile surgical gloves;
- Steel toe work boots, meeting ANSI Z41;
- Chemical-resistant boots with steel toes or latex/PVC overboots over steel toe boots;
- Hard hat, meeting ANSI Z89;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

### 4.2 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of supervising site personnel and health and safety professionals. The PPE used will be chosen to be effective against the COCs present on the site.

### 4.3 Site Respiratory Protection Program

Respiratory protection is an integral part of employee health and safety at the site due to potentially hazardous concentrations of airborne COCs. The site respiratory protection program will consist of the following (as a minimum):

- All on-site personnel who may use respiratory protection will have an assigned respirator.
- All on-site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-face air-purifying respirator within the past 12 months. Documentation of the fit test must be provided to the SSO prior to commencement of work.
- All on-site personnel who may use respiratory protection must within the past year have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SSO, prior to commencement of site work.
- Only cleaned, maintained, NIOSH-approved respirators will be used.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All on-site personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

### 4.4 Using PPE

Depending upon the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if

Modified Level D or Level C PPE is used. All personnel entering the EZ must put on the required PPE in accordance with the requirements of this HASP. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of COCs.

### 4.4.1 Donning Procedures

These procedures are mandatory only if Modified Level D or Level C PPE is used on the site:

- Remove bulky outerwear. Remove street clothes and store in clean location;
- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;
- Don the required respirator and perform appropriate fit check (Level C);
- Put hood or head covering over head and respirator straps and tape hood to facepiece (Level C); and
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

### 4.4.2 Doffing Procedures

The following procedures are only mandatory if Modified Level D or Level C PPE is required for the site. Whenever a person leaves the work area, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;
- Remove protective garments, equipment, and respirator (Level C). All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels;
- Wash hands, face, and neck (or shower if necessary);
- Proceed to clean area and dress in clean clothing; and
- Clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags, labeled for disposal. See Section 7, Decontamination, for detailed information on decontamination stations.

## 4.5 Selection Matrix

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the FS and SSO of the potential for skin contact with COCs. The PPE selection matrix is presented in Table 2. This matrix is based on information available at the time this plan was written. The Airborne Contaminant Action

Levels in Table 3, Airborne Contaminant Action Levels, should be used to verify that the PPE prescribed in these matrices is appropriate.

**Table 2 – PPE Selection Matrix**

| Task | Anticipated Level of Protection |
|---|---|
| Mobilization | Level D |
| Subsurface Intrusive Activities (Excavation, Drilling) | Modified Level D/Level C |
| Earthwork/Grading | Level D/Level C |
| Chemical Sampling / Delineation | Modified Level D/Level C |
| Decontamination | Modified Level D |
| Demobilization | Level D |

## 5.0 AIR AND NOISE MONITORING

### 5.1 Air Monitoring

Air monitoring, sampling, and testing will be conducted to determine employee exposure to airborne constituents. The monitoring results will dictate work procedures and the selection of PPE. The SESI SSO will be responsible for defining appropriate air monitoring procedures and for utilizing the air monitoring results to determine appropriate procedures and PPE for project personnel. Air monitoring results should be recorded in field notebooks or on an air monitoring log (see Attachment 1 for a copy of the Air Monitoring Log). Any deviations from the procedures listed here should be documented and explained in the Air Monitoring Log.

The monitoring device to be used is a Rae Systems MultiRAE detector (PID with a 11.7 eV lamp/oxygen/LEL/hydrogen sulfide sensors). Colorimetric detector tubes may be utilized to estimate airborne concentrations of benzene and should be onsite during any activities that may result in elevated PID readings including drilling, excavating, and groundwater sampling.

Air monitoring will be conducted continuously with the LEL/Oxygen meter during drilling in areas where flammable vapors or gases are suspect. All work activity must stop where tests indicate the concentration of flammable vapors exceeds 10% of the LEL at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

### 5.2 Noise Monitoring

Noise monitoring may be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

### 5.3 Monitoring Equipment Maintenance and Calibration

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. Instruments must be calibrated before and after use, noting the reading(s) and any adjustments that are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented on a calibration log or in the field notebook. All completed health and safety documentation/forms must be reviewed by the SSO and

maintained by the FS.

All air monitoring equipment will be maintained and calibrated in accordance with the specific manufacturer's procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturer's procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the SSO must be responsible for immediately removing the instrument from service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The SSO will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

### 5.4 Action Levels

Table 3 presents airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

**Table 3 – Airborne Contaminant Action Levels**

| Parameter | Reading | Action |
|---|---|---|
| Total Hydrocarbons | 0 ppm to ≤ 1 ppm | Normal operations; continue hourly breathing zone monitoring |
| | > 1 ppm to 5 ppm | Increase monitoring frequency to every 15 minutes and use benzene detector tube to screen for the presence of benzene |
| | ≥ 5 ppm to ≤ 50 ppm | Upgrade to Level C PPE; continue screening for benzene |
| | > 50 ppm | Stop work; investigate cause of reading |
| Benzene | ≥ 1 ppm to 5 ppm | Upgrade to Level C PPE |
| | > 5 ppm | Stop work; investigate cause of reading |
| Dust | 0 to .5 mg/m3 | Normal operations |
| | 0.5 to 1 mg/m3 | Begin soil wetting procedure (Level C protection would be needed beyond this point) |
| | > 1 mg/m3 | Stop work, fully implement dust control plan |
| Oxygen | ≤ 19.5% | Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area |
| | > 19.5% to < 23.5% | Normal operations |
| | ≥ 23.5% | Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area |
| Carbon Monoxide | 0 ppm to ≤ 20 ppm | Normal operations |
| | > 20 ppm | Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area |
| Hydrogen Sulfide | 0 ppm to ≤ 5 ppm | Normal operations |
| | > 5 ppm | Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area |
| Flammable Vapors (LEL) | < 10% LEL | Normal operations |
| | ≥ 10% LEL | Stop work, ventilate area, investigate source of vapors |

## 6.0 WORK ZONES AND DECONTAMINATION

### 6.1 Work Zones

#### 6.1.1 Authorization to Enter

Only personnel with the appropriate training and medical certifications (if respirators are required) will be allowed to work at the project site. The FS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed to enter the site work areas.

#### 6.1.2 Site Orientation and Hazard Briefing

No person will be allowed in the work area during site operations without first being given a site orientation and hazard briefing. This orientation will be presented by the FS or SSO and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Following this initial meeting, daily safety meetings will be held each day before work begins.

All people entering the site work areas, including visitors, must document their attendance at this briefing, as well as the daily safety meetings on the forms included with this plan.

#### 6.1.3 Certification Documents

A training and medical file may be established for the project and kept on site during all site operations. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR) certificates, as well as current medical clearances for all project field personnel required to wear respirators, will be maintained within that file. All project personnel must provide their training and medical documentation to the SSO prior to starting work.

#### 6.1.4 Entry Log

A log-in/log-out sheet will be maintained at the site by the FS. Personnel must sign in and out on a log sheet as they enter and leave the work area, and the FS may document entry and exit in the field notebook.

#### 6.1.5 Entry Requirements

In addition to the authorization, hazard briefing, and certification requirements listed above, no person will be allowed in any SESI work area unless they are wearing the minimum PPE as described in Section 4.0.

#### 6.1.6 Emergency Entry and Exit

People who must enter the work area on an emergency basis will be briefed of the hazards by the FS or SSO. All activities will cease in the event of an emergency. People exiting the work area because of an emergency will gather in a designated safe area for a head count. The FS is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

### 6.1.7 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

### 6.1.8 Exclusion Zone (EZ)

An EZ may consist of a specific work area or may be the entire area of potential contamination. All employees entering an EZ must use the required PPE and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Cones, caution tape, or a posted site diagram will identify the location of each EZ.

### 6.1.9 Contamination Reduction Zone

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the support zone (SZ) discussed below.

### 6.1.10 Support Zone (SZ)

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the SZ, subject to site requirements.

### 6.1.11 Posting

Work areas will be prominently marked and delineated using cones, caution tape, or a posted site diagram.

### 6.1.12 Site Inspections

The FS will conduct a daily inspection of site activities, equipment, and procedures to verify that the required elements are in place.

## 6.2 Decontamination

### 6.2.1 Personnel Decontamination

All personnel wearing Modified Level D or Level C protective equipment in the EZ must undergo personal decontamination prior to entering the SZ. The personnel decontamination area will consist of the following stations at a minimum:

- *Station 1*: Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.
- *Station 2*: Personnel will remove their outer garment and gloves and dispose of it in properly labeled containers. Personnel will then decontaminate their hard hats, and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand carried to the next station.

- *Station 3*: Personnel will thoroughly wash their hands and face before leaving the CRZ. Respirators will be sanitized and then placed in a clean plastic bag.

### 6.2.2 Equipment Decontamination

All vehicles that have entered the EZ will be decontaminated at the decontamination pad prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

### 6.2.3 Personal Protective Equipment Decontamination

Where and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers. Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

When removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves, and covers must be thoroughly cleaned at the end of each work shift, and ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water (mixed at 2% bleach by volume), or by using a spray disinfectant.

## 7.0 TRAINING AND MEDICAL SURVEILLANCE

### 7.1 Training

### 7.1.1 General

All on-site project personnel who work in areas where they may be exposed to site contaminants must be trained as required by OSHA Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial training more than 12 months prior to the start of the project must have completed an eight-hour refresher course within the past 12 months. The FS must have completed an additional eight hours of supervisory training and must have a current first-aid/CPR certificate (See Attachment 2).

### 7.1.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour HAZWOPER training course:

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site health and safety;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application, and limitations of PPE;
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment on site;

- Medical surveillance requirements;
- Recognition of symptoms and signs which might indicate overexposure to hazards;
- Worker right-to-know (Hazard Communication OSHA 1910.1200);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a health and safety program and a site-specific HASP;
- Decontamination practices for personnel and equipment;
- Confined-space entry procedures; and
- General emergency response procedures.

### 7.1.3 Supervisor Course

Management and supervisors must receive an additional eight hours of training, which typically includes:

- General site safety and health procedures;
- PPE programs; and
- Air monitoring techniques.

### 7.1.4 Site-Specific Training

Site-specific training will be accomplished by on-site personnel reading this HASP, and through a thorough site briefing by the PM, FS, or SSO on the contents of this HASP before work begins. The review must include a discussion of the chemical, physical, and biological hazards; the protective equipment and safety procedures; and emergency procedures.

### 7.1.5 Daily Safety Meetings

Daily safety meetings will be held to cover the work to be accomplished, the hazards anticipated, the PPE and procedures required to minimize site hazards, and emergency procedures. The FS or SSO should present these meetings prior to beginning the day's fieldwork. No work will be performed in an EZ before a daily safety meeting has been held. An additional safety meeting must also be held prior to new tasks, or if new hazards are encountered. The daily safety meetings will be logged in the field notebook.

### 7.1.6 First Aid and CPR

At least one employee current in first aid/CPR will be assigned to the work crew and will be on the site during operations. Site records will document the presence of this individual. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

## 7.2 Medical Surveillance

### 7.2.1 Medical Examination

All personnel who are potentially exposed to site contaminants must participate in a medical surveillance program as defined by OSHA at 29 CFR 1910.120 (f).

### 7.2.2 Pre-placement Medical Examination

All potentially exposed personnel must have completed a comprehensive medical examination prior to assignment, and periodically thereafter as defined by applicable regulations. The pre-placement and periodic medical examinations typically include the following elements:

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;
- Chest X-ray, at a frequency determined by the physician;
- Pulmonary function test;
- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations, confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

### 7.2.3 Other Medical Examinations

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the SSO, HSM, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials.

### 7.2.4 Periodic Exam

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be 24 months.

### 7.2.5 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the SSO. The terms of the restriction will be discussed with the employee and the supervisor.

## 8.0 GENERAL SAFETY PRACTICES

### 8.1 General Safety Rules

General safety rules for site activities include, but are not limited to, the following:

- At least one copy of this HASP must be in a location at the site that is readily available to personnel, and all project personnel shall review the plan prior to starting work.
- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required and stop work and replace damaged PPE immediately.
- Secure disposable coveralls, boots, and gloves at the wrists and legs and ensure closure of the suit around the neck.
- Upon skin contact with materials that may be impacted by COCs, remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by COCs must be reported to the FS or SSO immediately. If needed, medical attention should be sought.
- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by COCs, such as standing water, mud, or discolored soil. Equipment must be stored on elevated or protected surfaces to reduce the potential for incidental contamination.
- Remove PPE as required in the CRZ to limit the spread of COC-containing materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Removing soil containing site COCs from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited.
- Inspect all non-disposable PPE for contamination in the CRZ. Any PPE found to be contaminated must be decontaminated or disposed of appropriately.
- Recognize emergency signals used for evacuation, injury, fire, etc.
- Report all injuries, illnesses, and unsafe conditions or work practices to the FS or SSO.
- Use the “buddy system” during all operations requiring Level C PPE, and when appropriate, during Modified Level D operations.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.
- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and in accordance with the manufacturer’s directions.
- Personnel are to perform only tasks for which they have been properly trained and will advise their supervisor if they have been assigned a task for which they are not trained.

- The presence or consumption of alcoholic beverages or illicit drugs during the workday, including breaks, is strictly prohibited. Notify your supervisor if you must take prescription or over-the-counter drugs that indicate they may cause drowsiness or, that you should not operate heavy equipment.
- Remain upwind during site activities whenever possible.

### 8.2 Buddy System

On-site personnel must use the buddy system as required by operations. Use of the "buddy system" is required during all operations requiring Level C to Level A PPE, and when appropriate, during Level D operations. Crewmembers must observe each other for signs of chemical exposure, and heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Crewmembers must also be aware of the potential exposure to possible safety hazards, unsafe acts, or non-compliance with safety procedures.

Field personnel must inform their partners or fellow crewmembers of non-visible effects of exposure to toxic materials that they may be experiencing. The symptoms of such exposure may include, but are not limited to:

- Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

### 8.3 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

*Heat rashes* are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually

appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

*Heat cramps* are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

*Heat exhaustion* occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

*Heat stroke* is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional

methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

### 8.4 Heat Stress Safety Precautions

Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described in Table 4.

**Table 4 – Work/Rest Schedule**

| Adjusted Temperature[b] | Work/Rest Regimen Normal Work Ensemble[c] | Work/Rest Regimen Impermeable Ensemble |
|---|---|---|
| 90ºF (32.2ºC) or above | After each 45 minutes of work | After each 15 minutes of work |
| 87.5º - 90ºF (30.8º-32.2ºC) | After each 60 minutes of work | After each 30 minutes of work |
| 82.5º - 87.5ºF (28.1º - 30.8ºC) | After each 90 minutes of work | After each 60 minutes of work |
| 77.5º - 82.5ºF (25.3º - 28.1ºC) | After each 120 minutes of work | After each 90 minutes of work |
| 72.5º - 77.5ºF (30.8º - 32.2ºC) | After each 150 minutes of work | After each 120 minutes of work |

a. For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)
b. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
c. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
d. The information presented above was generated using the information provided in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Handbook.

In order to determine if the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- On-site drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek-type garments.

All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

### 8.5 Cold Stress

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at 18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in Table 5.

**Table 5 – Wind Chill Temperature Chart**

| **Estimated Wind Speed (in mph)** | **Actual Temperature Reading (ºF)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **50** | **40** | **30** | **20** | **10** | **0** | **-10** | **-20** | **-30** | **-40** | **-50** | **-60** |
| | **Equivalent Chill Temperature (ºF)** | | | | | | | | | | | |
| Calm | 50 | 40 | 30 | 20 | 10 | 0 | -10 | -20 | -30 | -40 | -50 | -60 |
| 5 | 48 | 37 | 27 | 16 | 6 | -5 | -15 | -26 | -36 | -47 | -57 | -68 |
| 10 | 40 | 28 | 16 | 4 | -9 | -24 | -33 | -46 | -58 | -70 | -83 | -95 |
| 15 | 36 | 22 | 9 | -5 | -18 | -32 | -45 | -58 | -72 | -85 | -99 | -112 |
| 20 | 32 | 18 | 4 | -10 | -25 | -39 | -53 | -67 | -82 | -96 | -110 | -121 |
| 25 | 30 | 16 | 0 | -15 | -29 | -44 | -59 | -74 | -88 | -104 | -118 | -133 |
| 30 | 28 | 13 | -2 | -18 | -33 | -48 | -63 | -79 | -94 | -109 | -125 | -140 |
| 35 | 27 | 11 | -4 | -20 | -35 | -51 | -67 | -82 | -98 | -113 | -129 | -145 |
| 40 | 26 | 10 | -6 | -21 | -37 | -53 | -69 | -85 | -100 | -116 | -132 | -148 |
| **(Wind speeds greater than 40 mph have little additional effect.)** | **LITTLE DANGER Maximum danger of false sense of security.** | | | | **INCREASING DANGER Danger from freezing of exposed flesh within one minute.** | | | **GREAT DANGER Flesh may freeze within 30 seconds.** | | | | |
| | **Trench foot and immersion foot may occur at any point on this chart.** | | | | | | | | | | | |

**[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents)].**

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- *Frost Nip or Incipient Frostbite* - characterized by sudden blanching or whitening of skin.
- *Superficial Frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- *Deep Frostbite* - tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

### 8.6 Safety Precautions for Cold Stress Prevention

For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.

At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.

If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must ensure that their clothing is not wet as a consequence of sweating. Wet field personnel must change into dry clothes prior to entering the cold area.

If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.

Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

### 8.7 Safe Work Practices

Direct contact between bare skin and cold surfaces (< 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.

For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed.

Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing. Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

### 8.8 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, spiders, and other pests.

#### 8.8.1 Tick Borne Diseases

*Lyme Disease* - The disease commonly occurs in summer and is transmitted by the bite of infected ticks. “Hot spots” in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

*Erlichiosis* - The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. “Hot spots” in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull’s eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

*Rocky Mountain Spotted Fever (RMSF)* - This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (Rickettsia rickettsii) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but if identified and treated promptly, death is uncommon.

*Control* - Tick repellant containing diethyltoluamide (DEET) should be used when working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

### 8.8.2 Poisonous Plants

Poisonous plants may be present in the work area. Personnel should be alerted to its presence and instructed on methods to prevent exposure.

*Control* - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water and observed for signs of reddening.

### 8.8.3 Snakes

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

*Control* - To minimize the threat of snakebites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes, and the need to avoid actions potentiating encounters, such as turning over logs, etc. If a snakebite occurs, an attempt should be made to safely identify the snake via size and markings. The victim must be transported to the nearest hospital within 30 minutes; first aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom.

### 8.8.4 Spiders

Personnel may encounter spiders during work activities.

Two spiders are of concern, the black widow and the brown recluse. Both prefer dark sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris. The black widow is shiny black, approximately one inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widows body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States. The brown recluse has a distinctive violin shape on the top of

its body. The bite of the brown recluse is painful and the bite site ulcerates and takes many weeks to heal completely.

*Control* - To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs, and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible; first aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

### 8.9 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on site.

*Control* - All personnel must wear hearing protection, with a Noise Reduction Rating (NRR) of at least 20, when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 5.2, Noise Monitoring.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

### 8.10 Spill Control

All personnel must take every precaution to minimize the potential for spills during site operations. All on-site personnel shall immediately report any discharge, no matter how small, to the FS.

Spill control equipment and materials will be located on the site at locations that present the potential for discharge. All sorbent materials used for the cleanup of spills will be containerized and labeled appropriately. In the event of a spill, the FS will follow the provisions in Section 10.0, Emergency Procedures, to contain and control released materials and to prevent their spread to off-site areas.

### 8.11 Sanitation

Site sanitation will be maintained according to OSHA requirements.

#### 8.11.1 Break Area

Breaks must be taken in the SZ, away from the active work area after site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in any area other than the SZ.

### 8.11.2 Potable Water

The following rules apply to all field operations:

- An adequate supply of potable water will be provided at each project site. Potable water must be kept away from hazardous materials or media, and contaminated clothing or equipment.
- Portable containers used to dispense drinking water must be capable of being tightly closed and must be equipped with a tap dispenser. Water must not be consumed directly from the container (drinking from the tap is prohibited) nor may it be removed from the container by dipping.
- Containers used for drinking water must be clearly marked and shall not be used for any other purpose.
- Disposable drinking cups must be provided. A sanitary container for dispensing cups and a receptacle for disposing of used cups is required.

### 8.11.3 Sanitary Facilities

Access to facilities for washing before eating, drinking, or smoking, or alternate methods such as waterless hand-cleaner and paper towels will be provided.

### 8.11.4 Lavatory

If permanent toilet facilities are not available, an appropriate number of portable chemical toilets will be provided. This requirement does not apply to mobile crews or to normally unattended site locations so long as employees at these locations have transportation immediately available to nearby toilet facilities.

## 8.12 Emergency Equipment

Adequate emergency equipment for the activities being conducted on site and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 will be on site prior to the commencement of project activities. Personnel will be provided with access to emergency equipment, including, but not limited to, the following:

- Fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 1926;
- Industrial first aid kits of adequate size for the number of personnel on site; and
- Emergency eyewash and/or shower if required by operations being conducted on site.

## 8.13 Lockout/Tagout Procedures

Only fully qualified and trained personnel will perform maintenance procedures. Before maintenance begins, lockout/tagout procedures per OSHA 29 CFR 1910.147 will be followed.

Lockout is the placement of a device that uses a positive means, such as lock, to hold an energy or material-isolating device such that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system shall be used. Tagout is the placement of a warning tag on an energy or material isolating device indicating that the equipment controls may not be operated until the personnel who attached the tag remove the tag.

## 8.14 Electrical Safety

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or USCG regulations.
- Portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- All extension cord outlets must be equipped with ground fault circuit interrupters (GFCI).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

## 8.15 Lifting Safety

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.

- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

### 8.16 Ladder Safety

When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

- Ladders shall be maintained free of oil, grease, and other slipping hazards.
- Ladders shall not be loaded beyond the maximum intended load for which they were built, or beyond their manufacturer's rated capacity.
- Ladders shall be used only for the purpose for which they were designed.
- Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).
- Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.
- Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.
- Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.
- Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces, including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.
- Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.
- The area around the top and bottom of ladders shall be kept clear.

- The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.
- Ladders shall not be moved, shifted, or extended while occupied.
- Ladders shall have non-conductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment.
- The top, top step, or the step labeled that it or any step above it should not be used as a step.
- Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders shall be inspected by the HSM for visible defects on a daily basis and after any occurrence that could affect their safe use.
- Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; corroded components; or other faulty or defective components shall either be immediately marked in a manner that readily identifies them as defective or be tagged with “Do Not Use” or similar language and shall be withdrawn from service.
- Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; or corroded components; shall be withdrawn from service.
- Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.
- Single-rail ladders shall not be used.
- When ascending or descending a ladder, the user shall face the ladder.
- Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- An employee shall not carry any object or load that could cause the employee to lose balance and fall.

### 8.17 Traffic Safety

The project site may be located adjacent to a public roadway where exposure to vehicular traffic is likely. Traffic may also be encountered as vehicles enter and exit the area. To minimize the likelihood of project personnel and activities being affected by traffic, the following procedures will be implemented.

Cones must be placed along the shoulder of the roadway starting 100 feet from the work area to alert passing motorists to the presence of personnel and equipment. A “Slow” or “Men Working” sign must be placed at the first cone. Barricades with flashing lights should be placed between the roadway and the work area.

During activities along a roadway, equipment will be aligned parallel to the roadway to the extent feasible, facing into the oncoming traffic so as to place a barrier between the work crew and the oncoming traffic. All crewmembers must remain behind the equipment and the traffic barrier.

All site personnel who are potentially exposed to vehicular traffic must wear an outer layer of orange warning garments, such as vests, jackets, or shirts. If work is performed in hours of dusk or darkness, workers will be outfitted with reflective garments either orange, white (including silver-coated reflective coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.

The flow of traffic into and out of the adjacent business must be assessed, and precautions taken to warn motorists of the presence of workers and equipment. Where possible, vehicles should be aligned to provide physical protection of people and equipment.

## 9.0 SITE-SPECIFIC HAZARDS AND CONTROL MEASURES

### 9.1 Evaluation of Hazards

The evaluation of hazards is provided as a quick reference as to the known conditions for the Site, wherein the level of detail for each of the subsections is identified.

#### *9.1.1 Hazard Characteristics*

Existing information for Site:
__X__ Detailed _____ Preliminary _____ None

Hazardous/Contaminated Material Form(s):
__X__ Solid __X__Liquid _____Sludge __ _Gas X Vapor

Containment Type(s):
_____ Drum _____ Tank _____ Pit __X__ Debris
_____ Pond _____Lagoon Other: Historic Fill

Hazardous Material Characteristics:
__X__ Volatile _____ Corrosive _____ Reactive _____ Radioactive
_____ Ignitable __X__ Toxic __X__ Unknown

Routes of Exposure:
__X__ Oral __X__ Dermal __X__ Eye __X__ Respiratory

#### *9.1.2 Potential Health and Safety Hazards*

__X__ Heat
__X__ Cold
_____ Confined space entry
_____ Oxygen depletion
_____ Asphyxiation
__X__ Excavation
__X__ Cave-ins
__X__ Falls, slippage
__X__ Heavy equipment
_____ Other: Potential Ignition Hazard.

_____Congested areas
__X__ General Construction
__X__ Physical injury
_____ Electrical hazards
_____ Handling and product transfer
__X__ Fire
__X__ Explosion
__X__ Biological Hazards
- _X_ Plants – Poison Ivy, Poison Oak
- _X_ Insects – Ticks
- _X_ Insects – Mosquitoes
- _X_ Insects – Bees and Wasps
- _X_ Rats and Mice

_____ Non-ionizing Radiation (i.e. UV, IR, etc.)

## 9.2 Field Activities, Hazards, and Control Procedures

The following task-specific safety analyses identify potential health, safety, and environmental hazards associated with each type of field activity. Because of the complex and changing nature of field projects, supervisors must continually inspect the site to identify hazards that may affect on-site personnel, the community, or the environment. The FS must be aware of these changing conditions and discuss them with the PM whenever these changes impact employee health, safety, the environment, or performance of the project. The FS will keep on-site personnel informed of the changing conditions, and the PM will write and/or approve addenda or revisions to this HASP as necessary.

### 9.2.1 Mobilization/Construction Stakeout

Description of Tasks

Site mobilization will include establishing excavation locations, determining the location of utilities and other installations, and establishing work areas. Mobilization will also include setting up equipment and establishing a temporary site office. A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ. During this initial phase, project personnel will walk the site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

Hazard Identification

The hazards of this phase of activity are associated with heavy equipment operation, manual materials handling, installation of temporary on-site facilities, and manual site preparation.

Manual materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Installation of temporary field office and support facilities may expose personnel to electrical hazards, underground and overhead utilities, and physical injury due to the manual lifting and moving of materials. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat- or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Controls

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

### 9.2.2 Demolition/Site Clearing

Description of Tasks

Site clearance will involve manual or mechanical removal of objects impeding access to the construction footprint. These obstructions are both natural and man-made items and will include, but not be limited to, fabricated metal and concrete structures, trees, vegetation, rubble, and miscellaneous trash/debris.

Hazard Identification

Hazards associated with demolition and site clearance include personnel working in and around potentially unstable structures, or locations of potential contact with hazardous chemicals, utilities, and/or falling objects. This task will involve manual, as well as mechanical demolition/clearance efforts so exertion and equipment hazards exist.

Controls

*PPE* – Personnel shall be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.

*Preparatory Operations* – Prior to permitting employees to start demolition operations, an engineering survey shall be made, by a licensed Professional Engineer, of the structure to determine the stability of the structure. Any adjacent structure shall where personnel may be exposed shall also be similarly checked. The PO shall have in writing evidence that such a survey has been performed. All structural instabilities shall be shored or braced, under the supervision of a licensed Professional Engineer, prior to access by an FP.

*Utilities* – All electric, gas, water, steam, sewer, and other service lines shall be shut off, caped, or otherwise controlled, outside the building line before demolition work is started. In each case, any utility company that is involved shall be notified in advance. If it is necessary to maintain any power, water or other utilities during demolition, such lines shall be temporarily relocated, as necessary.

*Hazardous Substances* – It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

*Falling Debris/Objects* – No material shall be dropped to any point lying outside the exterior walls of the structure unless the area is effective protected. Access to the area where falling objects/debris may be encountered must be gated and controlled.

*Structural Collapse* – Structural or load supporting members on any floor shall not be cut or removed until all stories above such a floor have been demolished and removed. Walls, which are to serve as retaining walls against which debris will be piled, shall not be so used unless capable of safely supporting the imposed load. Mechanical equipment shall not be used on floors or working surfaces unless such floors or surfaces are not of sufficient strength to support the imposed load.

*Rollover Guards* – All equipment used in site clearing operations shall be equipped with rollover guards meeting the applicable requirements. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the applicable requirements.

*Inspections* – During demolition, continuing inspections by a licensed Professional Engineer shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, walls, or loosened material. No FP shall be permitted

to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

### 9.2.3 Excavation and Cut/Fill Operations

#### 9.2.3.1 Excavation/Trenching

Description of Tasks

This task includes the excavation of contaminated soils and superficial debris. Excavation depths vary across the site.

Hazard Identification

The hazards of this activity are associated with heavy equipment operation, subsurface intrusion, manual materials handling, stockpiling, and disposal. Subsurface intrusion presents hazards associated with negotiating buried utilities, cave-ins of the excavated areas, and regress methods for personnel working inside the excavated areas. Disruption of contaminated soil also presents a health hazard.

Controls

*Underground Utilities* – The estimated locations of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during the excavation work, shall be determined prior to opening an excavation. Utility companies or owners shall be contacted ("Call Before You Dig") within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation.

When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by save and acceptable means. While the excavation is open, underground installations shall be protected, supported, or removed, as necessary, to safeguard site personnel.

*Cave-Ins* – Project personnel in an excavation shall be protected from cave-ins by an adequate protective system, except when:

- Excavations are made entirely in stable rock or excavations are less than five feet in depth and examination of the ground by the SSO provides no indication of a potential cave-in.
- Protective systems shall have the capacity to resist, without failure, all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

Project personnel shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least two feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by the SSO for evidence of a situation that could result in possible cave-ins,

indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the SSO prior to the start of work and as needed throughout operations. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when project personnel exposure can be reasonably anticipated.

Where the SSO finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed personnel shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

*Excavation Egress* – A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are four feet or more in depth so as to require no more than 25 feet or lateral travel for project personnel.

#### 9.2.3.2 Heavy Equipment Operation

Description of Tasks
Heavy equipment to be used for this task include, but are not limited to, excavators, dozers, dump trucks, and water sprayers (if required).

Hazard Identification
The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and an object gets caught between two moving parts of the equipment. Operation of the heavy construction equipment may produce harmful noise.

Controls
*Equipment Inspection* – All vehicles in use shall be checked prior to operation to ensure that all parts, equipment, and accessories that affect safe operations are in proper operating condition and free from defects. All defects shall be corrected before the vehicle is placed in service.

*Ground Guides* – No personnel shall use any motor vehicle, earthmoving, or compacting equipment having an obstructed view to the rear, unless:

- The vehicle has a reverse signal alarm distinguishable from the surrounding noise level; or
- The vehicle is backed up only when an observer signals that it is safe to do so.

*Blocking* – Heavy machinery, equipment, or parts thereof that are suspended or held aloft shall be substantially blocked to prevent falling or shifting before employees are permitted to work under or between them.

*Noise* – Control measures for noise are addressed in Section 4.9.
*Traffic* – Control measures for traffic are addressed in Section 8.17.

#### 9.2.3.3 Disturbance/Handling of Contaminated Material

Description of Tasks
After the contaminated soil is excavated from below the Site's surface, the material will be stockpiled, dried, and either transported offsite or relocated and backfilled on site.

Hazard Identification
The hazards associated with materials handling include contact of the contaminated material with project personnel, or cross contamination with other site soil.

Controls
*Cross Contamination* – Following excavation, contaminated soil stockpiles will be placed on a structure constructed to separate the material from the site soil and collect any groundwater leachate. The material shall be covered to prevent storm water erosion or migration of contaminants through storm water.

*Air Monitoring* – Air and particulate monitoring will be conducted during soil excavation activities to assess the potential for exposure to airborne COCs. If the results of air monitoring indicate the presence of organic vapors or particulates in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

*Traffic* – Control measures for traffic are addressed in Section 8.17.

### 9.2.4 Drilling/Subsurface Intrusion Activities

Description of Tasks
This component of work includes the project tasks of delineation and sampling the PCB–impacted soil, installation of the groundwater cutoff wall, and in-situ soil grouting. Geotechnical testing of the grout and existing site soils will also be conducted.

Hazard Identification
The primary physical hazards for this activity are associated with the use of soil boring and grouting equipment. The equipment is hydraulically powered and uses static force and dynamic percussion force to advance sampling and penetrating tubes.

Accidents can occur as a result of improperly placing the equipment on uneven or unstable terrain or failing to adequately secure the equipment prior to the start of operations. Overhead utility lines can create hazardous conditions if contacted by the equipment. Underground installations such as electrical lines, conduit, and product lines pose a significant hazard if contacted.

Controls
*Geoprobe and Drill Rig Safety Procedures* - The operator of the equipment must possess required state or local licenses to perform such work. All members of the crew shall receive site-specific training prior to beginning work.

The operator is responsible for the safe operation of the rig, as well as the crew's adherence to the requirements of this HASP. The operator must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the operator, wear all personal protective equipment, and be aware of all hazards and control procedures. The operator and crew must participate in the Daily Safety Meetings and be aware of all emergency procedures.

*Equipment Inspection* - Each day, prior to the start of work, the rig and associated equipment must be inspected by the operator. The following items must be inspected:

- Vehicle condition;
- Proper storage of equipment;
- Condition of all hydraulic lines;
- Fire extinguisher; and
- First aid kit.

*Equipment Set Up* - The drill rig must be properly blocked and leveled prior to raising the derrick. The wheels which remain on the ground must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

All well sites will be inspected by the driller prior to the location of the rig to verify a stable surface exists. This is especially important in areas where soft, unstable terrain is common.

The drill rig must be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur.

When the ground surface is soft or otherwise unstable, wooden blocks, at least 24" by 24" and 4" to 8" thick shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

*Rules for Intrusive Activity* - Before beginning any intrusive activity, the existence and location of underground pipe, conduit, electrical equipment, and other installations will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. “Call Before You Dig” will verify the potential for encountering subsurface utilities. If the client’s knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line.

Combustible gas readings of the general work area will be made regularly in areas where and/or during operations when the presence of flammable vapors or gases is suspected, such as during intrusive activities (see Section 5.1). Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10% of the LEL in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

*Overhead Electrical Clearances* - If equipment is operated in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables, can come within the minimum clearances as follows:

| Nominal System Voltage | Minimum Required Clearance |
|---|---|
| 0-50kV | 10 feet |
| 51-100kV | 12 feet |
| 101-200kV | 15 feet |
| 201-300kV | 20 feet |
| 301-500kV | 25 feet |
| 501-750kV | 35 feet |
| 751-1,000kV | 45 feet |

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

*Hoisting Operations* - Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

Drill pipe, auger strings or casing should be picked up slowly. Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrickman has signaled that he may safely hoist the pipe.

During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor; no one else should be on the rig or derrick.

The brakes on the drawworks of the drill rig should be tested by the driller each day. The brakes should be thoroughly inspected by a competent individual each week.

A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

Workers should never stand near the borehole whenever any wire line device is being run.

Hoisting control stations should be kept clean and controls labeled as to their functions.

*Catline Operations* - Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline. The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

Personnel should not stand near, step over, or go under a cable or catline which is under tension.

Employees rigging loads on catlines shall:

- Keep out from under the load;
- Keep fingers and feet where they will not be crushed;
- Be sure to signal clearly when the load is being picked;
- Use standard visual signals only and not depend on shouting to coworkers; and
- Make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

*Wire Rope* - When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or re-socketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

An eye splice made in any wire rope shall have not less that five full tucks.

Wire rope shall not be secured by knots. Wire rope clips shall not be used to splice rope.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

*Pipe/Auger Handling* - Pipe and auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger or pipe sections without assistance.

Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

Slip handles should be used to lift and move slips. Employees are not permitted to kick slips into position.

When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

Pipe and augers stored in racks, catwalks or on flatbed trucks should be secured to prevent rolling.

### 9.2.5 Subsurface Chemical Sample Collection/Analysis

Description of Tasks

This sub-task consists of the collection of soil samples for subsequent field and laboratory analysis. The physical hazards of soil sampling are primarily associated with the sample collection methods, procedures utilized, and the environment itself.

Hazard Identification

Incidental contact with COCs is the primary hazard associated with sampling the stabilized material. This contact may occur through the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. The primary hazards associated with these sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present chemical and physical hazards. The hazards directly associated with sampling procedures are generally limited to strains/sprains and potential eye hazards. Potential chemical hazards may include contact with media containing site COCs and potential contact with chemicals used for equipment decontamination.

Controls

*PPE* – To control dermal exposure during sampling activities, a minimum of Level D protection will be worn. If necessary, based on field observations and site conditions, air monitoring may be conducted during sediment sampling activities. If the results of air monitoring indicate the presence of airborne contaminants in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

### 9.2.6 UST Closure

#### 9.2.6.1 Working in Confined Spaces

Description of Tasks

The project will involve the closure of several USTs.

Hazard Identification

Closure activities may require the entrance into confined spaces to facilitate cleaning and removal of the USTs.

Controls

All personnel required to enter into confined or enclosed spaces must be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of required protective and emergency equipment. The PO shall comply with all specific regulations that apply to work in dangerous or potentially dangerous areas.

#### 9.2.6.2 Working with Compressed Air

Description of Tasks

The proposed method of purging the USTs includes the injection of compressed gas into the tank and attached piping network.

Hazard Identification

Uncontrolled release of the highly pressured air can cause injury to FP during this task. Cylinders must also be properly managed to ensure they are not compromised during storage and/or use.

Controls

*Pressure Regulation* – Compressed air used for cleaning purposes shall be reduced to less than 30 pounds per square inch and then only with effective chip guarding and personal protective equipment.

*Cylinder Storage* – Valve protection caps shall be in place and secured when compressed gas cylinders are transported, moved, or stored. Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved. Compressed gas cylinders shall be secured in an upright position at all times, except if necessary for short periods of time when cylinders are actually being hoisted or carried. Cylinders shall be placed in a location where they cannot become part of an electrical circuit.

### 9.2.7 Site Capping System Construction

Refer to Section 8.0 for general safety procedures.

### 9.2.8 Creek Relocation

Refer to Section 8.0 for general safety procedures.

### 9.2.9 Decontamination

All equipment will be decontaminated before leaving the site. Personnel involved in decontamination activities may be inadvertently exposed to skin contact with contaminated materials and chemicals brought from the EZ. Personnel involved in decontamination activities must wear PPE that is, at a minimum, one level below the level worn by personnel working in the EZ.

### 9.2.10 Demobilization

Demobilization involves the removal of all tools, equipment, supplies, and vehicles brought to the site. The hazards of this phase of activity are associated with heavy equipment operation and manual materials handling.

Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Heavy equipment operation presents noise and vibration hazards, and hot surfaces, to operators. Personnel in the vicinity of heavy equipment operation may be exposed to physical hazards resulting in fractures, contusions, and lacerations and may be exposed to high noise levels. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat-or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

### 9.3 Chemical Hazards

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site COCs. Concentrations of airborne COCs during site tasks may be measurable and will require air monitoring during certain operations. Air monitoring requirements for site tasks are outlined in Section 5.1.

COCs at the site include heavy metals, some VOC compounds, some SVOC compounds and potentially other industrial chemicals including PCBs and pesticides.

The potential for inhalation of site COCs is low. The potential for dermal contact with soils containing site COCs during remedial operations is moderate. Table 6 lists the primary contaminants that have been identified at the Site and the media in which they are present.

Table 6 – List of Primary Contaminants

| **Media: Soil** | | |
|---|---|---|
| **Metals** | **Highest Concentration (mg/kg)** | **Applicable Monitoring Instrument** |
| Copper | 61.8 | Not Applicable |
| Lead | 67.4 | Not Applicable |
| Nickel | 35.7 | Not Applicable |
| Zinc | 240 | Not Applicable |
| **SVOCs** | **Concentration (mg/kg)** | **Applicable Monitoring Instrument** |
| Acenaphthene | 770 | Not Applicable |
| Anthracene | 900 | Not Applicable |
| Benzo(a)Pyrene | 38 | Not Applicable |
| Benzo(a)Anthracene | 160 | Not Applicable |
| Benzo(b)Fluoranthene | 69 | Not Applicable |
| Benzo(k)Fluoranthene | 24 | Not Applicable |
| Chrysene | 160 | Not Applicable |
| Dibenzo(a,h)Anthracene | 3.6 | Not Applicable |
| Dibenzofuran | 600 | Not Applicable |
| Fluoranthene | 960 | Not Applicable |
| Fluorene | 850 | Not Applicable |
| Indeno(1,2,3-c,d)Pyrene | 9.2 | Not Applicable |
| Naphthalene | 720 | Not Applicable |
| Phenanthrene | 2400 | Not Applicable |
| Pyrene | 630 | Not Applicable |

| PCBs | | |
|---|---|---|
| Aroclor 1260 | 0.36 | Not Applicable |
| **Pesticides** | **Concentration (mg/kg)** | **Applicable Monitoring Instrument** |
| 4,4-DDD | 0.013 | Not Applicable |
| 4,4-DDE | 0.0052 | Not Applicable |
| Dieldrin | 0.0082 | Not Applicable |

| Media: Soil Vapor | | |
|---|---|---|
| **Volatile Organic Compounds** | **Highest Concentration (ug/m3)** | **Applicable Monitoring Instrument** |
| Benzene | 41 | PID |
| Butadiene | 13 | PID |
| Chloroform | 40 | PID |

## 10.0 EMERGENCY PROCEDURES

### 10.1 General

Prior to the start of operations, the work area will be evaluated for the potential for fire, contaminant release, or other catastrophic event. Unusual conditions or events, activities, chemicals, and conditions will be reported to the FS/SSO immediately.

The FS/SSO will establish evacuation routes and assembly areas for the site. All personnel entering the site will be informed of this route and the assembly area.

### 10.2 Emergency Response

If an incident occurs, the following steps will be taken:

- The FS/SSO will evaluate the incident and assess the need for assistance and/or evacuation;
- The FS/SSO will call for outside assistance as needed;
- The FS/SSO will ensure the PM is notified promptly of the incident; and
- The FS/SSO will take appropriate measures to stabilize the incident scene.

#### 10.2.1 Fire

In the case of a fire at the site, the FS/SSO will assess the situation and direct fire-fighting activities. The FS/SSO will ensure that the PM is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that site personnel are unable to safely extinguish with one fire extinguisher, the local fire department will be summoned.

### 10.2.2 Contaminant Release

In the event of a contaminant release, the following steps will be taken:

- Notify FS/SSO immediately;
- Evacuate immediate area of release;
- Conduct air monitoring to determine needed level of PPE; and
- Don required level of PPE and prepare to implement control procedures.

The FS/SSO has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-site areas.

## 10.3 Medical Emergency

All employee injuries must be promptly reported to the SSO/FS, who will:

- Ensure that the injured employee receives prompt first aid and medical attention;
- In emergency situations, the worker is to be transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room); and
- If the injured person is a SESI employee, notify SESI at 973-808-9050.

### 10.3.1 Emergency Care Steps

Survey the scene. Determine if it is safe to proceed. Try to determine if the conditions that caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.

- Do a primary survey of the victim. Check for airway obstruction, breathing, and pulse. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victim's condition, and help being given.
- Maintain airway and perform rescue breathing as necessary.
- Perform CPR as necessary.
- Do a secondary survey of the victim. Check vital signs and do a head-to-toe exam.

Treat other conditions as necessary. If the victim can be moved, take him/her to a location away from the work area where EMS can gain access.

## 10.4 First Aid - General

All persons must report any injury or illness to their immediate supervisor or the FS. Trained personnel will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The FS and SSO must fill out an accident/incident report as soon as emergency conditions no longer exist and first aid and/or medical treatment has been ensured. The report must be completed and submitted to the PM within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured person(s) should be transported to the medical facility. If the injured person is not ambulatory or shows any sign of not being in a comfortable and

stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

### 10.4.1 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Section 4, General Site Safety Procedures, will be removed from the work area and transported to the designated medical facility for examination and treatment.

### 10.4.2 First Aid - Ingestion

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for treatment information. If the victim is unconscious, keep them on their side and clear the airway if vomiting occurs.

### 10.4.3 First Aid - Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the CRZ, to the wash area. Personnel will remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The worker should be transported to the medical facility if he/she shows any sign of skin reddening, irritation, or if he/she requests a medical examination.

### 10.4.4 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the EZ, must immediately proceed to the eyewash station in the CRZ. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

## 10.5 Reporting Injuries, Illnesses, and Safety Incidents

Injuries and illnesses, however minor, will be reported to the FS immediately. The FS will complete an injury report and submit it to the HSM, and the PM by end of shift.

## 10.6 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. These agencies are identified in Table 7.

**Table 7 – Emergency Contacts**

| **Local Emergency Contacts** | **Telephone No.** |
|---|---|
| EMERGENCY | 911 |
| Montefiore New Rochelle Hospital | (914) 632-5000 |
| Police Emergency | 911 |
| | |
| Fire Emergency | 911 |
| Rescue Squad | 911 |
| Ambulance | 911 |
| **Miscellaneous Contacts** | **Telephone No.** |
| N.Y. Poison Control Center | (800) 222-1222 |
| National Response Center and Terrorist | (800) 424-8802 |

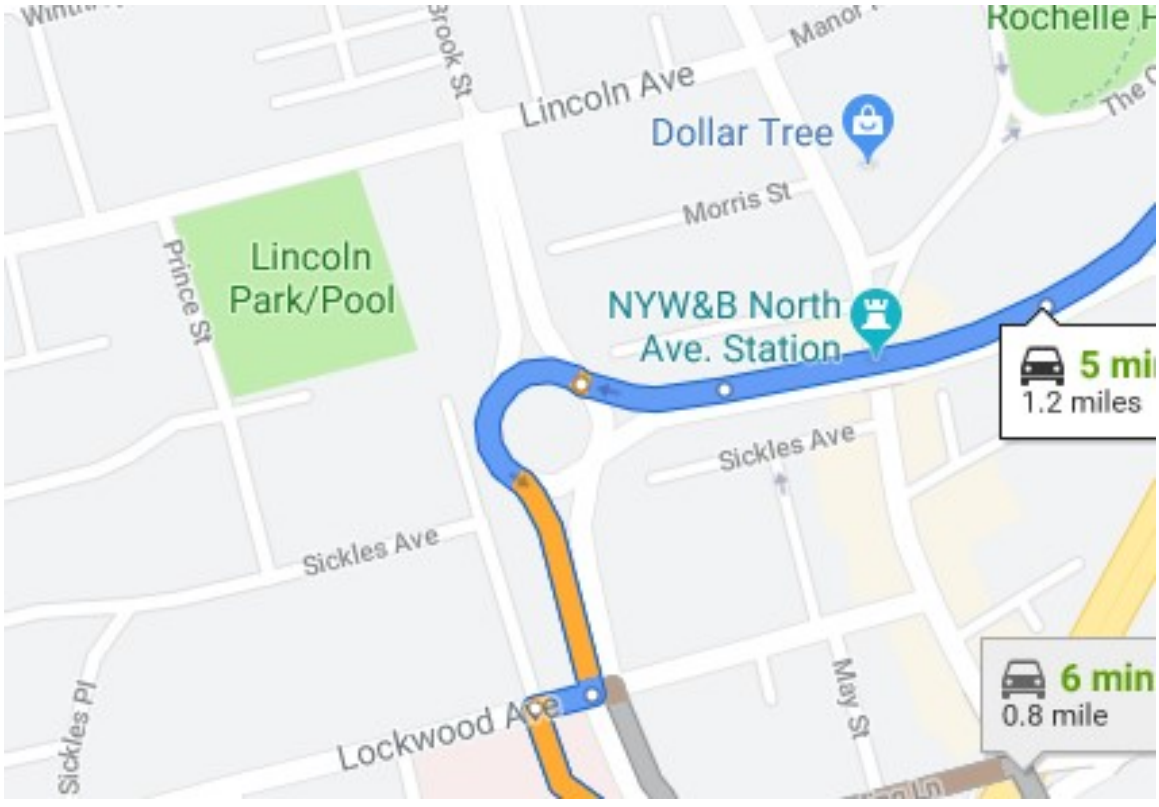
| | |
|---|---|
| Hotline | |
| Center for Disease Control | (800) 311-3435 |
| Utility Mark-Out | (800) 962-7962 |

### 10.6.1 Directions to Hospital

Montefiore New Rochelle Hospital
16 Guion Place, New Rochelle, NY 10801
(914) 632-5000

Directions to Hospital:

1. Head northeast on Renewal Pl toward Commerce Dr
2. Turn right onto Cedar St
3. Use the left lane to turn left onto Radisson Plaza
Continue on River St. Take Cedar St, Memorial Hwy and Norman Rockwell Blvd to Guion Pl
4. Turn left onto River St
5. Merge onto Cedar St
6. Continue straight
7. Continue onto Memorial Hwy
8. Continue onto Norman Rockwell Blvd
9. At the traffic circle, take the 2nd exit and stay on Norman Rockwell Blvd
10. Turn left at the 1st cross street onto Guion Pl
Destination will be on the right



## 11.0 LOGS, REPORTS, AND RECORD KEEPING

The following is a summary of required health and safety logs, reports, and record keeping for the operations at the subject site.

### 11.1 HASP Field Change Request

To be completed for initiating a change to the HASP. PM approval is required. The original will be kept in the project file (See Attachment 3).

### 11.2 Medical and Training Records

The HSM must obtain and keep a log of personnel meeting appropriate training and medical qualifications for the site work. The log will be kept in the project file. Each company's Human Resources Department will maintain medical records, in accordance with 29 CFR 1910.1020.

### 11.3 Exposure Records

Any personnel monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR 1910.1020. For SESI employees, the originals will be sent to the Human Resources Manager. For subcontractor employees, the original file will be sent to the subcontractor employer with a copy maintained in the SESI project file.

### 11.4 Accident/Incident Report

Any accident/incident reports must be completed following procedures given in Section 10.5 of this HASP. The originals will be sent to the HSM for maintenance. A copy of the forms will be kept in the project file. (See Attachment 4)

### 11.5 OSHA Form 200

An OSHA Form 200 (Log of Occupational Injuries and Illnesses) will be kept at the project site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the Human Resources Manager for maintenance. Subcontractor employees must also meet the requirements of maintaining an OSHA 200 Form. The accident/incident report meets the requirements of the OSHA Form 101 (Supplemental Record), which must be maintained with the OSHA Form 200 for all recordable injuries or illnesses.

### 11.6 On-Site Health and Safety Field Logbooks

The HSM or designee will maintain an on-site health and safety log book in which daily Site conditions, activities, personnel, and significant events will be recorded. Calibration records and personnel monitoring results, if available, will also be recorded in the field logbook. The original logbook will be kept in the project file.

Whenever any personnel monitoring is conducted onsite, the monitoring results will be noted in the filed logbook. These will become part of the exposure records file and will be maintained by the HSM.

A signatory page is included (See Attachment 5) and is to be signed by those working on and/or visiting the site.

### 11.7 Material Safety Data Sheets

Material Safety Data Sheets (MSDS) will be obtained and kept on file at the project site for each hazardous chemical brought to, use, or stored at the Site (See Attachment 6).

## 12.0 COVID-19 RESPONSE ACTION PLAN

SESI is concerned with the safety and well-being of its employees, vendors, subcontractors, and others with access to its offices and job sites, with particular emphasis on the unique challenges posed by COVID-19.

SESI has established the following protocols in keeping with the recommendations of the CDC and other sources including State Governor Executive Orders for work taking place on construction sites.

We request that all SESI employees, vendors, and subcontractors help with our prevention efforts while at work. In order to minimize the spread of COVID-19, we must all cooperate in doing the following:

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol. Always wash hands that are visibly soiled.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.
- Discourage handshaking, avoid touching your eyes, nose, or mouth with unwashed hands.
- Limit the sharing of tools, machinery, equipment, phones, desks, and computers.
- Wear cloth face coverings on all construction sites.
- Avoid close contact with people who are sick.
- Employees who have symptoms (i.e., fever, cough, or shortness of breath) should notify their supervisor and stay home—DO NOT GO TO WORK.
- Sick employees should follow CDC-recommended steps. Employees should not return to work until the criteria to discontinue home isolation are met, in consultation with healthcare providers and state and local health departments.

The following are the specific jobsite protocols and response actions to be taken in the event someone on site has been in contact with, or has themselves, the COVID-19 virus:

**OFFICE/JOBSITE PROTOCOL**

- If an employee/worker exhibits COVID-19 symptoms, the employee/worker must remain at home until he or she is symptom free for 72 hours (3 full days) without the use of fever-reducing or other symptom-altering medicines (e.g. acetaminophen, cough suppressants). SESI will similarly require an employee or worker that reports to work with symptoms to return home until they are symptom free for 72 hours (3 full days).
- Limit person to person contact, and when unavoidable, maintain CDC distancing guidelines.

- Avoid eating lunch in groups.
- Avoid in-person meetings if possible. If an in-person meeting is necessary, conduct it in a well-ventilated area with enough space for attendees to distance themselves from one another. Field jobsite meetings should be conducted in smaller group meetings (no more than 5 persons when possible) versus one large meeting.
- Only workers necessary to the execution of the work should be at the jobsites. No non-essential visitors should be permitted at the worksite.

**RESPONSE ACTION TRIGGER EVENTS:**

- an employee/worker at work has tested positive for COVID-19
- an employee/worker at work has suspected, but unconfirmed, case of COVID-19
- an employee/worker self-reported that they came in contact with someone who had a presumptive positive case of COVID-19
- an employee/worker has been exposed to the virus but only found out after they have interacted with others

**RESPONSE ACTIONS:**

- Upon occurrence of any of the Trigger Events above, employees/subcontractors shall notify SESI Management about the suspected employee/worker infected with, or exposed to, COVID-19.
- SESI Management will investigate the incident to confirm the report is valid.
- Employees/Subcontractors shall investigate their respective infected employee(s) and report the following to SESI Management and HR:
    a) Identify all individuals who worked in proximity (six feet) of the infected employee/worker,
    b) Employee(s)/Worker(s) infected with the COVID-19 virus, and employee(s)/worker(s) that came in contact with the infected employee/worker shall be sent home for a period of 14 days,
    c) Do not identify the infected employee/worker by name to avoid violation of privacy/confidentiality laws, and,
    d) Keep SESI Management informed of progress and updates.

- If an infected person was in the office, SESI will clean and disinfect common areas and surfaces, in accordance with CDC recommendations.

- SESI Management will notify affected employees/workers of the Trigger Event and instruct them to take the response actions above.

- **SESI Management policy requires written documentation from a health care professional, that confirmed infected employees can return to work.**

Except for circumstances in which SESI is legally required to report workplace occurrences of communicable disease, the confidentiality of all medical conditions will be maintained in accordance with applicable law and to the extent practical under the circumstances. When required, the number of persons who will be informed of an employee's/worker's condition will be kept at the minimum needed to appropriately notify other potentially affected employees/workers of Trigger Events and to attempt to minimize the potential for transmission of the virus.

# ATTACHMENT 1

# AIR MONITOR LOG

# ATTACHMENT 1

# AIR MONITOR LOG

## Air Monitoring: Sample Collection and Analysis

| Date & Time of Monitoring | Task / Operation Being | Substance(s)/ Hazard(s) Being | Monitoring Location | Type/Method of Monitoring | Monitoring Results | Exposure Limits | Required Action |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
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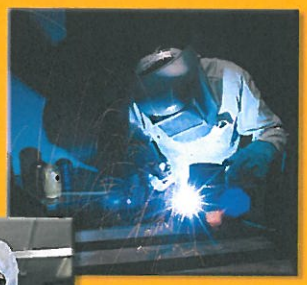
# ATTACHMENT 2

# OSHA POSTER

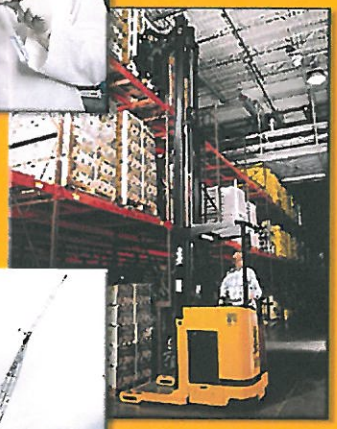
# Job Safety and Health

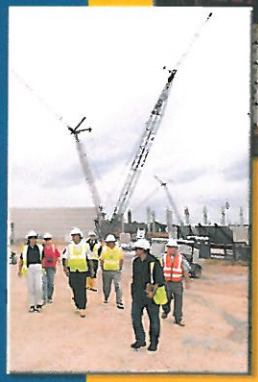
# It's the law!

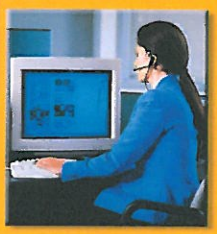
OSHA®
Occupational Safety and Health Administration
U.S. Department of Labor











**EMPLOYEES:**

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

**EMPLOYERS:**

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
*The Best Resource for Safety and Health*

**Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.**

**1-800-321-OSHA (6742)**
**www.osha.gov**

OSHA 3165-02 2012R

# ATTACHMENT 3

# FILED CHANGE REQUEST FORM

# HEALTH & SAFETY PLAN
# CHANGE NOTICE

Pages _____ of _____

Project: H&S-CN

1) HASP VERSION: _____ SECTION: _____ PAGE (s): _____

RE: --- Change to existing HASP Anticipated Revision Date: _____
--- Addition to existing HASP
--- Other: _____
_____CONT._____

2) PROPOSED CHANGE: _____
_____
_____
_____

3) REASON FOR PROPOSED CHANGE(s):
--- Required by SPEC or Change Order --- Other: _____
--- Disposition of Deficiency _____CONT._____
--- Change in Regulatory or Other Requirements
--- Operational Experience

4) EXHIBITS ATTACHED ____ NO ____ YES (If YES, describe) _____
_____CONT._____

5) PMK APPROVALS PROJECT MANAGER: _____ Date: _____
SITE MANAGER: _____ Date: _____
H&S MANAGER: _____ Date: _____

Client Approval Required: ____ NO ____ YES (If YES, date submitted) _____

6) CLIENT APPROVAL _____ APPROVED _____ REMANDED _____ REJECTED

Comments: _____
_____
_____ CONT._____

Client Representative: _____Date: _____

7) DISTRIBUTION AFTER APPROVAL

X HASP UPDATE LIST --- OTHER: _____
X CLIENT _____
X PROJECT FILES _____

8) PREPARED BY: _____Date: _____
Title: _____

# ATTACHMENT 4

# INJURY REPORT FORM

# OSHA's Form 301
# Injury and Illness Incident Report

**Attention:** This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

**U.S. Department of Labor**
**Occupational Safety and Health Administration**

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (_____)_____-_____ Date ____/ ____/ ____

### Information about the employee

1) Full name _____

2) Street _____

City _____ State _____ ZIP _____

3) Date of birth ____/ ____/ ____

4) Date hired ____/ ____/ ____

5) ☐ Male
☐ Female

### Information about the physician or other health care professional

6) Name of physician or other health care professional _____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ ZIP _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

### Information about the case

10) Case number from the *Log* _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ____/ ____/ ____

12) Time employee began work _____ AM / PM

13) Time of event _____ AM / PM ☐ Check if time cannot be determined

14) ***What was the employee doing just before the incident occurred?*** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) ***What happened?*** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) ***What was the injury or illness?*** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) ***What object or substance directly harmed the employee?*** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.*

18) ***If the employee died, when did death occur?*** Date of death ____/ ____/ ____

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspects of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 300 (Rev. 01/2004)

# Log of Work-Related Injuries and Illnesses

**Attention:** This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

**U.S. Department of Labor**
**Occupational Safety and Health Administration**

Form approved OMB no. 1218-0176

*You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.*

Establishment name _____

City _____ State _____

| Identify the person | | | Describe the case | | | Classify the case — CHECK ONLY ONE box for each case based on the most serious outcome for that case: | | | | Enter the number of days the injured or ill worker was: | | Check the "Injury" column or choose one type of illness: | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Remained at Work | | | | | | (M) | | | | | |
| (A) Case no. | (B) Employee's name | (C) Job title (*e.g., Welder*) | (D) Date of injury or onset of illness | (E) Where the event occurred (*e.g., Loading dock north end*) | (F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*) | Death (G) | Days away from work (H) | Job transfer or restriction (I) | Other recordable cases (J) | Away from work (K) | On job transfer or restriction (L) | Injury (1) | Skin disorder (2) | Respiratory condition (3) | Poisoning (4) | Hearing loss (5) | All other illnesses (6) |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ____ | | | __/__ month/day | | | ☐ | ☐ | ☐ | ☐ | ____ days | ____ days | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **Page totals ➤** | | | | | | ____ | ____ | ____ | ____ | ____ | ____ | ____ Injury (1) | ____ Skin disorder (2) | ____ Respiratory condition (3) | ____ Poisoning (4) | ____ Hearing loss (5) | ____ All other illnesses (6) |

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

*Be sure to transfer these totals to the Summary page (Form 300A) before you post it.*

OSHA's Form 300A (Rev. 01/2004)

# Summary of Work-Related Injuries and Illnesses

Year 20__ __

**U.S. Department of Labor**
**Occupational Safety and Health Administration**

Form approved OMB no. 1218-0176

*All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.*

*Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."*

*Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.*

## Number of Cases

| Total number of deaths | Total number of cases with days away from work | Total number of cases with job transfer or restriction | Total number of other recordable cases |
|---|---|---|---|
| _____ | _____ | _____ | _____ |
| (G) | (H) | (I) | (J) |

## Number of Days

| Total number of days away from work | Total number of days of job transfer or restriction |
|---|---|
| _____ | _____ |
| (K) | (L) |

## Injury and Illness Types

| Total number of . . . | (M) | | |
|---|---|---|---|
| (1) Injuries | _____ | (4) Poisonings | _____ |
| | | (5) Hearing loss | _____ |
| (2) Skin disorders | _____ | (6) All other illnesses | _____ |
| (3) Respiratory conditions | _____ | | |

**Post this Summary page from February 1 to April 30 of the year following the year covered by the form.**

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

## Establishment information

**Your establishment name** _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

__ __ __ __

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

__ __ __ __ __ __

## Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

## Sign here

**Knowingly falsifying this document may result in a fine.**

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

( ) - / /
Phone Date

# ATTACHMENT 5

# SIGNATORY PAGE

## Attachment 5 – Site-Specific Health and Safety Orientation Signatory Page
### HEALTH AND SAFETY PLAN

| Title | Name | Signature |
|---|---|---|
| Project Manager: | TBD | |
| Health and Safety Manager: | TBD | |

I have read the attached Health and Safety Plan (HASP) and have received site-specific information and orientation regarding the identified physical, chemical, and biological hazards anticipated at this site. My signature certifies that I understand the procedures, equipment, and restrictions applicable to this project site and agree to abide by them.

| Signature | Printed Name | Company | Date |
|---|---|---|---|
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**Attachment 4 – Health and Safety Orientation Signatory Page (continued)**

| Signature | Printed Name | Company | Date |
|---|---|---|---|
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# ATTACHMENT 6

# SAFETY DATA SHEETS

# (SDS)

# SAFETY DATA SHEET

Version 4.9
Revision Date 07/27/2018
Print Date 11/10/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : 1,1,1-Trichloroethane solution

Product Number : 48614
Brand : Supelco
Index-No. : 603-001-00-X

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311
Specific target organ toxicity - single exposure (Category 1), H370

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H301 + H311 + H331 Toxic if swallowed, in contact with skin or if inhaled.
H370 Causes damage to organs.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.

| | |
|---|---|
| P260 | Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P270 | Do not eat, drink or smoke when using this product. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P280 | Wear protective gloves/ eye protection/ face protection. |
| P301 + P310 + P330 | IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth. |
| P303 + P361 + P353 | IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower. |
| P304 + P340 + P311 | IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician. |
| P307 + P311 | IF exposed: Call a POISON CENTER or doctor/ physician. |
| P363 | Wash contaminated clothing before reuse. |
| P370 + P378 | In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction. |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P403 + P235 | Store in a well-ventilated place. Keep cool. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.2 Mixtures**

Synonyms : Methyl chloroform

Molecular weight : 32.04 g/mol

**Hazardous components**

| Component | | Classification | Concentration |
|---|---|---|---|
| **Methanol** | | | |
| CAS-No. | 67-56-1 | Flam. Liq. 2; Acute Tox. 3; STOT SE 1; H225, H301 + H311 + H331, H370 | 90 - 100 % |
| EC-No. | 200-659-6 | | |
| Index-No. | 603-001-00-X | | |
| Registration number | 01-2119433307-44-XXXX | | |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
No data available

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
Use water spray to cool unopened containers.

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

**6.3 Methods and materials for containment and cleaning up**
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store at room temperature.
Storage class (TRGS 510): 3: Flammable liquids

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| Methanol | 67-56-1 | TWA | 200 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Headache<br>Nausea<br>Dizziness<br>Eye damage | | |

| | | | | |
|---|---|---|---|---|
| | | Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Danger of cutaneous absorption | | |
| | | STEL | 250 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | | Headache<br>Nausea<br>Dizziness<br>Eye damage<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Danger of cutaneous absorption | | |
| | | TWA | 200 ppm<br>260 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential for dermal absorption | | |
| | | ST | 250 ppm<br>325 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential for dermal absorption | | |
| | | TWA | 200 ppm<br>260 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | The value in mg/m3 is approximate. | | |
| | | C | 1,000 ppm | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | Skin | | |
| | | PEL | 200 ppm<br>260 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | Skin | | |
| | | STEL | 250 ppm<br>325 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | Skin | | |

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| | - | Methanol | 15 mg/l | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | End of shift (As soon as possible after exposure ceases) | | | |

## 8.2 Exposure controls

**Appropriate engineering controls**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: -98 °C (-144 °F) |
| f) | Initial boiling point and boiling range | 64.6 - 64.7 °C (148.3 - 148.5 °F) at 1,013 hPa (760 mmHg) |
| g) | Flash point | 11 °C (52 °F) - closed cup |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | Upper explosion limit: 36 %(V)<br>Lower explosion limit: 6 %(V) |
| k) | Vapour pressure | 130.23 hPa (97.68 mmHg) at 20 °C (68 °F)<br>547 hPa (410 mmHg) at 50 °C (122 °F) |
| l) | Vapour density | No data available |
| m) | Relative density | 0.791 g/cm3 |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | 385 °C (725 °F) |
| q) | Decomposition temperature | No data available |

| | | |
|---|---|---|
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**10.4 Conditions to avoid**
Heat, flames and sparks.

**10.5 Incompatible materials**
Acids, Oxidizing agents, Alkali metals, Acid chlorides, Acid anhydrides, Reducing agents

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - male and female - > 1,187 - 2,769 mg/kg
Remarks: (ECHA) (Regulation (EC) No 1272/2008, Annex VI)

LDLO Oral - Human - 143 mg/kg
Remarks: Lungs, Thorax, or Respiration:Dyspnea. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

LC50 Inhalation - Rat - male and female - 4 h - 131.25 mg/l
Remarks: (ECHA) (Regulation (EC) No 1272/2008, Annex VI)

LD50 Dermal - Rabbit - 17,100 mg/kg
Remarks: (External MSDS) (Regulation (EC) No 1272/2008, Annex VI)

No data available

No data available

**Skin corrosion/irritation**
No data available

Skin - Rabbit
Result: No skin irritation
Remarks: (ECHA) Drying-out effect resulting in rough and chapped skin.

**Serious eye damage/eye irritation**
No data available

Eyes - Rabbit
Result: No eye irritation
Remarks: (ECHA) Irritation of mucous membranes

**Respiratory or skin sensitisation**
Maximisation Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

**Germ cell mutagenicity**

No data available

Based on available data the classification criteria are not met.

Ames test
S. typhimurium
Result: negative

In vitro mammalian cell gene mutation test
fibroblast
Result: negative

OECD Test Guideline 474
Mouse - male and female - Bone marrow
Result: negative

**Carcinogenicity**

Did not show carcinogenic effects in animal experiments.

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| ACGIH: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |

**Reproductive toxicity**
No data available
No data available

Based on available data the classification criteria are not met.

**Specific target organ toxicity - single exposure**
No data available
Acute inhalation toxicity - Irritation symptoms in the respiratory tract.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**

| | |
|---|---|
| Repeated dose toxicity | Rat - male and female - Inhalation - 28 d - NOAEL : 6.66 mg/l - OECD Test Guideline 412 -Subacute toxicity |
| | Rat - male and female - Inhalation - 365 d - NOAEL : 0.13 mg/l - LOAEL : 1.3 mg/l - OECD Test Guideline 453 |

RTECS: Not available

Methyl alcohol may be fatal or cause blindness if swallowed., Cannot be made non-poisonous., Effects due to ingestion may include:, Nausea, Dizziness, Gastrointestinal disturbance, Weakness, Confusion., Drowsiness, Unconsciousness, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Headache, Dizziness, Drowsiness, Coma, narcosis, Blindness, Impairment of vision, irritant effects, Nausea, Vomiting, agitation, spasms, inebriation
Drying-out effect resulting in rough and chapped skin., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

No data available

| | |
|---|---|
| Toxicity to fish | flow-through test LC50 - Lepomis macrochirus (Bluegill) - 15,400.0 mg/l - 96 h<br>(US-EPA) |
| Toxicity to daphnia and other aquatic invertebrates | EC50 - Daphnia magna (Water flea) - > 10,000 mg/l - 48 h<br>Remarks: (ECHA) |
| | semi-static test EC50 - Daphnia magna (Water flea) - 18,260 mg/l - 96 h<br>(OECD Test Guideline 202) |
| Toxicity to algae | static test ErC50 - Pseudokirchneriella subcapitata (green algae) - ca. 22,000.0 mg/l - 96 h<br>(OECD Test Guideline 201) |
| Toxicity to bacteria | EC5 - Pseudomonas fluorescens - 6,600 mg/l - 16 h<br>Remarks: (IUCLID) |
| | static test IC50 - activated sludge - > 1,000 mg/l - 3 h<br>(OECD Test Guideline 209) |

12.2 Persistence and degradability

No data available

| | |
|---|---|
| Biochemical Oxygen Demand (BOD) | 600 - 1,120 mg/g<br>Remarks: (IUCLID) |
| Chemical Oxygen Demand (COD) | 1,420 mg/g<br>Remarks: (IUCLID) |
| Theoretical oxygen demand | 1,500 mg/g<br>Remarks: (Lit.) |
| Ratio BOD/ThBOD | 76 %<br>Remarks: Closed Bottle test(IUCLID) |

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

| | |
|---|---|
| Additional ecological information | Avoid release to the environment. |
| Stability in water | at 19 °C83 - 91 % - 72 h<br>Remarks: Hydrolyses on contact with water.Hydrolyses readily. |

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 1230 Class: 3 Packing group: II
Proper shipping name: Methanol
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

**IMDG**
UN number: 1230 Class: 3 (6.1) Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHANOL

**IATA**
UN number: 1230 Class: 3 (6.1) Packing group: II
Proper shipping name: Methanol

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Methanol | 67-56-1 | 2007-07-01 |

**SARA 311/312 Hazards**
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Methanol | 67-56-1 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Methanol | 67-56-1 | 2007-07-01 |
| 1,1,1-Trichloroethane | 71-55-6 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Methanol | 67-56-1 | 2007-07-01 |

**California Prop. 65 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.<br>Methanol | 67-56-1 | 2012-03-16 |

## 16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

| | |
|---|---|
| Acute Tox. | Acute toxicity |
| Flam. Liq. | Flammable liquids |
| H225 | Highly flammable liquid and vapour. |
| H301 | Toxic if swallowed. |
| H301 + H311 + H331 | Toxic if swallowed, in contact with skin or if inhaled. |
| H311 | Toxic in contact with skin. |
| H331 | Toxic if inhaled. |
| H370 | Causes damage to organs. |
| STOT SE | Specific target organ toxicity - single exposure |

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.9 Revision Date: 07/27/2018 Print Date: 11/10/2018

# SAFETY DATA SHEET

Version 6.0
Revision Date 05/25/2018
Print Date 01/21/2019

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : 1,1,2-Trichloroethane

Product Number : 46262
Brand : Sigma-Aldrich
Index-No. : 602-014-00-8

CAS-No. : 79-00-5

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

### 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Acute toxicity, Oral (Category 4), H302

Acute toxicity, Inhalation (Category 3), H331

Acute toxicity, Dermal (Category 4), H312

Carcinogenicity (Category 2), H351

Acute aquatic toxicity (Category 3), H402

Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



| | |
|---|---|
| Signal word | Danger |
| Hazard statement(s) | |
| H302 + H312 | Harmful if swallowed or in contact with skin. |
| H331 | Toxic if inhaled. |
| H351 | Suspected of causing cancer. |
| H412 | Harmful to aquatic life with long lasting effects. |
| Precautionary statement(s) | |
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P270 | Do not eat, drink or smoke when using this product. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing. |
| P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P304 + P340 | IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. |
| P311 | Call a POISON CENTER /doctor. |
| P322 | Specific measures (see supplemental first aid instructions on this label). |
| P330 | Rinse mouth. |
| P363 | Wash contaminated clothing before reuse. |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Repeated exposure may cause skin dryness or cracking.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

| | | |
|---|---|---|
| Formula | : | $C_2H_3Cl_3$ |
| Molecular weight | : | 133.40 g/mol |
| CAS-No. | : | 79-00-5 |
| EC-No. | : | 201-166-9 |
| Index-No. | : | 602-014-00-8 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **1,1,2-Trichloroethane** | | |
| | Acute Tox. 4; Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 3; Aquatic Chronic 3; H302 + H312, H331, H351, H412 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**General advice**

Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
Carbon oxides, Hydrogen chloride gas

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**
**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| 1,1,2-Trichloroethane | 79-00-5 | TWA | 10 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Central Nervous System impairment<br>Liver damage<br>Confirmed animal carcinogen with unknown relevance to humans<br>Danger of cutaneous absorption | | |
| | | TWA | 10 ppm<br>45 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential Occupational Carcinogen<br>See Appendix C<br>See Appendix A<br>Potential for dermal absorption | | |
| | | TWA | 10 ppm<br>45 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | Skin designation<br>The value in mg/m3 is approximate. | | |
| | | PEL | 10 ppm<br>45 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | Skin | | |

**8.2 Exposure controls**

**Appropriate engineering controls**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Personal protective equipment**

**Eye/face protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 60 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls.

If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid<br>Colour: colourless |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | -37.0 °C (-34.6 °F) |
| f) | Initial boiling point and boiling range | 110 - 115 °C (230 - 239 °F) - lit. |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | 1.435 g/cm3 at 25 °C (77 °F) |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

### 9.2 Other safety information

No data available

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid
No data available

### 10.5 Incompatible materials
Strong bases, Strong oxidizing agents, Reacts violently with:, Sodium/sodium oxides, Potassium, Magnesium, Aluminum

### 10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

**Acute toxicity**
LD50 Oral - Rat - 836.0 mg/kg
Inhalation: No data available
Dermal: No data available
No data available

**Skin corrosion/irritation**
Skin - Rabbit
Result: Severe skin irritation - 24 h
Skin - Rabbit
Result: Mild skin irritation - 24 h

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Mild eye irritation - 24 h

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification. The National Cancer Institute (NCI) has found clear evidence for carcinogenicity.
Limited evidence of carcinogenicity in animal studies

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |

**Reproductive toxicity**
No data available
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: KJ3150000

Central nervous system depression, prolonged or repeated exposure can cause:, narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | LC50 - Lepomis macrochirus (Bluegill) - 40.00 mg/l - 96 h(1,1,2-Trichloroethane) |
| | LC50 - Pimephales promelas (fathead minnow) - 81.60 mg/l - 96 h(1,1,2-Trichloroethane) |
| Toxicity to daphnia and other aquatic invertebrates | EC50 - Daphnia magna (Water flea) - 43.00 mg/l - 48 h(1,1,2-Trichloroethane) |

### 12.2 Persistence and degradability
No data available

### 12.3 Bioaccumulative potential
No data available

### 12.4 Mobility in soil
No data available(1,1,2-Trichloroethane)

### 12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 2810 Class: 6.1 Packing group: III
Proper shipping name: Toxic, liquids, organic, n.o.s. (1,1,2-Trichloroethane)
Reportable Quantity (RQ) : 100 lbs

no
Poison Inhalation Hazard: No

**IMDG**
UN number: 2810 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC LIQUID, ORGANIC, N.O.S. (1,1,2-Trichloroethane)

**IATA**
UN number: 2810 Class: 6.1 Packing group: III
Proper shipping name: Toxic liquid, organic, n.o.s. (1,1,2-Trichloroethane)

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1,2-Trichloroethane | 79-00-5 | 2007-07-01 |

**SARA 311/312 Hazards**
Acute Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1,2-Trichloroethane | 79-00-5 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1,2-Trichloroethane | 79-00-5 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1,2-Trichloroethane | 79-00-5 | 2007-07-01 |

**California Prop. 65 Components**

| WARNING! This product contains a chemical known to the State of California to cause cancer. | CAS-No. | Revision Date |
|---|---|---|
| 1,1,2-Trichloroethane | 79-00-5 | 2007-09-28 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| H302 | Harmful if swallowed. |
| H302 + H312 | Harmful if swallowed or in contact with skin. |
| H312 | Harmful in contact with skin. |
| H331 | Toxic if inhaled. |
| H351 | Suspected of causing cancer. |
| H402 | Harmful to aquatic life. |
| H412 | Harmful to aquatic life with long lasting effects. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Chronic Health Hazard: | |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 1 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.0 Revision Date: 05/25/2018 Print Date: 01/21/2019

# SAFETY DATA SHEET

Version 5.4
Revision Date 05/27/2016
Print Date 04/26/2019

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : 1,1-Dichloroethane

Product Number : 48512
Brand : Supelco
Index-No. : 602-011-00-1

CAS-No. : 75-34-3

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

| | |
|---|---|
| P233 | Keep container tightly closed. |
| P240 | Ground/bond container and receiving equipment. |
| P241 | Use explosion-proof electrical/ ventilating/ lighting/ equipment. |
| P242 | Use only non-sparking tools. |
| P243 | Take precautionary measures against static discharge. |
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P270 | Do not eat, drink or smoke when using this product. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ eye protection/ face protection. |
| P301 + P312 + P330 | IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth. |
| P303 + P361 + P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. |
| P304 + P340 + P312 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P337 + P313 | If eye irritation persists: Get medical advice/ attention. |
| P370 + P378 | In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish. |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P403 + P235 | Store in a well-ventilated place. Keep cool. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

| | | |
|---|---|---|
| Synonyms | : | Ethylidene chloride |
| Formula | : | $C_2H_4Cl_2$ |
| Molecular weight | : | 98.96 g/mol |
| CAS-No. | : | 75-34-3 |
| EC-No. | : | 200-863-5 |
| Index-No. | : | 602-011-00-1 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **1,1-Dichloroethane** | | |
| | Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H225, H302, H319, H335, H412 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
No data available

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
Use water spray to cool unopened containers.

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| 1,1-Dichloroethane | 75-34-3 | TWA | 100.000000 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Upper Respiratory Tract irritation<br>Eye irritation<br>Liver damage<br>Kidney damage<br>Not classifiable as a human carcinogen | | |
| | | TWA | 100.000000 ppm<br>400.000000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | See Appendix C | | |
| | | TWA | 100.000000 ppm<br>400.000000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | The value in mg/m3 is approximate. | | |
| | | PEL | 100 ppm<br>400 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 60 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | -98.0 °C (-144.4 °F) |
| f) | Initial boiling point and boiling range | 55.0 - 58.0 °C (131.0 - 136.4 °F) |
| g) | Flash point | -10.0 °C (14.0 °F) - closed cup |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | 1.17 g/cm3 |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

### 9.2 Other safety information
No data available

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**10.4 Conditions to avoid**
Heat, flames and sparks.

**10.5 Incompatible materials**
Oxidizing agents

**10.6 Hazardous decomposition products**
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - 725.0 mg/kg

LC50 Inhalation - Rat - 4 h - 13000 ppm

Dermal: No data available

No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
Chronic exposure may cause dermatitis.

**Germ cell mutagenicity**
No data available

**Carcinogenicity**

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**
No data available

No data available

**Specific target organ toxicity - single exposure**
May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: KI0175000

Liver injury may occur., Kidney injury may occur., narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

## 12. ECOLOGICAL INFORMATION

**12.1 Toxicity**
No data available

**12.2 Persistence and degradability**
No data available

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available

**12.5 Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

## 13. DISPOSAL CONSIDERATIONS

**13.1 Waste treatment methods**

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 2362 Class: 3 Packing group: II
Proper shipping name: 1,1-Dichloroethane
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

**IMDG**
UN number: 2362 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,1-DICHLOROETHANE

**IATA**
UN number: 2362 Class: 3 Packing group: II
Proper shipping name: 1,1-Dichloroethane

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1-Dichloroethane | 75-34-3 | 2007-07-01 |

**SARA 311/312 Hazards**
Fire Hazard, Acute Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1-Dichloroethane | 75-34-3 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1-Dichloroethane | 75-34-3 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| 1,1-Dichloroethane | 75-34-3 | 2007-07-01 |

**California Prop. 65 Components**

| | | |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer. | CAS-No. | Revision Date |
| 1,1-Dichloroethane | 75-34-3 | 2007-09-28 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Acute Tox. | Acute toxicity |
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Eye Irrit. | Eye irritation |
| Flam. Liq. | Flammable liquids |
| H225 | Highly flammable liquid and vapour. |
| H302 | Harmful if swallowed. |
| H319 | Causes serious eye irritation. |
| H335 | May cause respiratory irritation. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Chronic Health Hazard: | * |
| Flammability: | 3 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Fire Hazard: | 3 |
| Reactivity Hazard: | 0 |

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.4 Revision Date: 05/27/2016 Print Date: 04/26/2019

# SAFETY DATA SHEET

**Creation Date** 22-Sep-2009 **Revision Date** 25-Apr-2019 **Revision Number** 6

## 1. Identification

**Product Name** **Vinylidene chloride, stabilized**

**Cat No. :** **AC172290000; AC172290010; AC172290025; AC172290250**

**CAS-No** 75-35-4
**Synonyms** 1,1-Dichloroethylene

**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
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

**Emergency Telephone Number**
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
**CHEMTREC** Tel. No.**US:**001-800-424-9300 / **Europe:**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)

| | |
|---|---|
| Flammable liquids | Category 1 |
| Acute oral toxicity | Category 4 |
| Acute Inhalation Toxicity - Vapors | Category 4 |
| Serious Eye Damage/Eye Irritation | Category 2 |
| Carcinogenicity | Category 2 |
| Specific target organ toxicity - (repeated exposure) | Category 2 |

**Label Elements**

**Signal Word**
Danger

**Hazard Statements**
Extremely flammable liquid and vapor
Harmful if swallowed
Causes serious eye irritation
Harmful if inhaled

Suspected of causing cancer
May cause damage to organs through prolonged or repeated exposure



**Precautionary Statements**
**Prevention**
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
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
**Response**
IF exposed or concerned: Get medical attention/advice
**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
**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/attention
**Ingestion**
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
**Fire**
In case of fire: Use CO2, dry chemical, or foam for extinction
**Storage**
Store locked up
Store in a well-ventilated place. Keep cool
**Disposal**
Dispose of contents/container to an approved waste disposal plant
**Hazards not otherwise classified (HNOC)**
Toxic to aquatic life with long lasting effects

## 3. Composition/Information on Ingredients

| Component | CAS-No | Weight % |
|---|---|---|
| Vinylidene chloride | 75-35-4 | >95 |
| 4-Methoxyphenol | 150-76-5 | 0.02 |

## 4. First-aid measures

**Eye Contact** Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

**Skin Contact** Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

**Inhalation** Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

**Ingestion** Do not induce vomiting. Obtain medical attention.

**Most important symptoms and effects** Breathing difficulties. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

**Notes to Physician** Treat symptomatically

## 5. Fire-fighting measures

**Suitable Extinguishing Media** Water spray. Carbon dioxide ($CO_2$). Dry chemical. Use water spray to cool unopened containers. Chemical foam. Cool closed containers exposed to fire with water spray.

**Unsuitable Extinguishing Media** No information available

**Flash Point** -25 °C / -13 °F

**Method -** No information available

**Autoignition Temperature** 520 °C / 968 °F

**Explosion Limits**

**Upper** 16.5%

**Lower** 8.4%

**Sensitivity to Mechanical Impact** No information available

**Sensitivity to Static Discharge** No information available

**Specific Hazards Arising from the Chemical**

Extremely flammable. Vapors may travel to source of ignition and flash back. Vapors may form explosive mixture with air. Containers may explode when heated. Vapors may form explosive mixtures with air.

**Hazardous Combustion Products**

Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide ($CO_2$) Formaldehyde peroxides

**Protective Equipment and Precautions for Firefighters**

Vapors are heavier than air and may spread along floors. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**NFPA**

| Health | Flammability | Instability | Physical hazards |
|---|---|---|---|
| 2 | 4 | 1 | N/A |

## 6. Accidental release measures

**Personal Precautions** Remove all sources of ignition. Take precautionary measures against static discharges.

**Environmental Precautions** Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

**Methods for Containment and Clean Up** Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Do not let this chemical enter the environment.

## 7. Handling and storage

**Handling** Ensure adequate ventilation. Wear personal protective equipment. Avoid contact with skin and eyes. Take precautionary measures against static discharges. Do not ingest. Use only

in area provided with appropriate exhaust ventilation. Use explosion-proof equipment. Use only non-sparking tools. Avoid shock and friction. Avoid breathing dust/fume/gas/mist/vapors/spray. Keep away from open flames, hot surfaces and sources of ignition. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

**Storage**

Refrigerator/flammables. Keep away from heat and sources of ignition. Protect from light. May form explosive peroxides on prolonged storage. Keep under nitrogen. Keep containers tightly closed in a dry, cool and well-ventilated place.

## 8. Exposure controls / personal protection

**Exposure Guidelines**

| Component | ACGIH TLV | OSHA PEL | NIOSH IDLH | Mexico OEL (TWA) |
|---|---|---|---|---|
| Vinylidene chloride | TWA: 5 ppm | (Vacated) TWA: 1 ppm<br>(Vacated) TWA: 4 mg/m³ | | TWA: 5 ppm |
| 4-Methoxyphenol | TWA: 5 mg/m³ | (Vacated) TWA: 5 mg/m³ | TWA: 5 mg/m³ | TWA: 5 mg/m³ |

*Legend*

*ACGIH - American Conference of Governmental Industrial Hygienists*
*OSHA - Occupational Safety and Health Administration*
*NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health*

**Engineering Measures**

Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas. 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.

**Hygiene Measures**

Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

| | |
|---|---|
| **Physical State** | Liquid |
| **Appearance** | Colorless |
| **Odor** | aromatic |
| **Odor Threshold** | No information available |
| **pH** | 7 2.5 g/l aq.sol |
| **Melting Point/Range** | -122 °C / -187.6 °F |
| **Boiling Point/Range** | 31.2 - 32 °C / 88.2 - 89.6 °F @ 760 mmHg |
| **Flash Point** | -25 °C / -13 °F |
| **Evaporation Rate** | No information available |
| **Flammability (solid,gas)** | Not applicable |
| **Flammability or explosive limits** | |
| **Upper** | 16.5% |
| **Lower** | 8.4% |
| **Vapor Pressure** | 665 mbar @ 20 °C |
| **Vapor Density** | 3.4 (Air = 1.0) |

| | |
|---|---|
| **Specific Gravity** | 1.218 |
| **Solubility** | No information available |
| **Partition coefficient; n-octanol/water** | No data available |
| **Autoignition Temperature** | 520 °C / 968 °F |
| **Decomposition Temperature** | No information available |
| **Viscosity** | .377 mPa.s at 15 °C |
| **Molecular Formula** | C2 H2 Cl2 |
| **Molecular Weight** | 96.94 |

## 10. Stability and reactivity

**Reactive Hazard** None known, based on information available

**Stability** May form explosive peroxides. Hazardous polymerization may occur upon depletion of inhibitor. Moisture sensitive. Air sensitive. Light sensitive.

**Conditions to Avoid** Keep away from open flames, hot surfaces and sources of ignition. Excess heat. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

**Incompatible Materials** Strong oxidizing agents, Strong bases, Powdered metal salts, oxygen, Peroxides, Metals, copper, Powdered metals, Acids

**Hazardous Decomposition Products** Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide ($CO_2$), Formaldehyde, peroxides

**Hazardous Polymerization** Hazardous polymerization may occur.

**Hazardous Reactions** None under normal processing.

## 11. Toxicological information

**Acute Toxicity**

**Product Information**

**Oral LD50** Category 4. ATE = 300 - 2000 mg/kg.

**Vapor LC50** Category 4. ATE = 10 - 20 mg/l.

**Component Information**

| Component | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|
| Vinylidene chloride | LD50 = 1500 mg/kg ( Rat )<br>LD50 = 200 mg/kg ( Rat ) | Not listed | LC50 = 1.66 mg/L ( Rat ) 4 h<br>LC50 = 6350 ppm ( Rat ) 4 h |
| 4-Methoxyphenol | 1600 mg/kg (Rat) | LD50 > 2000 mg/kg ( Rabbit ) | Not listed |

**Toxicologically Synergistic Products** No information available

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Irritation** May cause eye, skin, and respiratory tract irritation

**Sensitization** No information available

**Carcinogenicity** Limited evidence of a carcinogenic effect. The table below indicates whether each agency has listed any ingredient as a carcinogen.

| Component | CAS-No | IARC | NTP | ACGIH | OSHA | Mexico |
|---|---|---|---|---|---|---|
| Vinylidene chloride | 75-35-4 | Group 2B | Not listed | Not listed | X | Not listed |
| 4-Methoxyphenol | 150-76-5 | Not listed | Not listed | Not listed | Not listed | Not listed |

**Mutagenic Effects** Ames test: positive.

**Reproductive Effects** No information available.

**Developmental Effects** No information available.

**Teratogenicity** No information available.

**STOT - single exposure** None known
**STOT - repeated exposure** None known

**Aspiration hazard** No information available

**Symptoms / effects,both acute and delayed** Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

**Endocrine Disruptor Information** No information available

**Other Adverse Effects** The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

## 12. Ecological information

**Ecotoxicity**

The product contains following substances which are hazardous for the environment. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

| Component | Freshwater Algae | Freshwater Fish | Microtox | Water Flea |
|---|---|---|---|---|
| Vinylidene chloride | Not listed | LC50: 85 - 117 mg/L, 96h flow-through (Pimephales promelas)<br>LC50: 161 - 179 mg/L, 96h static (Pimephales promelas)<br>LC50: 57 - 91 mg/L, 96h static (Lepomis macrochirus) | EC50 > 2000 mg/L 17 h | LC50: 62 - 110 mg/L, 48h Static (Daphnia magna)<br>LC50: 9.0 - 14.0 mg/L, 48h Static (Daphnia magna) |
| 4-Methoxyphenol | Not listed | LC50: = 84.3 mg/L, 96h flow-through (Pimephales promelas)<br>LC50: = 28.5 mg/L, 96h flow-through (Oncorhynchus mykiss) | EC50 = 3.66 mg/L 5 min<br>EC50 = 4.30 mg/L 15 min<br>EC50 = 4.61 mg/L 30 min | Not listed |

**Persistence and Degradability** No information available

**Bioaccumulation/ Accumulation** No information available.

**Mobility** Will likely be mobile in the environment due to its volatility.

| Component | log Pow |
|---|---|
| Vinylidene chloride | 2.02 |
| 4-Methoxyphenol | 1.3 |

## 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.

| Component | RCRA - U Series Wastes | RCRA - P Series Wastes |
|---|---|---|
| Vinylidene chloride - 75-35-4 | U078 | - |

## 14. Transport information

**DOT**

**UN-No** UN1303

**Proper Shipping Name** VINYLIDENE CHLORIDE, STABILIZED
**Hazard Class** 3
**Packing Group** I

**TDG**
**UN-No** UN1303
**Proper Shipping Name** VINYLIDENE CHLORIDE, STABILIZED
**Hazard Class** 3
**Packing Group** I

**IATA**
**UN-No** UN1303
**Proper Shipping Name** VINYLIDENE CHLORIDE, STABILIZED
**Hazard Class** 3
**Packing Group** I

**IMDG/IMO**
**UN-No** UN1303
**Proper Shipping Name** VINYLIDENE CHLORIDE, STABILIZED
**Hazard Class** 3
**Subsidiary Hazard Class** P
**Packing Group** I

## 15. Regulatory information

**United States of America Inventory**

| Component | CAS-No | TSCA | TSCA Inventory notification - Active/Inactive | TSCA - EPA Regulatory Flags |
|---|---|---|---|---|
| Vinylidene chloride | 75-35-4 | X | ACTIVE | - |
| 4-Methoxyphenol | 150-76-5 | X | ACTIVE | - |

**Legend:**
**TSCA** - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

**TSCA 12(b)** - Notices of Export Not applicable

**International Inventories**
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

| Component | CAS-No | DSL | NDSL | EINECS | PICCS | ENCS | AICS | IECSC | KECL |
|---|---|---|---|---|---|---|---|---|---|
| Vinylidene chloride | 75-35-4 | X | - | 200-864-0 | X | X | X | X | KE-10122 |
| 4-Methoxyphenol | 150-76-5 | X | - | 205-769-8 | X | X | X | X | KE-23353 |

**U.S. Federal Regulations**

**SARA 313**

| Component | CAS-No | Weight % | SARA 313 - Threshold Values % |
|---|---|---|---|
| Vinylidene chloride | 75-35-4 | >95 | 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 |
|---|---|---|---|---|
| Vinylidene chloride | X | 100 lb | X | X |

**Clean Air Act**

| Component | HAPS Data | Class 1 Ozone Depletors | Class 2 Ozone Depletors |
|---|---|---|---|
| Vinylidene chloride | X | | - |

**OSHA** - Occupational Safety and Health Administration: Not applicable

**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 |
|---|---|---|
| Vinylidene chloride | 100 lb 1 lb | - |

**California Proposition 65**: This product does not contain any Proposition 65 chemicals

| Component | CAS-No | California Prop. 65 | Prop 65 NSRL | Category |
|---|---|---|---|---|
| Vinylidene chloride | 75-35-4 | Carcinogen | 0.88 µg/day | Carcinogen |

**U.S. State Right-to-Know Regulations**

| Component | Massachusetts | New Jersey | Pennsylvania | Illinois | Rhode Island |
|---|---|---|---|---|---|
| Vinylidene chloride | X | X | X | X | X |
| 4-Methoxyphenol | X | X | X | - | X |

**U.S. Department of Transportation**

Reportable Quantity (RQ): N
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 |
|---|---|
| Vinylidene chloride | Release STQs - 10000lb |

**Other International Regulations**

**Mexico - Grade**: No information available

## 16. Other information

**Prepared By**
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

**Creation Date** 22-Sep-2009
**Revision Date** 25-Apr-2019
**Print Date** 25-Apr-2019
**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

**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

**Creation Date** 04-Feb-2010 **Revision Date** 18-Jan-2018 **Revision Number** 6

## 1. Identification

**Product Name** **1,2-Dichloroethane**

**Cat No. :** **E175-4; E175-20; E175-500; E175RS-19; E175RS-50; E190-4**

**CAS-No** 107-06-2
**Synonyms** Ethylene dichloride; Ethylene chloride (Certified ACS/Spectranalyzed)

**Recommended Use** Laboratory chemicals.
**Uses advised against** Not for food, drug, pesticide or biocidal product use

**Details of the supplier of the safety data sheet**

**Company**
Fisher Scientific
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)

| | |
|---|---|
| Flammable liquids | Category 2 |
| Acute oral toxicity | Category 4 |
| Acute Inhalation Toxicity - Vapors | Category 3 |
| Skin Corrosion/irritation | Category 2 |
| Serious Eye Damage/Eye Irritation | Category 2 |
| Carcinogenicity | Category 1B |
| Specific target organ toxicity (single exposure) | Category 3 |
| Target Organs - Respiratory system, Central nervous system (CNS). | |
| Specific target organ toxicity - (repeated exposure) | Category 2 |
| Target Organs - Kidney, Liver, Heart, Blood. | |

**Label Elements**

**Signal Word**
Danger

**Hazard Statements**
Highly flammable liquid and vapor
Harmful if swallowed
Causes skin irritation
Causes serious eye irritation

Toxic if inhaled
May cause respiratory irritation
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



**Precautionary Statements**
**Prevention**
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
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
Keep cool
**Response**
IF exposed or concerned: Get medical attention/advice
**Inhalation**
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician
**Skin**
If skin irritation occurs: Get medical advice/attention
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
If eye irritation persists: Get medical advice/attention
**Ingestion**
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
**Fire**
In case of fire: Use CO2, dry chemical, or foam for extinction
**Storage**
Store locked up
Store in a well-ventilated place. Keep container tightly closed
**Disposal**
Dispose of contents/container to an approved waste disposal plant
**Hazards not otherwise classified (HNOC)**

**WARNING.** Cancer - https://www.p65warnings.ca.gov/.

## 3. Composition/Information on Ingredients

| Component | CAS-No | Weight % |
|---|---|---|
| Ethylene dichloride | 107-06-2 | >95 |

## 4. First-aid measures

**General Advice** Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

**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** Move 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** Breathing difficulties. May cause cardiac arrhythmia. May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

**Notes to Physician** Treat symptomatically

## 5. Fire-fighting measures

**Suitable Extinguishing Media** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

**Unsuitable Extinguishing Media** Water may be ineffective

**Flash Point** 13 °C / 55.4 °F

**Method -** No information available

**Autoignition Temperature** 440 °C / 824 °F

**Explosion Limits**

**Upper** 15.9 vol %
**Lower** 6.2 vol %
**Sensitivity to Mechanical Impact** No information available
**Sensitivity to Static Discharge** No information available

**Specific Hazards Arising from the Chemical**
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Keep product and empty container away from heat and sources of ignition. Thermal decomposition can lead to release of irritating gases and vapors.

**Hazardous Combustion Products**
Carbon monoxide (CO) Carbon dioxide ($CO_2$) Hydrogen chloride gas Phosgene
**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. Thermal decomposition can lead to release of irritating gases and vapors.

**NFPA**

| Health | Flammability | Instability | Physical hazards |
|---|---|---|---|
| 3 | 3 | 0 | N/A |

## 6. Accidental release measures

**Personal Precautions** Use personal protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

**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. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

## 7. Handling and storage

**Handling** Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not ingest. Use only under a chemical fume hood. Do not breathe vapors or spray mist. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges.

**Storage** Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition.

## 8. Exposure controls / personal protection

**Exposure Guidelines**

| Component | ACGIH TLV | OSHA PEL | NIOSH IDLH | Mexico OEL (TWA) |
|---|---|---|---|---|
| Ethylene dichloride | TWA: 10 ppm | (Vacated) TWA: 1 ppm<br>(Vacated) TWA: 4 mg/m³<br>Ceiling: 100 ppm<br>(Vacated) STEL: 2 ppm<br>(Vacated) STEL: 8 mg/m³<br>TWA: 50 ppm | IDLH: 50 ppm<br>TWA: 1 ppm<br>TWA: 4 mg/m³<br>STEL: 2 ppm<br>STEL: 8 mg/m³ | TWA: 10 ppm<br>TWA: 40 mg/m³ |

*Legend*

*ACGIH - American Conference of Governmental Industrial Hygienists*
*OSHA - Occupational Safety and Health Administration*
*NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health*

**Engineering Measures** Use only under a chemical fume hood. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

**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. Tightly fitting safety goggles. Face-shield.

**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.

**Hygiene Measures** Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

| | |
|---|---|
| **Physical State** | Liquid |
| **Appearance** | Colorless |
| **Odor** | sweet |
| **Odor Threshold** | 400 ppm |
| **pH** | No information available |
| **Melting Point/Range** | -35 °C / -31 °F |
| **Boiling Point/Range** | 81 - 85 °C / 177.8 - 185 °F |
| **Flash Point** | 13 °C / 55.4 °F |
| **Evaporation Rate** | 6.5 (Butyl Acetate = 1.0) |
| **Flammability (solid,gas)** | Not applicable |
| **Flammability or explosive limits** | |
| **Upper** | 15.9 vol % |
| **Lower** | 6.2 vol % |
| **Vapor Pressure** | 65 mmHg @ 29 °C |
| **Vapor Density** | 3.4 |
| **Specific Gravity** | 1.250 |
| **Solubility** | Insoluble in water |
| **Partition coefficient; n-octanol/water** | No data available |
| **Autoignition Temperature** | 440 °C / 824 °F |
| **Decomposition Temperature** | No information available |
| **Viscosity** | 0.8 mPa s at 20 °C |
| **Molecular Formula** | C2 H4 Cl2 |
| **Molecular Weight** | 98.96 |

## 10. Stability and reactivity

**Reactive Hazard** None known, based on information available

**Stability** Stable under normal conditions.

**Conditions to Avoid** Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

**Incompatible Materials** Strong oxidizing agents, Bases, Alkali metals

**Hazardous Decomposition Products** Carbon monoxide (CO), Carbon dioxide ($CO_2$), Hydrogen chloride gas, Phosgene

**Hazardous Polymerization** Hazardous polymerization does not occur.

**Hazardous Reactions** None under normal processing.

## 11. Toxicological information

**Acute Toxicity**

**Product Information**

**Component Information**

| Component | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|
| Ethylene dichloride | 625 mg/kg ( Rat )<br>413 mg/kg ( Mouse ) | 2800 mg/kg ( Rabbit ) | 28.79 mg/L ( Rat ) 1h<br>7.8 mg/l ( Rat ) 4h |

**Toxicologically Synergistic Products** No information available

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Irritation** Irritating to eyes, respiratory system and skin

**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 |
|---|---|---|---|---|---|---|
| Ethylene dichloride | 107-06-2 | Group 2B | Reasonably Anticipated | Not listed | X | Not listed |

*IARC: (International Agency for Research on Cancer)*

*NTP: (National Toxicity Program)*

*IARC: (International Agency for Research on Cancer)*
*Group 1 - Carcinogenic to Humans*
*Group 2A - Probably Carcinogenic to Humans*
*Group 2B - Possibly Carcinogenic to Humans*
*NTP: (National Toxicity Program)*
*Known - Known Carcinogen*
*Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*

**Mutagenic Effects** No information available

**Reproductive Effects** No information available.

**Developmental Effects** No information available.

**Teratogenicity** No information available.

**STOT - single exposure** Respiratory system Central nervous system (CNS)
**STOT - repeated exposure** Kidney Liver Heart Blood

**Aspiration hazard** No information available

**Symptoms / effects,both acute and delayed** May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

**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.

| Component | Freshwater Algae | Freshwater Fish | Microtox | Water Flea |
|---|---|---|---|---|
| Ethylene dichloride | EC50: = 166 mg/L, 96h static (Desmodesmus subspicatus)<br>EC50: > 433 mg/L, 96h (Pseudokirchneriella subcapitata) | LC50: 110 - 123 mg/L, 96h flow-through (Pimephales promelas)<br>LC50: 230 - 710 mg/L, 96h flow-through (Lepomis macrochirus)<br>LC50: = 225 mg/L, 96h static (Oncorhynchus mykiss) | Not listed | EC50: 140 - 190 mg/L, 48h Static (Daphnia magna) |

**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 volatility.

| Component | log Pow |
|---|---|
| Ethylene dichloride | 1.45 |

## 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.

| Component | RCRA - U Series Wastes | RCRA - P Series Wastes |
|---|---|---|
| Ethylene dichloride - 107-06-2 | U077 | - |

## 14. Transport information

**DOT**

| | |
|---|---|
| **UN-No** | UN1184 |
| **Proper Shipping Name** | ETHYLENE DICHLORIDE |
| **Hazard Class** | 3 |
| **Subsidiary Hazard Class** | 6.1 |
| **Packing Group** | II |

**TDG**

| | |
|---|---|
| **UN-No** | UN1184 |
| **Proper Shipping Name** | ETHYLENE DICHLORIDE |
| **Hazard Class** | 3 |
| **Subsidiary Hazard Class** | 6.1 |
| **Packing Group** | II |

**IATA**

| | |
|---|---|
| **UN-No** | UN1184 |
| **Proper Shipping Name** | ETHYLENE DICHLORIDE |
| **Hazard Class** | 3 |
| **Subsidiary Hazard Class** | 6.1 |
| **Packing Group** | II |

**IMDG/IMO**

| | |
|---|---|
| **UN-No** | UN1184 |
| **Proper Shipping Name** | ETHYLENE DICHLORIDE |
| **Hazard Class** | 3 |
| **Subsidiary Hazard Class** | 6.1 |
| **Packing Group** | II |

## 15. Regulatory information

**All of the components in the product are on the following Inventory lists:** X = listed

**International Inventories**

| Component | TSCA | DSL | NDSL | EINECS | ELINCS | NLP | PICCS | ENCS | AICS | IECSC | KECL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ethylene dichloride | X | X | - | 203-458-1 | - | | X | X | X | X | X |

**Legend:**
**X - Listed**
**E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.**
**F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.**
**N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.**
**P - Indicates a commenced PMN substance**
**R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.**
**S - Indicates a substance that is identified in a proposed or final Significant New Use Rule**
**T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.**
**XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).**
**Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.**
**Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.**

**U.S. Federal Regulations**

**TSCA 12(b)**

| Component | TSCA 12(b) |
|---|---|
| Ethylene dichloride | Section 4 |

**SARA 313**

| Component | CAS-No | Weight % | SARA 313 - Threshold Values % |
|---|---|---|---|
| Ethylene dichloride | 107-06-2 | >95 | 0.1 |

**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 |
|---|---|---|---|---|
| Ethylene dichloride | X | 100 lb | X | X |

**Clean Air Act**

| Component | HAPS Data | Class 1 Ozone Depletors | Class 2 Ozone Depletors |
|---|---|---|---|
| Ethylene dichloride | X | | - |

**OSHA** Occupational Safety and Health Administration
Not applicable

**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 |
|---|---|---|
| Ethylene dichloride | 100 lb 1 lb | - |

**California Proposition 65** This product contains the following proposition 65 chemicals

| Component | CAS-No | California Prop. 65 | Prop 65 NSRL | Category |
|---|---|---|---|---|
| Ethylene dichloride | 107-06-2 | Carcinogen | 10 µg/day | Carcinogen |

**U.S. State Right-to-Know Regulations**

| Component | Massachusetts | New Jersey | Pennsylvania | Illinois | Rhode Island |
|---|---|---|---|---|---|
| Ethylene dichloride | 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 does not contain any DHS chemicals.

**Other International Regulations**

**Mexico - Grade** Serious risk, Grade 3

## 16. Other information

**Prepared By** Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

**Creation Date** 04-Feb-2010
**Revision Date** 18-Jan-2018
**Print Date** 18-Jan-2018
**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

**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

**Creation Date** 05-May-2009 **Revision Date** 18-Jan-2018 **Revision Number** 3

## 1. Identification

**Product Name** **1,4-Dioxane**

**Cat No. :** **D111-4; D111-4LC; D111-500; D56S-4; D116-4; D116-200**

**CAS-No** 123-91-1
**Synonyms** Diox

**Recommended Use** Laboratory chemicals.
**Uses advised against** Not for food, drug, pesticide or biocidal product use

**Details of the supplier of the safety data sheet**

**Company**
Fisher Scientific
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)

| | |
|---|---|
| Flammable liquids | Category 2 |
| Serious Eye Damage/Eye Irritation | Category 2 |
| Carcinogenicity | Category 2 |
| Specific target organ toxicity (single exposure) | Category 3 |
| Target Organs - Respiratory system, Central nervous system (CNS), Eyes. | |
| Specific target organ toxicity - (repeated exposure) | Category 2 |
| Target Organs - Kidney, Liver. | |

**Label Elements**

**Signal Word**
Danger

**Hazard Statements**
Highly flammable liquid and vapor
Causes serious eye irritation
May cause respiratory irritation
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



**Precautionary Statements**
**Prevention**
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
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
Keep cool
**Response**
IF exposed or concerned: Get medical attention/advice
**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
**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/attention
**Fire**
In case of fire: Use CO2, dry chemical, or foam for extinction
**Storage**
Store locked up
Store in a well-ventilated place. Keep container tightly closed
**Disposal**
Dispose of contents/container to an approved waste disposal plant
**Hazards not otherwise classified (HNOC)**
May form explosive peroxides
Repeated exposure may cause skin dryness or cracking
**WARNING.** Cancer - https://www.p65warnings.ca.gov/.

## 3. Composition/Information on Ingredients

| Component | CAS-No | Weight % |
|---|---|---|
| 1,4-Dioxane | 123-91-1 | >95 |

## 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** Move 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** Breathing difficulties. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

**Notes to Physician** Treat symptomatically

## 5. Fire-fighting measures

**Suitable Extinguishing Media** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

**Unsuitable Extinguishing Media** Water may be ineffective

**Flash Point** 12 °C / 53.6 °F

**Method -** No information available

**Autoignition Temperature** 355 °C / 671 °F

**Explosion Limits**

**Upper** 22%

**Lower** 2%

**Sensitivity to Mechanical Impact** No information available

**Sensitivity to Static Discharge** No information available

**Specific Hazards Arising from the Chemical**

Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. May form explosive peroxides. Vapors may form explosive mixtures with air.

**Hazardous Combustion Products**

Carbon monoxide (CO) Carbon dioxide ($CO_2$) peroxides

**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 | Flammability | Instability | Physical hazards |
|---|---|---|---|
| 2 | 3 | 1 | N/A |

## 6. Accidental release measures

**Personal Precautions** Remove all sources of ignition. Use personal protective equipment. Take precautionary measures against static discharges. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation.

**Environmental Precautions** Should not be released into the environment. See Section 12 for additional ecological information.

**Methods for Containment and Clean Up** Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Keep in suitable, closed containers for disposal. Use spark-proof tools and explosion-proof equipment.

## 7. Handling and storage

**Handling** Wear personal protective equipment. Ensure adequate ventilation. Handle under an inert atmosphere. Keep away from open flames, hot surfaces and sources of ignition. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Take precautionary measures against static discharges. If peroxide formation is suspected, do

not open or move container. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Wash hands before breaks and immediately after handling the product.

**Storage**

Keep containers tightly closed in a dry, cool and well-ventilated place. Store under an inert atmosphere. Flammables area. May form explosive peroxides. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. Keep away from heat and sources of ignition.

## 8. Exposure controls / personal protection

**Exposure Guidelines**

| Component | ACGIH TLV | OSHA PEL | NIOSH IDLH | Mexico OEL (TWA) |
|---|---|---|---|---|
| 1,4-Dioxane | TWA: 20 ppm<br>Skin | (Vacated) TWA: 25 ppm<br>(Vacated) TWA: 90 mg/m$^3$<br>Skin<br>TWA: 100 ppm<br>TWA: 360 mg/m$^3$ | IDLH: 500 ppm<br>Ceiling: 1 ppm<br>Ceiling: 3.6 mg/m$^3$ | TWA: 25 ppm<br>TWA: 90 mg/m$^3$<br>STEL: 100 ppm<br>STEL: 360 mg/m$^3$ |

*Legend*

*ACGIH - American Conference of Governmental Industrial Hygienists*
*OSHA - Occupational Safety and Health Administration*
*NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health*

**Engineering Measures**

Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. 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**

Long sleeved clothing.

**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.

**Hygiene Measures**

Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

| | |
|---|---|
| **Physical State** | Liquid |
| **Appearance** | Colorless |
| **Odor** | Petroleum distillates |
| **Odor Threshold** | No information available |
| **pH** | 6-8 500 g/l aq.sol |
| **Melting Point/Range** | 12 °C / 53.6 °F |
| **Boiling Point/Range** | 101 °C / 213.8 °F @ 760 mmHg |
| **Flash Point** | 12 °C / 53.6 °F |
| **Evaporation Rate** | No information available |
| **Flammability (solid,gas)** | Not applicable |
| **Flammability or explosive limits** | |
| **Upper** | 22% |
| **Lower** | 2% |

| | |
|---|---|
| **Vapor Pressure** | 41 mbar @ 20 °C |
| **Vapor Density** | 3 |
| **Specific Gravity** | 1.034 |
| **Solubility** | Soluble in water |
| **Partition coefficient; n-octanol/water** | No data available |
| **Autoignition Temperature** | 355 °C / 671 °F |
| **Decomposition Temperature** | No information available |
| **Viscosity** | 1.32 mPa.s @ 20 °C |
| **Molecular Formula** | C4 H8 O2 |
| **Molecular Weight** | 88.11 |

## 10. Stability and reactivity

**Reactive Hazard** None known, based on information available

**Stability** May form explosive peroxides. Hygroscopic.

**Conditions to Avoid** Incompatible products. Heat, flames and sparks. Exposure to air or moisture over prolonged periods. Keep away from open flames, hot surfaces and sources of ignition.

**Incompatible Materials** Strong oxidizing agents, Reducing agents, Halogens

**Hazardous Decomposition Products** Carbon monoxide (CO), Carbon dioxide ($CO_2$), peroxides

**Hazardous Polymerization** Hazardous polymerization does not occur.

**Hazardous Reactions** May form explosive peroxides.

## 11. Toxicological information

**Acute Toxicity**

**Product Information**

**Component Information**

| Component | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|
| 1,4-Dioxane | 5170 mg/kg ( Rat )<br>4200 mg/kg ( Rat ) | LD50 = 7600 mg/kg ( Rabbit ) | 48.5 mg/L ( Rat ) 4 h |

**Toxicologically Synergistic Products** Acetonitrile; Tetrachloroethylene

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Irritation** Irritating to eyes, respiratory system and skin

**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 |
|---|---|---|---|---|---|---|
| 1,4-Dioxane | 123-91-1 | Group 2B | Reasonably Anticipated | A3 | X | 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*

*NTP: (National Toxicity Program)*

*NTP: (National Toxicity Program)*
*Known - Known Carcinogen*
*Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*

*ACGIH: (American Conference of Governmental Industrial Hygienists)*

*A1 - Known Human Carcinogen*
*A2 - Suspected Human Carcinogen*
*A3 - Animal Carcinogen*
*ACGIH: (American Conference of Governmental Industrial Hygienists)*

**Mutagenic Effects** No information available

**Reproductive Effects** No information available.

**Developmental Effects** No information available.

**Teratogenicity** No information available.

**STOT - single exposure** Respiratory system Central nervous system (CNS) Eyes
**STOT - repeated exposure** Kidney Liver

**Aspiration hazard** No information available

**Symptoms / effects,both acute and delayed** Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

**Endocrine Disruptor Information** No information available

**Other Adverse Effects** See actual entry in RTECS for complete information.

## 12. Ecological information

**Ecotoxicity**

.

| Component | Freshwater Algae | Freshwater Fish | Microtox | Water Flea |
|---|---|---|---|---|
| 1,4-Dioxane | Not listed | LC50: = 9850 mg/L, 96h (Pimephales promelas)<br>LC50: 10306 - 14742 mg/L, 96h static (Pimephales promelas)<br>LC50: = 9850 mg/L, 96h flow-through (Pimephales promelas)<br>LC50: > 10000 mg/L, 96h semi-static (Lepomis macrochirus)<br>LC50: > 10000 mg/L, 96h static (Lepomis macrochirus) | EC50 = 610 mg/L 5 min<br>EC50 = 668 mg/L 15 min<br>EC50 = 733 mg/L 30 min | EC50 = 163 mg/L 48h |

**Persistence and Degradability** Soluble in water 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.

| Component | log Pow |
|---|---|
| 1,4-Dioxane | -0.42 |

## 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.

| Component | RCRA - U Series Wastes | RCRA - P Series Wastes |
|---|---|---|
| 1,4-Dioxane - 123-91-1 | U108 | - |

## 14. Transport information

**DOT**

**UN-No** UN1165
**Proper Shipping Name** DIOXANE

**Hazard Class** 3
**Packing Group** II

**TDG**
**UN-No** UN1165
**Proper Shipping Name** DIOXANE
**Hazard Class** 3
**Packing Group** II

**IATA**
**UN-No** UN1165
**Proper Shipping Name** DIOXANE
**Hazard Class** 3
**Packing Group** II

**IMDG/IMO**
**UN-No** UN1165
**Proper Shipping Name** DIOXANE
**Hazard Class** 3
**Packing Group** II

## 15. Regulatory information

**International Inventories**

| Component | TSCA | DSL | NDSL | EINECS | ELINCS | NLP | PICCS | ENCS | AICS | IECSC | KECL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,4-Dioxane | X | X | - | 204-661-8 | - | | X | X | X | X | X |

**Legend:**
**X - Listed**
**E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.**
**F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.**
**N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.**
**P - Indicates a commenced PMN substance**
**R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.**
**S - Indicates a substance that is identified in a proposed or final Significant New Use Rule**
**T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.**
**XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).**
**Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.**
**Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.**

**U.S. Federal Regulations**

**TSCA 12(b)** Not applicable

**SARA 313**

| Component | CAS-No | Weight % | SARA 313 - Threshold Values % |
|---|---|---|---|
| 1,4-Dioxane | 123-91-1 | >95 | 0.1 |

**SARA 311/312 Hazard Categories** See section 2 for more information

**CWA (Clean Water Act)** Not applicable

**Clean Air Act**

| Component | HAPS Data | Class 1 Ozone Depletors | Class 2 Ozone Depletors |
|---|---|---|---|
| 1,4-Dioxane | X | | - |

**OSHA** Occupational Safety and Health Administration
Not applicable

**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 |
|---|---|---|
| 1,4-Dioxane | 100 lb | - |

**California Proposition 65** This product contains the following proposition 65 chemicals

| Component | CAS-No | California Prop. 65 | Prop 65 NSRL | Category |
|---|---|---|---|---|
| 1,4-Dioxane | 123-91-1 | Carcinogen | 30 µg/day | Carcinogen |

**U.S. State Right-to-Know Regulations**

| Component | Massachusetts | New Jersey | Pennsylvania | Illinois | Rhode Island |
|---|---|---|---|---|---|
| 1,4-Dioxane | 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 does not contain any DHS chemicals.

**Other International Regulations**

**Mexico - Grade** Serious risk, Grade 3

## 16. Other information

**Prepared By**
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

**Creation Date** 05-May-2009
**Revision Date** 18-Jan-2018
**Print Date** 18-Jan-2018
**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

**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**

# Barium

Print

## SAFETY DATA SHEET

### 1 PRODUCT AND SUPPLIER IDENTIFICATION

**Product Name**: Barium

**Formula**: Ba

**Supplier**: ESPI Metals

1050 Benson Way

Ashland, OR 97520

**Telephone**: 800-638-2581

**Fax**: 541-488-8313

**Email**: sales@espimetals.com

**Emergency**: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

**Recommended Uses**: Scientific Research

### 2 HAZARDS IDENTIFICATION

**GHS Classification (29 CFR 1910.1200)**: Substances and mixtures which, in contact with water, emit flammable gases, category 2, Skin corrosion/irritation, category 2, Eye damage/irritation, category 2A.

**GHS Label Elements**:



**Signal Word**: Danger

**Hazard Statements**: H261 In contact with water releases flammable gas, H315 Causes skin irritation, H319 Causes serious eye irritation.

**Precautionary Statements**: P223 Do not allow contact with water, P231+P232 Handle and store contents under inert gas, protect from moisture, P264 Wash skin thoroughly after handling, P280 Wear protective gloves/protective clothing/eye protection/face protection, P302+P335+P334+352 IF ON SKIN: Brush off loose particles from skin, and immerse in cool water, wash with plenty of soap and water,

P332+P313 IF SKIN irritation occurs: Get medical advice/attention, P305+P351+P338 IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing, P337+P313 IF eye irritation persists: Get medical advice/attention, P362+P364 Take off contaminated clothing and wash it before reuse, P370+P378 In case of fire: Use Class D dry powder for extinction, P402+P404 Store in a dry place. Store in a closed container, P501 Dispose of contents/container in accordance with local, state or federal regulations.

## 3 COMPOSITION/INFORMATION ON INGREDIENTS

**Ingredient**: Barium

**CAS#**: 7440-39-3

**%**: 100

**EC#**: 231-149-1

## 4 FIRST AID MEASURES

**General Measures**: Remove patient from area of exposure.

**INHALATION**: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek immediate medical attention.

**INGESTION**: Quickly wipe material from mouth and rinse with water. Do not induce vomiting. Seek medical attention immediately.

**SKIN**: Remove contaminated clothing if necessary. Brush off any visible solids. Wash the affected area with water for at least 15 minutes. Seek medical attention.

**EYES**: Immediately flush eyes with copious amounts of water, including under eyelids for at least 10-15 minutes. A victim may need assistance in keeping their eyelids open. Seek immediate medical attention.

**Most Important Symptoms/Effects, Acute and Delayed**: May cause severe irritation in contact with moist skin. See section 11 for more information.

**Indication of Immediate Medical Attention and Special Treatment**: No other relevant information available.

## 5 FIREFIGHTING MEASURES

**Extinguishing Media**: Use Class D dry powder extinguishing agent.

**Unsuitable Extinguishing Media**: Do not use water, carbon dioxide or halogenated extinguishers.

**Specific Hazards Arising from the Material**: Material readily reacts with water generating flammable hydrogen gas. May emit toxic fumes under fire conditions.

**Special Protective Equipment and Precautions for Firefighters**: Full face, self-contained breathing apparatus and full protective clothing to prevent contact with skin and eyes. Barium metal can reignite after fire is initially extinguished. Never leave extinguished fire unattended.

## 6 ACCIDENTAL RELEASE MEASURES

**Personal Precautions, Protective Equipment, and Emergency Procedures**: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes. Eliminate all sources of ignition.

**Methods and Materials for Containment and Cleaning Up**: Sweep or scoop spilled product and place in a closed container for further handling and disposal. Do not use water for spill clean-up. Cover very small quantities in the open with powdered limestone and let decompose. Use only non-sparking tools and natural bristle brushes.

**Environmental Precautions**: Do not flush to sewer, stream, or other bodies of water. Do not allow to enter drains or to be released to the environment.

## 7 HANDLING AND STORAGE

**Precautions for Safe Handling**: Handle in an enclosed, controlled process under dry protective gas such as argon. Protect from water and moisture. Avoid breathing dust or fumes. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

**Conditions for Safe Storage, Including Any Incompatibilities**: Store in tightly-sealed containers under argon or mineral oil. Storage containers should be properly labeled and kept in a cool, dry, well-ventilated area, protected from heat and direct sunlight. Do not allow contact with water. Storage area should be free of combustibles and ignition sources. Do not store together with acids or oxidizers. See section 10 for more information on incompatible materials.

## 8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

**Exposure Limits**: Barium

**OSHA/PEL**: 0.5 mg/$m^3$

**ACGIH/TLV**: 0.5 mg/$m^3$

**Appropriate Engineering Controls**: Handle in an enclosed, controlled process under dry argon. Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Prepare for the possibility of a fire. Keep extinguishing agents, tools for handling and protective clothing readily available.

**Individual Protection Measures, Such as Personal Protective Equipment**:

**Respiratory Protection**: Wear a NIOSH/MSHA approved respirator when high concentrations are present.

**Eye Protection**: Always wear approved chemical splash proof goggles.

**Skin Protection**: Rubber gloves, flame retardant protective work clothing.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**:

**Form**: Solid in various forms

**Color**: Silver-gray metallic

**Odor**: Not determined

**Odor Threshold**: Not determined

**pH**: N/A

**Melting Point**: 725 °C

**Boiling Point**: 1640 °C

**Flash Point**: N/A

**Evaporation Rate**: N/A

**Flammability**: No data

**Upper Flammable Limit**: No data

**Lower Flammable Limit**: No data

**Vapor Pressure**: 10 mm at 1049 °C

**Vapor Density**: N/A

**Relative Density (Specific Gravity)**: 3.51 g/cc at 20 °C

**Solubility in $H_2O$**: Decomposes

**Partition Coefficient (n-octanol/water)**: Not determined

**Autoignition Temperature**: No data

**Decomposition Temperature**: No data

**Viscosity**: N/A

## 10 STABILITY AND REACTIVITY

**Reactivity**: No specific test data available.

**Chemical Stability**: Stable under recommended storage conditions.

**Possibility of Hazardous Reactions**: Reacts readily with water releasing flammable hydrogen gas.

**Conditions to Avoid**: Avoid contact with water or moist air and possible ignition sources such as sparks or flame.

**Incompatible Materials**: Water or moisture, oxidizing agents, oxygen, acids, alcohols, halocarbons, carbon dioxide, ammonia.

**Hazardous Decomposition Products**: Barium hydroxides, barium oxides, hydrogen gas.

## 11 TOXICOLOGICAL INFORMATION

**Likely Routes of Exposure**: Inhalation, skin, eyes.

**Symptoms of Exposure**: May cause severe irritation to the nose, throat, and upper respiratory tract, mouth, throat, and esophagus. Contact with skin can cause mild to moderate irritation. May cause chemical burns in eyes or on skin as it reacts with moisture on living tissue.

**Acute and Chronic Effects**: Barium compounds may cause severe gastroenteritis, including abdominal pain, vomiting and diarrhea, tremors, faintness, paralysis of the arms and legs, and slow or irregular heartbeat. Severe cases may produce collapse and death due to respiratory failure. Soluble barium compounds are more likely to cause these effects than insoluble compounds. Inhalation of fumes may

cause sore throat, coughing, labored breathing, and irritation of the respiratory tract as well as the above symptoms. Chronic exposure to barium may cause sensitization, chronic barium poisoning, dermatitis, corneal opacity and blindness.

**Acute Toxicity**: No data

**Carcinogenicity**: **NTP**: Not identified as carcinogenic **IARC**: Not identified as carcinogenic

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

## 12 ECOLOGICAL INFORMATION

**Ecotoxicity**: No data

**Persistence and Degradability**: No data

**Bioaccumulative Potential**: No data

**Mobility in Soil**: No data

**Other Adverse Effects**: Do not allow material to be released to the environment. No further relevant information available.

## 13 DISPOSAL CONSIDERATIONS

**Waste Disposal Method**:

**Product**: Dispose of in accordance with Federal, State and Local regulations.

**Packaging**: Dispose of in accordance with Federal, State and Local regulations.

## 14 TRANSPORT INFORMATION

**UN Number**: UN1400

**UN Proper Shipping Name**: Barium

**Transport Hazard Class**: 4.3

**Packing Group**: II

**Marine Pollutant**: No

**Special Precautions**: Warning, substances which, in contact with water, emit flammable gases.

## 15 REGULATORY INFORMATION

**TSCA Listed**: Yes

**DSL Listed**: Yes

**Regulation (EC) No 1272/2008 (CLP)**: Substances and mixtures which, in contact with water, emit flammable gases, category 2, Skin corrosion/irritation, category 2, Eye damage/irritation, category 2A.

**WHMIS 2015 Classification**: Substances and mixtures which, in contact with water, emit flammable gases, Skin corrosion/irritation, Eye damage/irritation.

**HMIS Ratings**: **Health**: 2 **Flammability**: 2 **Physical**: 2

**NFPA Ratings**: **Health**: 2 **Flammability**: 2 **Instability**: 2 **Special Hazard**: W

**Chemical Safety Assessment**: A chemical safety assessment has not been carried out.

## 16 OTHER INFORMATION

The information contained in this document is based on the state of our knowledge at the time of publication and is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI Metals makes no representation, warranty, or guarantee of any kind with respect to the information contained in this document or any use of the product based on this information. ESPI Metals shall not be held liable for any damages resulting from handling or from contact with the above product. Users should satisfy themselves that they have all current data relevant to their particular use.

**Prepared by**: ESPI Metals

**Revised/Reviewed**: July 2016

# POCH Safety Data Sheet

According to Regulation (EC) No. 1907/2006 (REACH). Creation date / last update: *2002-10-15 / 2005-04-22*

## 1. Identification of the substance/preparation and of the company/undertaking

## *BENZENE*

Catalogue Numbers: *99,9% standard for GC-162500320; pure-162500426; pure p. a.-162500110; for HPLC-162503155; Pochsolv-162505156;*

Use of the substance / preparation: analitical and chemical reagent for synthesis solvent

POCH SA
44-101 Gliwice, Sowinskiego Str. 11
tel.: +48 32 23-92-381; fax: +48 32 23-92-370; e-mail: export@poch.com.pl
Emergency telephone no: +48 606-659-006

## 2. Hazard identification

*Highly flammable. May cause cancer. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.*

## 3. Composition/information on ingredients

CAS-No.: *71-43-2*

Molecular mass: *78.11*

Molecular formula: $C_6H_6$

WE Number: *200-753-7*

EC-Index No.: *601-020-00-8*

## 4. First aid measures

After eye contact: *rinse out with plenty of water with the eyelid held wide open. Call in ophtalmologist.*

After skin contact: *wash off with plenty of water. Remove contaminated clothing.*

After swallowing: *make victim drink plenty of water. Avoid vomiting (risk of aspiration). Laxative: paraffin oil (3 mg/kg), sodium sulfate (1 tablespoon 1/4 l water). Lavage of stomach only if necessary. Call in physician.*

After inhalation: *fresh air. If necessary, apply mouth- to- mouth resuscitation or mechanical ventilation.*

## 5. Fire-fighting measures

Suitable extinguishing media: *foam, powder*

Special risk: *combustible. Vapours heavier than air. Formation of explosive mixtures possible with air. Keep away from sources of fire. Take measures to prevent electrostatic charging. Development of hazardous gases or vapours possible in the event of fire.*

Special protective equipment for fire fighting:

Other information: *contain escaping vapoures with spray water. Do not stay in dangerous zone without self- contained breathing apparatus. Prevent fire- fighting water from entering surface water or groundwater*

Prevent fire-fighting water from entering surface water or groundwater. Cool container with spray water from a safe distance. Contain escaping vapours with water.

## 6. Accidental release measures

*Do not inhale vapours/aerosols. Avoid substance contact. Ensure supply of fresh air in enclosed rooms. Take up with liquid- absorbent material. Forward for disposal. Clean up affected area. Do not allow to enter sewerage system (risk of explosion).*

**7. Handling and storage**

Handling: *Use with adequate ventilation. Use of the basic principles of Industrial Hygiene. Use according to good industry practice. Work under hood. Do not inhale substance. Do not empty into sewerage system. Use protective equipment according to p.8. Avoid skin contact. Protect against electrostatic charges. Keep away from source od ignition.*

Storage: *tightly closed. Dry well-ventilated place. Protect from light. Keep away from sources of ignition and heat. At +15 to + 25 deg C.*

**8. Exposure controls/personal protection**

Specific control parameter:

*Provide exhaust ventilation. Ensure the eye wash station and safety showers. Protective equipment should be selected for the working place, depending on concentration and quantity of the hazardous product handled. The resistance of the protective clothing to chemicals should be ascertained with respective supplier.*

Personal protective equipment:

respiratory protection: *required when vapours/aerosols are generated - gas mask with specific absorber.*

eye protection: *required - safety goggles.*

hand protection: *required - protective clothing.*

body protection: *required - protective clothing.*

industrial hygiene: *immediately change contaminated clothing. Apply skin - protective barrier cream. Wash hands and face after working with substance.*

**9. Physical and chemical properties**

Form: *liquid*

Colour: *colourless*

Odour: *characteristic*

pH value: *not available*

Melting point: *5°C*

Boiling point: *80°C*

Autoignition temperature: *555°C*

Flash point: *-11°C*

Explosion limit:

lower: *1,4 Vol%*

upper: *8 Vol%*

dynamic viscosity: *(20°C): 0,66 mPa*s*

kinematical viscosity: *0,75 mm2/s*

Vapour pressure: *100 mbar (20°C)*

Density: *0,88 g/cm³ (20°C)*

Bulk density: *not applicable*

Solublity:

in water: *1,8 g/l (20°C)*

in organic solvents: *soluble*

log P(w/o): *2,65. Bioconcentration factor: 1,10.*

**10. Stability and reactivity**

Conditions to be avioded: *high temperature*

Substances to be avoided: *nonorganic acids, sulfur, halogen-halogen compounds, oxidizing agents, peroxide compounds, oxyhalogenic compounds, halogenic hydrocarbons, rubber.*

Hazardous decomposition products: *no information available*

Other information: *volatile in steam. Unsuitable workings materials: various plastics*

**11. Toxicological information**

Toxicological information: *LD50 (oral rat) 930 mg/kg, LC50 (inhalation rat) 10 000 ppm (vol.) /7h. Experience has shown this substance to be carcinogenic to man.*

Other information: *After skin contact: irritations, danger of absorption, Degreasing effect on the skin possibly followed by secondary inflammation; After swallowing: nausea and vomiting; After absorption: pain and dizziness, cardiac arrhythmia, drop in blood pressure, dyspnoea, spasms, narcosis, respiratory paralysis, death; After eye contact: irritations of mucous membranes. Carcinogenic class 1. This substance should be handled with particular care.*

**12. Ecological information**

*Log P(w/o): 2,65. No appreciable bioaccumulation potential is to be expected. Toxicity: Fish: Onchorhynchus mykiss LC50: 5,3 mg/l/96h. C. auratus LC50: 34 mg/l/96h. Daphnia: Daphnia magma EC50: 200 mg/l/48h. Algea: Chlorella vulgaris: LC50: 530 mg/l/24h. Bacteria: Ps. putida EC10: 168 mg/l. Toxic effect on aquatic organisms. Biologic degradation: ThOD 3,1 g/g, B.O.D 10% ThOD, C.O.D. 19% ThOD. Hazard for drinking water supplies. Do not allow to enter waters, waste water or soil!*

**13. Disposal considerations**

*POCH product packaging must be disposed of in compliance with the country-specific regulations or must be passed to a packaging return system. Handle contaminated packing in the same way as the substrate itself. Always contact a permitted waste disposal to assure compliance with all current local, state and federal regulations.*

**14. Transport information**

ADR Class and package group: *3,II*

UN Number: *1114*

Name (acc. to UN): *benzene*

**15. Regulatory information**

*Labelling according to EC Directives.*

Symbol: *F, T; Flammable. Toxic.*

R-phrases: *45-11-48/23/24/25; Highly flammable. May cause cancer. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.*

S-phrases: *53-45; In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid exposure - obtain special instructions before use. Restricted to professional users.*

*EC label.*

**16. Other information**

*Reason for alteration: general update.*

*Informations contained in this SDS while accurate to the best knowledge*

POCH

# SAFETY DATA SHEET

Version 5.8
Revision Date 02/02/2018
Print Date 10/19/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Benzo[*a*]pyrene

Product Number : 48564
Brand : Supelco
Index-No. : 601-032-00-3

CAS-No. : 50-32-8

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Skin sensitisation (Category 1), H317
Germ cell mutagenicity (Category 1B), H340
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 1B), H360
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H317 May cause an allergic skin reaction.
H340 May cause genetic defects.
H350 May cause cancer.
H360 May damage fertility or the unborn child.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

| | |
|---|---|
| | understood. |
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P272 | Contaminated work clothing should not be allowed out of the workplace. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P333 + P313 | If skin irritation or rash occurs: Get medical advice/ attention. |
| P363 | Wash contaminated clothing before reuse. |
| P391 | Collect spillage. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

Synonyms : 3,4-Benzpyrene
3,4-Benzopyrene
Benzo[def]chrysene
benzo[pqr]tetraphene

Formula : $C_{20}H_{12}$
Molecular weight : 252.31 g/mol
CAS-No. : 50-32-8
EC-No. : 200-028-5
Index-No. : 601-032-00-3

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Benzo[a]pyrene** | | |
| | Skin Sens. 1; Muta. 1B; Carc. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H317, H340, H350, H360, H410 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
No data available

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| | Remarks | Cancer<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs)<br>Exposure by all routes should be carefully controlled to levels as low | | |

| | | | | |
|---|---|---|---|---|
| | | as possible.<br>Suspected human carcinogen | | |
| | | Cancer<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs)<br>Exposure by all routes should be carefully controlled to levels as low as possible.<br>Suspected human carcinogen | | |
| Benzo[a]pyrene | 50-32-8 | TWA | 0.200000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | TWA | 0.200000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | 1910.1002<br>As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard<br>OSHA specifically regulated carcinogen | | |
| | | TWA | 0.100000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential Occupational Carcinogen<br>NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.<br>cyclohexane-extractable fraction<br>See Appendix C<br>See Appendix A | | |
| | | TWA | 0.2 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | 1910.1002<br>As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard<br>OSHA specifically regulated carcinogen | | |
| | | TWA | 0.1 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential Occupational Carcinogen<br>NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.<br>cyclohexane-extractable fraction<br>See Appendix C<br>See Appendix A | | |
| | | TWA | 0.2 mg/m3 | USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000 |
| | | PEL | 0.2 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | PEL | 0.2 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological | Basis |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | | | | specimen | |
| | - | 1-Hydroxypyrene | | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | End of shift at end of workweek | | | |
| | | 1-Hydroxypyrene | | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | | End of shift at end of workweek | | | |

### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

a) Appearance — Form: solid

b) Odour — No data available

| | | |
|---|---|---|
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: 177 - 180 °C (351 - 356 °F) |
| f) | Initial boiling point and boiling range | 495 °C (923 °F) |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | 1.35 g/cm3 |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | log Pow: 5.97 |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
No data available

Inhalation: No data available

Dermal: No data available

LD50 Subcutaneous - Rat - 50 mg/kg

**Skin corrosion/irritation**
Skin - Mouse
Result: Mild skin irritation

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
Chronic exposure may cause dermatitis.

**Germ cell mutagenicity**
May alter genetic material.
In vivo tests showed mutagenic effects

**Carcinogenicity**

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

| | |
|---|---|
| IARC: | 1 - Group 1: Carcinogenic to humans (Benzo[a]pyrene) |
| NTP: | RAHC - Reasonably anticipated to be a human carcinogen (Benzo[a]pyrene) |
| OSHA: | OSHA specifically regulated carcinogen (Benzo[a]pyrene) |

**Reproductive toxicity**
May cause congenital malformation in the fetus.
Presumed human reproductive toxicant

May cause reproductive disorders.

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to daphnia and other aquatic invertebrates | EC50 - Daphnia magna (Water flea) - 0.25 mg/l - 48 h |
| Toxicity to algae | EC50 - Pseudokirchneriella subcapitata (green algae) - 0.02 mg/l - 72 h |

### 12.2 Persistence and degradability

### 12.3 Bioaccumulative potential

| | |
|---|---|
| Bioaccumulation | Lepomis macrochirus (Bluegill) - 48 h<br>- 0.0005 mg/l |
| | Bioconcentration factor (BCF): 3,208 |

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Benzo[a]pyrene)
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

**IMDG**

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[a]pyrene)
Marine pollutant:yes

**IATA**

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[a]pyrene)

**Further information**

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**SARA 302 Components**

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Benzo[a]pyrene | 50-32-8 | 2007-03-01 |

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benzo[a]pyrene | 50-32-8 | 2007-03-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benzo[a]pyrene | 50-32-8 | 2007-03-01 |

| | CAS-No. | Revision Date |
|---|---|---|
| Benzo[a]pyrene | 50-32-8 | 2007-03-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|

| | | |
|---|---|---|
| Benzo[a]pyrene | 50-32-8 | 2007-03-01 |

**California Prop. 65 Components**

| WARNING! This product contains a chemical known to the State of California to cause cancer. | CAS-No. | Revision Date |
|---|---|---|
| Benzo[a]pyrene | 50-32-8 | 1990-01-01 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Carc. | Carcinogenicity |
| H317 | May cause an allergic skin reaction. |
| H340 | May cause genetic defects. |
| H350 | May cause cancer. |
| H360 | May damage fertility or the unborn child. |
| H400 | Very toxic to aquatic life. |
| H410 | Very toxic to aquatic life with long lasting effects. |
| Muta. | Germ cell mutagenicity |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 3 |
| Chronic Health Hazard: | * |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 3 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 02/02/2018 Print Date: 10/19/2018

# SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 01/21/2019

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Benzo[<I>b</>]fluoranthene

Product Number : 48490
Brand : Supelco
Index-No. : 601-034-00-4

CAS-No. : 205-99-2

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

### 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

| | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P273 | Avoid release to the environment. |
| P281 | Use personal protective equipment as required. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P391 | Collect spillage. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Synonyms | : | 3,4-Benzofluoranthene |
| Formula | : | C<SB>20</>H<SB>12</> |
| Molecular weight | : | 252.31 g/mol |
| CAS-No. | : | 205-99-2 |
| EC-No. | : | 205-911-9 |
| Index-No. | : | 601-034-00-4 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Benz[e]acephenanthrylene** | | |
| | Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
Carbon oxides

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**

**Components with workplace control parameters**

| | | |
|---|---|---|
| | Remarks | Cancer<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs)<br>Exposure by all routes should be carefully controlled to levels as low as possible.<br>Suspected human carcinogen |

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| Benz[e]acephenanthrylene | 205-99-2 | 1-Hydroxypyrene | | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | End of shift at end of workweek | | | |

### 8.2 Exposure controls

**Appropriate engineering controls**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**

Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: solid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: 163 - 165 °C (325 - 329 °F) - lit. |
| f) | Initial boiling point and boiling range | No data available |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |

| | | |
|---|---|---|
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | No data available |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
TDLo Oral - Mouse - 7.57 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Changes in thymus weight.
Inhalation: No data available
Dermal: No data available
No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

| | |
|---|---|
| IARC: | 2B - Group 2B: Possibly carcinogenic to humans (Benz[e]acephenanthrylene) |
| NTP: | RAHC - Reasonably anticipated to be a human carcinogen (Benz[e]acephenanthrylene) |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |

**Reproductive toxicity**
No data available
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to daphnia and other aquatic invertebrates | Immobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h(Benz[e]acephenanthrylene) |

### 12.2 Persistence and degradability
No data available

### 12.3 Bioaccumulative potential
No data available

### 12.4 Mobility in soil
No data available(Benz[e]acephenanthrylene)

### 12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
Not dangerous goods

**IMDG**
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[e]acephenanthrylene)
Marine pollutant : yes

**IATA**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[e]acephenanthrylene)

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Benz[e]acephenanthrylene | 205-99-2 | 2007-03-01 |

**SARA 311/312 Hazards**
Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benz[e]acephenanthrylene | 205-99-2 | 2007-03-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benz[e]acephenanthrylene | 205-99-2 | 2007-03-01 |

**California Prop. 65 Components**

| , which is/are known to the State of California to cause cancer. | CAS-No. | Revision Date |
|---|---|---|
| For more information go to www.P65Warnings.ca.gov. | 205-99-2 | 2007-09-28 |
| Benz[e]acephenanthrylene | | |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

H350 May cause cancer.

| | |
|---|---|
| H400 | Very toxic to aquatic life. |
| H410 | Very toxic to aquatic life with long lasting effects. |

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

# SAFETY DATA SHEET

Version 6.1
Revision Date 07/16/2018
Print Date 01/21/2019

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Benzo[<I>k</>]fluoranthene

Product Number : 48492
Brand : Supelco
Index-No. : 601-036-00-5

CAS-No. : 207-08-9

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

### 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

| | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P273 | Avoid release to the environment. |
| P281 | Use personal protective equipment as required. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P391 | Collect spillage. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Formula | : | C<SB>20</>H<SB>12</> |
| Molecular weight | : | 252.31 g/mol |
| CAS-No. | : | 207-08-9 |
| EC-No. | : | 205-916-6 |
| Index-No. | : | 601-036-00-5 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Benzo[k]fluoranthene** | | |
| | Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
Carbon oxides

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**
**Components with workplace control parameters**
**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| Benzo[k]fluoranthene | 207-08-9 | 1-Hydroxypyrene | | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | End of shift at end of workweek | | | |

**8.2 Exposure controls**
**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
**Personal protective equipment**
**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: crystalline<br>Colour: yellow |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: 215 - 217 °C (419 - 423 °F) - lit. |
| f) | Initial boiling point and boiling range | No data available |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |

| | | |
|---|---|---|
| m) | Relative density | No data available |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
No data available
Inhalation: No data available
Dermal: No data available
No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
Carcinogenicity- Rat- Implant

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benzo[k]fluoranthene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benzo[k]fluoranthene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**
No data available
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: DF6350000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

**12.1 Toxicity**
No data available

**12.2 Persistence and degradability**
No data available

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available(Benzo[k]fluoranthene)

**12.5 Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

**13.1 Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

Reportable Quantity (RQ) : 5000 lbs

no
Poison Inhalation Hazard: No

**IMDG**
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[k]fluoranthene)
Marine pollutant : yes

**IATA**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benzo[k]fluoranthene | 207-08-9 | 1994-04-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benzo[k]fluoranthene | 207-08-9 | 1994-04-01 |

**California Prop. 65 Components**

| | | |
|---|---|---|
| , which is/are known to the State of California to cause cancer. | CAS-No. | Revision Date |
| For more information go to www.P65Warnings.ca.gov. | 207-08-9 | 2007-09-28 |
| Benzo[k]fluoranthene | | |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| H350 | May cause cancer. |
| H400 | Very toxic to aquatic life. |
| H410 | Very toxic to aquatic life with long lasting effects. |

**Further information**
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/16/2018 Print Date: 01/21/2019

# SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 01/21/2019

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

| | | |
|---|---|---|
| Product name | : | Benz[*a*]anthracene |
| Product Number | : | 48563 |
| Brand | : | Supelco |
| Index-No. | : | 601-033-00-9 |
| CAS-No. | : | 56-55-3 |

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

| | | |
|---|---|---|
| Identified uses | : | Laboratory chemicals, Synthesis of substances |

### 1.3 Details of the supplier of the safety data sheet

| | | |
|---|---|---|
| Company | : | Sigma-Aldrich Inc.<br>3050 Spruce Street<br>ST. LOUIS MO 63103<br>UNITED STATES |
| Telephone | : | +1 314 771-5765 |
| Fax | : | +1 800 325-5052 |

### 1.4 Emergency telephone number

| | | |
|---|---|---|
| Emergency Phone # | : | (314) 776-6555 |

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

| | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P273 | Avoid release to the environment. |
| P281 | Use personal protective equipment as required. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P391 | Collect spillage. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Synonyms | : | 1,2-Benzanthracene<br>Tetraphene |
| Formula | : | C<SB>18</>H<SB>12</> |
| Molecular weight | : | 228.29 g/mol |
| CAS-No. | : | 56-55-3 |
| EC-No. | : | 200-280-6 |
| Index-No. | : | 601-033-00-9 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Benz[a]anthracene** | | |
| | Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture
Carbon oxides

### 5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information
No data available

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

### 6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections
For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters
**Components with workplace control parameters**
Contains no substances with occupational exposure limit values.

### 8.2 Exposure controls
**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: solid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: 157 - 159 °C (315 - 318 °F) |
| f) | Initial boiling point and boiling range | 437.6 °C (819.7 °F) |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | No data available |

| | | |
|---|---|---|
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
No data available
Inhalation: No data available
Dermal: No data available
LD50 Intravenous - Rat - > 200 mg/kg

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**
No data available
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

**12.1 Toxicity**
No data available

**12.2 Persistence and degradability**
No data available

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available(Benz[a]anthracene)

**12.5 Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

**13.1 Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
Not dangerous goods
**IMDG**
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Marine pollutant : yes

**IATA**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benz[a]anthracene | 56-55-3 | 1993-04-24 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benz[a]anthracene | 56-55-3 | 1993-04-24 |

| | CAS-No. | Revision Date |
|---|---|---|
| Benz[a]anthracene | 56-55-3 | 1993-04-24 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Benz[a]anthracene | 56-55-3 | 1993-04-24 |

**California Prop. 65 Components**

| | | |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene | CAS-No. 56-55-3 | Revision Date 2007-09-28 |
| WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene | CAS-No. 56-55-3 | Revision Date 2007-09-28 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| H350 | May cause cancer. |
| H400 | Very toxic to aquatic life. |

H410 Very toxic to aquatic life with long lasting effects.

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

# SAFETY DATA SHEET

Version 5.11
Revision Date 03/19/2018
Print Date 11/10/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Carbon disulfide

Product Number : 335266
Brand : Sigma-Aldrich
Index-No. : 006-003-00-3

CAS-No. : 75-15-0

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

| | |
|---|---|
| H225 | Highly flammable liquid and vapour. |
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H332 | Harmful if inhaled. |
| H361 | Suspected of damaging fertility or the unborn child. |
| H372 | Causes damage to organs through prolonged or repeated exposure if inhaled. |
| H401 | Toxic to aquatic life. |

| Precautionary statement(s) | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P210 | Keep away from heat/sparks/open flames/hot surfaces. No smoking. |
| P233 | Keep container tightly closed. |
| P240 | Ground/bond container and receiving equipment. |
| P241 | Use explosion-proof electrical/ ventilating/ lighting/ equipment. |
| P242 | Use only non-sparking tools. |
| P243 | Take precautionary measures against static discharge. |
| P260 | Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P270 | Do not eat, drink or smoke when using this product. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P303 + P361 + P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. |
| P304 + P340 + P312 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P332 + P313 | If skin irritation occurs: Get medical advice/ attention. |
| P337 + P313 | If eye irritation persists: Get medical advice/ attention. |
| P362 | Take off contaminated clothing and wash before reuse. |
| P370 + P378 | In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish. |
| P403 + P235 | Store in a well-ventilated place. Keep cool. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Formula | : | $CS_2$ |
| Molecular weight | : | 76.14 g/mol |
| CAS-No. | : | 75-15-0 |
| EC-No. | : | 200-843-6 |
| Index-No. | : | 006-003-00-3 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Carbon disulphide** | | |
| | Flam. Liq. 2; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Repr. 2; STOT RE 1; Aquatic Acute 2; H225, H315, H319, H332, H361, H372, H401 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed
No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture
Flash back possible over considerable distance., Container explosion may occur under fire conditions., Vapours may form explosive mixture with air., May explode when heated.

### 5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information
Use water spray to cool unopened containers.

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

### 6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections
For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Refrigerate before opening.
Storage class (TRGS 510): 3: Flammable liquids

**7.3 Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| Carbon disulphide | 75-15-0 | TWA | 1 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Peripheral Nervous System impairment<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Not classifiable as a human carcinogen<br>Danger of cutaneous absorption | | |
| | | TWA | 1 ppm<br>3 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential for dermal absorption | | |
| | | ST | 10 ppm<br>30 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential for dermal absorption | | |
| | | See Table Z-2 | | |
| | | TWA | 20 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.3-1968 | | |
| | | CEIL | 30 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.3-1968 | | |
| | | Peak | 100 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.3-1968 | | |
| | | PEL | 1 ppm<br>3 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | Skin | | |
| | | STEL | 12 ppm<br>36 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | Skin | | |
| | | C | 30 ppm | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | Skin | | |

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| | - | 2-Thiothiazolidine-4-carboxylix acid (TTCA) | 0.5mg/g Creatinine | Urine | ACGIH - Biological Exposure Indices (BEI) |

| | | |
|---|---|---|
| | Remarks | End of shift (As soon as possible after exposure ceases) |

### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid<br>Colour: colourless |
| b) | Odour | Stench. |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: -112 - -111 °C (-170 - -168 °F) |

| | | |
|---|---|---|
| f) | Initial boiling point and boiling range | 46 °C (115 °F) |
| g) | Flash point | -30 °C (-22 °F) - closed cup |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | Upper explosion limit: 50 %(V)<br>Lower explosion limit: 1.3 %(V) |
| k) | Vapour pressure | 394.956 hPa (296.241 mmHg) at 20 °C (68 °F)<br>1,342.711 hPa (1,007.116 mmHg) at 55 °C (131 °F) |
| l) | Vapour density | 2.63 - (Air = 1.0) |
| m) | Relative density | 1.266 g/mL at 25 °C (77 °F) |
| n) | Water solubility | 2.9 g/l at 20 °C (68 °F) - OECD Test Guideline 105 |
| o) | Partition coefficient: n-octanol/water | log Pow: 2.7 at 25 °C (77 °F) |
| p) | Auto-ignition temperature | 97 - 107 °C (207 - 225 °F) |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**

| | |
|---|---|
| Surface tension | 71.9 mN/m at 19.5 °C (67.1 °F) |
| Relative vapour density | 2.63 - (Air = 1.0) |

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**10.4 Conditions to avoid**
Heat, flames and sparks.

**10.5 Incompatible materials**
Alkali metals, Zinc, Amines, Azides, Oxidizing agents

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 423)

LC50 Inhalation - Rat - male and female - 4 h - 10.35 mg/l
(OECD Test Guideline 403)

Dermal: No data available

No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

**Germ cell mutagenicity**
Laboratory experiments have shown mutagenic effects.

Ames test
Salmonella typhimurium
Result: negative

**Carcinogenicity**

| | |
|---|---|
| IARC: | No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |

**Reproductive toxicity**
Suspected human reproductive toxicant

May cause reproductive disorders.

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: FF6650000

May cause convulsions.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | LC50 - Poecilia reticulata (guppy) - 4 mg/l - 96 h<br>(OECD Test Guideline 203) |
| Toxicity to daphnia and other aquatic invertebrates | Immobilization EC50 - Daphnia magna (Water flea) - 2.1 mg/l - 48 h<br>(OECD Test Guideline 202) |
| Toxicity to algae | Growth inhibition EC50 - Chlorella pyrenoidosa - 21 mg/l - 96 h<br>(OECD Test Guideline 201) |

### 12.2 Persistence and degradability

| | |
|---|---|
| Biodegradability | aerobic - Exposure time 28 d<br>Result: > 80 % - Readily biodegradable.<br>(OECD Test Guideline 301D) |

**12.3 Bioaccumulative potential**

**12.4 Mobility in soil**
No data available

**12.5 Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

No data available

## 13. DISPOSAL CONSIDERATIONS

**13.1 Waste treatment methods**

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 1131 Class: 3 (6.1) Packing group: I
Proper shipping name: Carbon disulfide
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

**IMDG**
UN number: 1131 Class: 3 (6.1) Packing group: I EMS-No: F-E, S-D
Proper shipping name: CARBON DISULPHIDE

**IATA**
UN number: 1131 Class: 3 (6.1)
Proper shipping name: Carbon disulphide
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

## 15. REGULATORY INFORMATION

**SARA 302 Components**
The following components are subject to reporting levels established by SARA Title III, Section 302:

| | CAS-No. | Revision Date |
|---|---|---|
| Carbon disulphide | 75-15-0 | 2008-11-03 |

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Carbon disulphide | 75-15-0 | 2008-11-03 |

**SARA 311/312 Hazards**
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Carbon disulphide | 75-15-0 | 2008-11-03 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Carbon disulphide | 75-15-0 | 2008-11-03 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Carbon disulphide | 75-15-0 | 2008-11-03 |

**California Prop. 65 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.<br>Carbon disulphide | 75-15-0 | 2008-06-17 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Acute Tox. | Acute toxicity |
| Aquatic Acute | Acute aquatic toxicity |
| Eye Irrit. | Eye irritation |
| Flam. Liq. | Flammable liquids |
| H225 | Highly flammable liquid and vapour. |
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H332 | Harmful if inhaled. |
| H361 | Suspected of damaging fertility or the unborn child. |
| H372 | Causes damage to organs through prolonged or repeated exposure if inhaled. |
| H401 | Toxic to aquatic life. |
| Repr. | Reproductive toxicity |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Chronic Health Hazard: | * |
| Flammability: | 3 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Fire Hazard: | 3 |
| Reactivity Hazard: | 0 |

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.11 Revision Date: 03/19/2018 Print Date: 11/10/2018

# SAFETY DATA SHEET

Version 3.18
Revision Date 08/14/2018
Print Date 11/10/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Chloroform

Product Number : C2432
Brand : Sigma-Aldrich
Index-No. : 602-006-00-4

CAS-No. : 67-66-3

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361d
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure (Category 1), Liver, Kidney, H372
Acute aquatic toxicity (Category 3), H402

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H336 May cause drowsiness or dizziness.
H351 Suspected of causing cancer.

| | |
|---|---|
| H361d | Suspected of damaging the unborn child. |
| H372 | Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure. |
| H402 | Harmful to aquatic life. |

Precautionary statement(s)

| | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P260 | Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P270 | Do not eat, drink or smoke when using this product. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P301 + P312 + P330 | IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth. |
| P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P304 + P340 + P311 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P332 + P313 | If skin irritation occurs: Get medical advice/ attention. |
| P337 + P313 | If eye irritation persists: Get medical advice/ attention. |
| P362 | Take off contaminated clothing and wash before reuse. |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Synonyms | : | Trichloromethane<br>Methylidyne trichloride |
| Formula | : | $CHCl_3$ |
| Molecular weight | : | 119.38 g/mol |
| CAS-No. | : | 67-66-3 |
| EC-No. | : | 200-663-8 |
| Index-No. | : | 602-006-00-4 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Chloroform** | | |
| | Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; Repr. 2; STOT SE 3; STOT RE 1; Aquatic Acute 3; H302, H315, H319, H331, H336, H351, H361d, H372, H402 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**General advice**
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed
No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture
No data available

### 5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information
No data available

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

### 6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections
For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| Chloroform | 67-66-3 | TWA | 10 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Central Nervous System impairment<br>Liver damage<br>Embryo/fetal damage<br>Confirmed animal carcinogen with unknown relevance to humans | | |
| | | ST | 2 ppm<br>9.78 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential Occupational Carcinogen<br>See Appendix A | | |
| | | C | 50 ppm<br>240 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | The value in mg/m3 is approximate.<br>Ceiling limit is to be determined from breathing-zone air samples. | | |
| | | PEL | 2 ppm<br>9.78 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

### 8.2 Exposure controls

**Appropriate engineering controls**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Personal protective equipment**

**Eye/face protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid, clear<br>Colour: colourless |
| b) | Odour | sweet |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: -63 °C (-81 °F) |
| f) | Initial boiling point and boiling range | 60.5 - 61.5 °C (140.9 - 142.7 °F) |
| g) | Flash point | - DIN 51755 Part 1does not flash |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | 210 hPa (158 mmHg) at 20 °C (68 °F) |
| l) | Vapour density | 4.12 - (Air = 1.0) |
| m) | Relative density | 1.492 g/mL at 25 °C (77 °F) |
| n) | Water solubility | 8.7 g/l at 23 °C (73 °F) - OECD Test Guideline 105 |
| o) | Partition coefficient: n-octanol/water | log Pow: 1.97 at 25 °C (77 °F) - (ECHA), Bioaccumulation is not expected. |
| p) | Auto-ignition temperature | > 600 °C (> 1,112 °F) at 1,013 hPa (760 mmHg) - DIN 51794 |
| q) | Decomposition temperature | Distillable in an undecomposed state at normal pressure. |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**

| | |
|---|---|
| Solubility in other solvents | organic solvent at 20 °C (68 °F) - miscible |
| Surface tension | 27.1 mN/m at 20.0 °C (68.0 °F) |
| Relative vapour density | 4.12 - (Air = 1.0) |

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.
Contains the following stabiliser(s):
2-Methyl-2-butene (>=0.001 - <=0.015 %)

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
various plastics, Rubber

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - male - 908 mg/kg
(OECD Test Guideline 401)
Remarks: Behavioral:Change in motor activity (specific assay). Behavioral:Ataxia. Lungs, Thorax, or Respiration:Respiratory stimulation.

LOEC Inhalation - Rat - male - 6 h - 500 ppm
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

LD50 Dermal - Rabbit - > 20,000 mg/kg
Remarks: (RTECS)

No data available

**Skin corrosion/irritation**
Skin - Rabbit
Result: Irritating to skin. - 24 h
Remarks: (ECHA)

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Irritating to eyes.
Remarks: (ECHA)

**Respiratory or skin sensitisation**
Sensitisation test: - Guinea pig
Result: negative
(Maximisation Test)
Remarks: (ECHA)

**Germ cell mutagenicity**
Ames test
Salmonella typhimurium
Result: negative

reverse mutation assay
Escherichia coli
Result: negative
(ECHA)

OECD Test Guideline 474
Rat - male and female - Bone marrow
Result: negative

OECD Test Guideline 486
Rat - male - Other cell types
Result: negative

**Carcinogenicity**

Carcinogenicity - Rat - Oral
Tumorigenic:Carcinogenic by RTECS criteria. Leukaemia

Suspected of causing cancer.

| | |
|---|---|
| IARC: | 2B - Group 2B: Possibly carcinogenic to humans (Chloroform) |
| NTP: | RAHC - Reasonably anticipated to be a human carcinogen (Chloroform) |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |

**Reproductive toxicity**
Suspected of damaging the unborn child.

**Specific target organ toxicity - single exposure**
May cause drowsiness or dizziness.

**Specific target organ toxicity - repeated exposure**
Causes damage to organs through prolonged or repeated exposure. - Liver, Kidney

**Aspiration hazard**
No data available

**Additional Information**
RTECS: FS9100000

Vomiting, Cough, irritant effects, Shortness of breath, respiratory arrest, narcosis, Dizziness, Nausea, agitation, spasms, inebriation, Headache, Stomach/intestinal disorders, ataxia (impaired locomotor coordination), cardiovascular disorders Drying-out effect resulting in rough and chapped skin.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | flow-through test LC50 - Danio rerio (zebra fish) - 121 mg/l - 48 h<br>(OECD Test Guideline 203) |
| | static test LC50 - Pimephales promelas (fathead minnow) - 103 - 171 mg/l - 96 h<br>Remarks: (ECHA) |
| | flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 18.2 mg/l - 96 h<br>Remarks: (ECHA) |
| | flow-through test LC50 - Micropterus dolomieui - 51 mg/l - 96 h<br>Remarks: (ECHA) |
| Toxicity to daphnia and other aquatic invertebrates | static test EC50 - Daphnia magna (Water flea) - 79 mg/l - 48 h<br>Remarks: (ECHA) |
| Toxicity to algae | static test ErC50 - Chlamydomonas reinhardtii (green algae) - 13.3 mg/l - 72 h<br>Remarks: (ECHA) |

12.2 Persistence and degradability

| | |
|---|---|
| Biodegradability | aerobic - Exposure time 14 d |

Result: 0 % - Not readily biodegradable.
(OECD Test Guideline 301C)

**12.3 Bioaccumulative potential**

Bioaccumulation

Cyprinus carpio (Carp) - 42 d
at 25 °C - 0.1 mg/l

Bioconcentration factor (BCF): 4.1 - 13
(OECD Test Guideline 305)

Cyprinus carpio (Carp) - 42 d
at 25 °C - 1 mg/l

Bioconcentration factor (BCF): 1.4 - 4.7
(OECD Test Guideline 305)

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

## 13. DISPOSAL CONSIDERATIONS

**13.1 Waste treatment methods**

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**

UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: Chloroform
Reportable Quantity (RQ): 10 lbsReportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

**IMDG**

UN number: 1888 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: CHLOROFORM

**IATA**

UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: Chloroform

## 15. REGULATORY INFORMATION

**SARA 302 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chloroform | 67-66-3 | 2008-11-03 |

**SARA 313 Components**

The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Chloroform | 67-66-3 | 2008-11-03 |

**SARA 311/312 Hazards**
Acute Health Hazard, Chronic Health Hazard

**Reportable Quantity** : D022 lbs

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chloroform | 67-66-3 | 2008-11-03 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chloroform | 67-66-3 | 2008-11-03 |

**California Prop. 65 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| , which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. Chloroform | 67-66-3 | 2011-09-01 |

## 16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

| | |
|---|---|
| Acute Tox. | Acute toxicity |
| Aquatic Acute | Acute aquatic toxicity |
| Carc. | Carcinogenicity |
| Eye Irrit. | Eye irritation |
| H302 | Harmful if swallowed. |
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H331 | Toxic if inhaled. |
| H336 | May cause drowsiness or dizziness. |
| H351 | Suspected of causing cancer. |
| H361d | Suspected of damaging the unborn child. |
| H372 | Causes damage to organs through prolonged or repeated exposure. |
| H402 | Harmful to aquatic life. |
| Repr. | Reproductive toxicity |
| Skin Irrit. | Skin irritation |
| STOT RE | Specific target organ toxicity - repeated exposure |
| STOT SE | Specific target organ toxicity - single exposure |

Further information
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**Preparation Information**
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.18 Revision Date: 08/14/2018 Print Date: 11/10/2018

Fisher Scientific

Part of Thermo Fisher Scientific

# SAFETY DATA SHEET

**Creation Date** 13-Sep-2013 **Revision Date** 21-Jul-2015 **Revision Number** 2

## 1. Identification

**Product Name** **Chromium**

**Cat No. :** **C318-500**

**Synonyms** Chrome

**Recommended Use** Laboratory chemicals.

**Uses advised against** No Information available

**Details of the supplier of the safety data sheet**

**Company**
Fisher Scientific
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)

| | |
|---|---|
| Specific target organ toxicity (single exposure)<br>Target Organs - Respiratory system. | Category 3 |

**Label Elements**

**Signal Word**
Warning

**Hazard Statements**
May cause respiratory irritation



**Precautionary Statements**
**Prevention**
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area

**Inhalation**
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
**Storage**
Store in a well-ventilated place. Keep container tightly closed
Store locked up
**Disposal**
Dispose of contents/container to an approved waste disposal plant
**Hazards not otherwise classified (HNOC)**
Very toxic to aquatic life

## 3. Composition / information on ingredients

| Component | CAS-No | Weight % |
|---|---|---|
| Chromium | 7440-47-3 | >95 |

## 4. First-aid measures

**General Advice** If symptoms persist, call a physician.

**Eye Contact** Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

**Skin Contact** Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

**Inhalation** Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

**Ingestion** Do not induce vomiting. Obtain medical attention.

**Most important symptoms/effects** None reasonably foreseeable.
**Notes to Physician** Treat symptomatically

## 5. Fire-fighting measures

**Unsuitable Extinguishing Media** Carbon dioxide (CO2)

**Flash Point** Not applicable
**Method -** No information available

**Autoignition Temperature** Not applicable
**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**
Dust can form an explosive mixture in air. Do not allow run-off from fire fighting to enter drains or water courses.

**Hazardous Combustion Products**
Chromium oxide
**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 | Flammability | Instability | Physical hazards |
|---|---|---|---|
| 2 | 1 | 1 | N/A |

## 6. Accidental release measures

**Personal Precautions** Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.

**Environmental Precautions** Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

**Methods for Containment and Clean Up** Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal.

## 7. Handling and storage

**Handling** Avoid dust formation. Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.

**Storage** Keep containers tightly closed in a dry, cool and well-ventilated place. Store under an inert atmosphere.

## 8. Exposure controls / personal protection

**Exposure Guidelines**

| Component | ACGIH TLV | OSHA PEL | NIOSH IDLH |
|---|---|---|---|
| Chromium | TWA: 0.5 mg/m³ | (Vacated) TWA: 1 mg/m³<br>TWA: 1 mg/m³ | IDLH: 250 mg/m³<br>TWA: 0.5 mg/m³ |

| Component | Quebec | Mexico OEL (TWA) | Ontario TWAEV |
|---|---|---|---|
| Chromium | TWA: 0.5 mg/m³ | TWA: 0.5 mg/m³ | TWA: 0.5 mg/m³ |

*Legend*

*ACGIH - American Conference of Governmental Industrial Hygienists*
*OSHA - Occupational Safety and Health Administration*
*NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health*

**Engineering Measures** Ensure adequate ventilation, especially in confined areas. 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.

**Hygiene Measures** Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

| | |
|---|---|
| **Physical State** | Powder |
| **Appearance** | Silver |
| **Odor** | Odorless |
| **Odor Threshold** | No information available |
| **pH** | No information available |
| **Melting Point/Range** | 1857.2 °C / 3375 °F |

| | |
|---|---|
| **Boiling Point/Range** | 2640 °C / 4784 °F |
| **Flash Point** | Not applicable |
| **Evaporation Rate** | Not applicable |
| **Flammability (solid,gas)** | No information available |
| **Flammability or explosive limits** | |
| **Upper** | No data available |
| **Lower** | No data available |
| **Vapor Pressure** | No information available |
| **Vapor Density** | Not applicable |
| **Relative Density** | 7.2 |
| **Solubility** | Insoluble in water |
| **Partition coefficient; n-octanol/water** | No data available |
| **Autoignition Temperature** | Not applicable |
| **Decomposition Temperature** | No information available |
| **Viscosity** | Not applicable |
| **Molecular Formula** | Cr |
| **Molecular Weight** | 51.996 |

## 10. Stability and reactivity

**Reactive Hazard** None known, based on information available

**Stability** Sensitive to air.

**Conditions to Avoid** Incompatible products. Excess heat. Avoid dust formation.

**Incompatible Materials** Strong oxidizing agents, Strong acids

**Hazardous Decomposition Products** Chromium oxide

**Hazardous Polymerization** Hazardous polymerization does not occur.

**Hazardous Reactions** None under normal processing.

## 11. Toxicological information

**Acute Toxicity**

**Component Information**

**Toxicologically Synergistic Products** No information available

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Irritation** May cause irritation of respiratory tract

**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 |
|---|---|---|---|---|---|---|
| Chromium | 7440-47-3 | Not listed | Not listed | Not listed | Not listed | Not listed |

**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** No information available

**Endocrine Disruptor Information** No information available

**Other Adverse Effects** The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

## 12. Ecological information

**Ecotoxicity**

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms.

| Component | Freshwater Algae | Freshwater Fish | Microtox | Water Flea |
|---|---|---|---|---|
| Chromium | Not listed | LC50: 14.3 mg/l/96 H (Pimephales promelas) | Not listed | EC50: 0.07 mg/l/48 H |

**Persistence and Degradability** Insoluble in water

**Bioaccumulation/ Accumulation** No information available.

**Mobility** Is not likely mobile in the environment due its low 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** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **Proper technical name** Chromium
- **Hazard Class** 9
- **Packing Group** III

**TDG** Not regulated

- **UN-No** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **Hazard Class** 9
- **Packing Group** III

**IATA**

- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

**IMDG/IMO**

- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

## 15. Regulatory information

**International Inventories**

| Component | TSCA | DSL | NDSL | EINECS | ELINCS | NLP | PICCS | ENCS | AICS | IECSC | KECL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chromium | X | X | - | 231-157-5 | - | | X | - | X | X | X |

**Legend:**
**X - Listed**
**E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.**

**F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.**
**N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.**
**P - Indicates a commenced PMN substance**
**R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.**
**S - Indicates a substance that is identified in a proposed or final Significant New Use Rule**
**T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.**
**XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).**
**Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.**
**Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.**

## U.S. Federal Regulations

**TSCA 12(b)** Not applicable

**SARA 313**

| Component | CAS-No | Weight % | SARA 313 - Threshold Values % |
|---|---|---|---|
| Chromium | 7440-47-3 | >95 | 1.0 |

**SARA 311/312 Hazardous Categorization**

| | |
|---|---|
| **Acute Health Hazard** | Yes |
| **Chronic Health Hazard** | No |
| **Fire Hazard** | No |
| **Sudden Release of Pressure Hazard** | No |
| **Reactive Hazard** | No |

**Clean Water Act**

| Component | CWA - Hazardous Substances | CWA - Reportable Quantities | CWA - Toxic Pollutants | CWA - Priority Pollutants |
|---|---|---|---|---|
| Chromium | - | - | X | X |

**Clean Air Act**

| Component | HAPS Data | Class 1 Ozone Depletors | Class 2 Ozone Depletors |
|---|---|---|---|
| Chromium | X | | - |

**OSHA** Occupational Safety and Health Administration
Not applicable

**CERCLA**
Not applicable

| Component | Hazardous Substances RQs | CERCLA EHS RQs |
|---|---|---|
| Chromium | 5000 lb 10 lb | - |

**California Proposition 65** This product does not contain any Proposition 65 chemicals

**State Right-to-Know**

| Component | Massachusetts | New Jersey | Pennsylvania | Illinois | Rhode Island |
|---|---|---|---|---|---|
| Chromium | X | X | X | X | X |

**U.S. Department of Transportation**

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

**U.S. Department of Homeland Security**
This product does not contain any DHS chemicals.

## Other International Regulations

**Mexico - Grade** No information available

**Canada**
**This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR**

**WHMIS Hazard Class** D2B Toxic materials



## 16. Other information

**Prepared By**
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

**Creation Date** 13-Sep-2013
**Revision Date** 21-Jul-2015
**Print Date** 21-Jul-2015
**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

**Disclaimer**
**The information provided on 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 guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.**

**End of SDS**

# SAFETY DATA SHEET

Version 5.5
Revision Date 01/10/2018
Print Date 01/21/2019

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Chrysene

Product Number : 35754
Brand : Sigma-Aldrich
Index-No. : 601-048-00-0

CAS-No. : 218-01-9

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

| | |
|---|---|
| P391 | Collect spillage. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Formula | : | $C_{18}H_{12}$ |
| Molecular weight | : | 228.29 g/mol |
| CAS-No. | : | 218-01-9 |
| EC-No. | : | 205-923-4 |
| Index-No. | : | 601-048-00-0 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Chrysene** | | |
| | Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, H350, H410 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
No data available

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| | Remarks | Cancer<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs)<br>Exposure by all routes should be carefully controlled to levels as low as possible.<br>Confirmed animal carcinogen with unknown relevance to humans | | |
| Chrysene | 218-01-9 | TWA | 0.200000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | TWA | 0.200000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | 1910.1002<br>As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard<br>OSHA specifically regulated carcinogen | | |
| | | TWA | 0.100000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential Occupational Carcinogen | | |

| | | | | |
|---|---|---|---|---|
| | | NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.<br>cyclohexane-extractable fraction<br>See Appendix C<br>See Appendix A | | |
| | | PEL | 0.2 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| | - | 1-Hydroxypyrene | | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | End of shift at end of workweek | | | |

## 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: solid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: 252 - 254 °C (486 - 489 °F) - lit. |
| f) | Initial boiling point and boiling range | 448 °C (838 °F) - lit. |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | No data available |
| n) | Water solubility | insoluble |
| o) | Partition coefficient: n-octanol/water | log Pow: 5.73 |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

### 9.2 Other safety information

No data available

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

**Acute toxicity**
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - > 320 mg/kg

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

**Carcinogenicity**

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

| | |
|---|---|
| IARC: | 2B - Group 2B: Possibly carcinogenic to humans (Chrysene) |
| NTP: | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |
| OSHA: | OSHA specifically regulated carcinogen (Chrysene) |

**Reproductive toxicity**
No data available

No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: GC0700000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to daphnia and other aquatic invertebrates | EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h |

### 12.2 Persistence and degradability
No data available

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available

**12.5 Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

## 13. DISPOSAL CONSIDERATIONS

**13.1 Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

**IMDG**
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)
Marine pollutant:yes

**IATA**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Chrysene | 218-01-9 | 1994-04-01 |

**SARA 311/312 Hazards**
Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chrysene | 218-01-9 | 1994-04-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chrysene | 218-01-9 | 1994-04-01 |

| | CAS-No. | Revision Date |
|---|---|---|
| Chrysene | 218-01-9 | 1994-04-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Chrysene | 218-01-9 | 1994-04-01 |

**California Prop. 65 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer.<br>Chrysene | 218-01-9 | 2007-09-28 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Carc. | Carcinogenicity |
| H341 | Suspected of causing genetic defects. |
| H350 | May cause cancer. |
| H400 | Very toxic to aquatic life. |
| H410 | Very toxic to aquatic life with long lasting effects. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 0 |
| Chronic Health Hazard: | * |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 0 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

**Further information**

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 01/10/2018 Print Date: 01/21/2019

# SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 01/21/2019

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

| | | |
|---|---|---|
| Product name | : | Dibenz[<I>a</>,<I>h</>]anthracene |
| Product Number | : | 48574 |
| Brand | : | Supelco |
| Index-No. | : | 601-041-00-2 |
| CAS-No. | : | 53-70-3 |

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

| | | |
|---|---|---|
| Identified uses | : | Laboratory chemicals, Synthesis of substances |

### 1.3 Details of the supplier of the safety data sheet

| | | |
|---|---|---|
| Company | : | Sigma-Aldrich Inc.<br>3050 Spruce Street<br>ST. LOUIS MO 63103<br>UNITED STATES |
| Telephone | : | +1 314 771-5765 |
| Fax | : | +1 800 325-5052 |

### 1.4 Emergency telephone number

| | | |
|---|---|---|
| Emergency Phone # | : | (314) 776-6555 |

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

| | |
|---|---|
| H350 | May cause cancer. |
| H410 | Very toxic to aquatic life with long lasting effects. |

Precautionary statement(s)

| | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P391 | Collect spillage. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

Synonyms : 1,2:5,6-Dibenzanthracene

Formula : C<SB>22</>H<SB>14</>
Molecular weight : 278.35 g/mol
CAS-No. : 53-70-3
EC-No. : 200-181-8
Index-No. : 601-041-00-2

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Dibenz[a,h]anthracene** | | |
| | Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture
Carbon oxides

### 5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information
No data available

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

### 6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections
For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters
**Components with workplace control parameters**

### 8.2 Exposure controls
**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: solid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: 262 - 265 °C (504 - 509 °F) - lit. |
| f) | Initial boiling point and boiling range | 524 °C (975 °F) - lit. |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | No data available |

| | | |
|---|---|---|
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
No data available
Inhalation: No data available
Dermal: No data available
No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
Laboratory experiments have shown mutagenic effects.

**Carcinogenicity**
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**
No data available
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: HN2625000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Lungs -

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to daphnia and other aquatic invertebrates | Immobilization EC50 - Daphnia magna (Water flea) - 0.496 mg/l - 24 h(Dibenz[a,h]anthracene) |

### 12.2 Persistence and degradability
No data available

### 12.3 Bioaccumulative potential
No data available

### 12.4 Mobility in soil
No data available(Dibenz[a,h]anthracene)

### 12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
Not dangerous goods
**IMDG**
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Dibenz[a,h]anthracene)

Marine pollutant : yes

**IATA**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenz[a,h]anthracene)

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenz[a,h]anthracene | 53-70-3 | |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenz[a,h]anthracene | 53-70-3 | |

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenz[a,h]anthracene | 53-70-3 | |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Dibenz[a,h]anthracene | 53-70-3 | |

**California Prop. 65 Components**

| | | |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer. Dibenz[a,h]anthracene | CAS-No. 53-70-3 | Revision Date |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| H350 | May cause cancer. |
| H400 | Very toxic to aquatic life. |
| H410 | Very toxic to aquatic life with long lasting effects. |

**Further information**
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

# SAFETY DATA SHEET

Version 5.6
Revision Date 12/11/2017
Print Date 11/10/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Indeno[1,2,3-*cd*]pyrene

Product Number : 48499
Brand : Supelco

CAS-No. : 193-39-5

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Carcinogenicity (Category 2), H351

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H351 Suspected of causing cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

| | | |
|---|---|---|
| Formula | : | $C_{22}H_{12}$ |
| Molecular weight | : | 276.33 g/mol |
| CAS-No. | : | 193-39-5 |
| EC-No. | : | 205-893-2 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Indeno[1,2,3-cd]pyrene** | | |
| | Carc. 2; H351 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

### 6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

### 6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections
For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 13: Non Combustible Solids

### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**
Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1-Hydroxypyrene (1-HP) | | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | End of shift at end of workweek | | | |

### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Body Protection**
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the

sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: solid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | 163.6 °C (326.5 °F) |
| f) | Initial boiling point and boiling range | 536.0 °C (996.8 °F) |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | No data available |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

### 9.2 Other safety information
No data available

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity
No data available

### 10.2 Chemical stability
Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions
No data available

### 10.4 Conditions to avoid
No data available

### 10.5 Incompatible materials
Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

**Acute toxicity**
No data available

Inhalation: No data available

Dermal: No data available

No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

| | |
|---|---|
| IARC: | 2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene) |
| NTP: | RAHC - Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene) |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA. |

**Reproductive toxicity**
No data available

No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

No data available

### 12.2 Persistence and degradability
No data available

### 12.3 Bioaccumulative potential
No data available

### 12.4 Mobility in soil
No data available

### 12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

No data available

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
Not dangerous goods

**IMDG**
Not dangerous goods

**IATA**
Not dangerous goods

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1993-04-24 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1993-04-24 |

| | CAS-No. | Revision Date |
|---|---|---|
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1993-04-24 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1993-04-24 |

**California Prop. 65 Components**

| | | |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer.<br>Indeno[1,2,3-cd]pyrene | CAS-No.<br>193-39-5 | Revision Date<br>2007-09-28 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Carc. | Carcinogenicity |
| H351 | Suspected of causing cancer. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 0 |
| Chronic Health Hazard: | * |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 1 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.6 Revision Date: 12/11/2017 Print Date: 11/10/2018

SDS preview

# LEAD

**DANGER**

## 7439-92-1

## by Fisher Scientific

Synonyms

C.I. 77575, C.I. Pigment Metal 4, EINECS 231-100-4, Glover, HSDB 231, Lead flake, Olow, Plumbum, CI 77575, Plumbum metallicum, Blei, CI pigment metal 4, EC 231-100-4, KS-4, Lead, Lead element, Lead S2, Olow [Polish], Omaha & grant, Pb-S 100, Rough lead bullion, CCRIS 1581, Lead metal, Lead S 2, SSO 1, UNII-2P299V784P

Hazard statements

Harmful if inhaled
Harmful if swallowed
May cause cancer
May cause damage to organs through prolonged or repeated exposure
May cause drowsiness or dizziness

Precautions

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Rinse mouth
Store locked up

Hazard category

Acute toxicity, inhalation, Acute toxicity, oral, Carcinogenicity, Specific target organ toxicity, repeated exposure, Specific target organ toxicity, single exposure; Narcotic effects



:200View GHS Label8&param1=ZmRwLjFfNzE0NjEwMDNORQ==&unique=1525284976)

The information contained herein is based on data compiled from the chemical components of the (M)SDS and may not accurately represent the safety hazards for the product. Only the manufacturer of the product can make actual representations about the hazard profile of a chemical product. No warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.

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# SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006
Version 6.0 Revision Date 10.11.2016
Print Date 21.01.2019
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1 Product identifiers

| | | |
|---|---|---|
| Product name | : | Methylene chloride |
| Product Number | : | M1550000 |
| Brand | : | Sigma-Aldrich |
| REACH No. | : | A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline. |
| CAS-No. | : | 75-09-2 |

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

| | | |
|---|---|---|
| Identified uses | : | Laboratory chemicals, Manufacture of substances |

### 1.3 Details of the supplier of the safety data sheet

| | | |
|---|---|---|
| Company | : | Sigma-Aldrich Inc.<br>3050 Spruce Street<br>ST. LOUIS MO 63103<br>UNITED STATES |
| Telephone | : | +1 314 771-5765 |
| Fax | : | +1 800 325-5052 |

### 1.4 Emergency telephone number

| | | |
|---|---|---|
| Emergency Phone # | : | (314) 776-6555 |

## SECTION 2: Hazards identification

### 2.1 Classification of the substance or mixture

**Classification according to Regulation (EC) No 1272/2008**
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure, Oral (Category 2), Liver, Blood, H373
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, H373

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 Label elements

**Labelling according Regulation (EC) No 1272/2008**
Pictogram



Signal word Warning

Hazard statement(s)
H315 Causes skin irritation.

| | |
|---|---|
| H319 | Causes serious eye irritation. |
| H335 | May cause respiratory irritation. |
| H336 | May cause drowsiness or dizziness. |
| H351 | Suspected of causing cancer. |
| H373 | May cause damage to organs (Liver, Blood) through prolonged or repeated exposure if swallowed. |
| H373 | May cause damage to organs (Central nervous system) through prolonged or repeated exposure if inhaled. |

| | |
|---|---|
| Precautionary statement(s) | |
| P260 | Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| Supplemental Hazard Statements | none |

**2.3 Other hazards**

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

## SECTION 3: Composition/information on ingredients

**3.1 Substances**

| | | |
|---|---|---|
| Formula | : | CH2Cl2 |
| Molecular weight | : | 84.93 g/mol |
| CAS-No. | : | 75-09-2 |

**Hazardous ingredients according to Regulation (EC) No 1272/2008**

| Component | | Classification | Concentration |
|---|---|---|---|
| **Methylene chloride** | | | |
| CAS-No.<br>EC-No.<br>Index-No. | 75-09-2<br>200-838-9<br>602-004-00-3 | Skin Irrit. 2; Eye Irrit. 2; Carc. 2; STOT SE 3; STOT RE 2; H315, H319, H351, H336, H335, H373, H373 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## SECTION 4: First aid measures

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

### 5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information
No data available

## SECTION 6: Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

### 6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

### 6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections
For disposal see section 13.

## SECTION 7: Handling and storage

### 7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non Combustible Liquids

### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of

contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engine protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid<br>Colour: colourless |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | -97.0 °C |
| f) | Initial boiling point and boiling range | 40.0 °C at 1,013.2 hPa |
| g) | Flash point | No data available |
| h) | Evaporation rate | 0.71 |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | Upper explosion limit: 19 %(V)<br>Lower explosion limit: 12 %(V) |
| k) | Vapour pressure | 470.9 hPa at 20.0 °C |
| l) | Vapour density | 2.93 - (Air = 1.0) |
| m) | Relative density | 1.32 g/cm3 |
| n) | Water solubility | slightly soluble |
| o) | Partition coefficient: n-octanol/water | log Pow: 1.25 |
| p) | Auto-ignition temperature | 556.1 °C<br>662.0 °C |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

### 9.2 Other safety information

Relative vapour density 2.93 - (Air = 1.0)

## SECTION 10: Stability and reactivity

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.
Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

Heat, flames and sparks. Exposure to sunlight.

### 10.5 Incompatible materials

Alkali metals, Aluminum, Strong oxidizing agents, Bases, Amines, Magnesium, Strong acids and strong bases, Vinyl compounds

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
In the event of fire: see section 5

## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

**Acute toxicity**
LD50 Oral - Rat - > 2,000 mg/kg(Methylene chloride)
LC50 Inhalation - Rat - 52,000 mg/m3(Methylene chloride)
LD50 Dermal - Rat - > 2,000 mg/kg(Methylene chloride)
(OECD Test Guideline 402)

**Skin corrosion/irritation**
Skin - Rabbit(Methylene chloride)
Result: Irritating to skin. - 24 h
(Draize Test)

**Serious eye damage/eye irritation**
Eyes - Rabbit(Methylene chloride)
Result: Irritating to eyes. - 24 h
(Draize Test)

**Respiratory or skin sensitisation**
No data available(Methylene chloride)

**Germ cell mutagenicity**

(Methylene chloride)
Rat
DNA damage

**Carcinogenicity**
Limited evidence of carcinogenicity in animal studies(Methylene chloride)
Suspected human carcinogens(Methylene chloride)

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**

No data available(Methylene chloride)

**Specific target organ toxicity - single exposure**
May cause respiratory irritation.(Methylene chloride)
May cause drowsiness or dizziness.(Methylene chloride)

**Specific target organ toxicity - repeated exposure**
Inhalation - May cause damage to organs through prolonged or repeated exposure. - Central nervous system
Oral - May cause damage to organs through prolonged or repeated exposure. - Liver, Blood

**Aspiration hazard**
No data available(Methylene chloride)

**Additional Information**
RTECS: Not available

Dichloromethane is metabolized in the body producing carbon monoxide which blood, reducing the oxygen-carrying capacity of the blood., Acts as a simple asphyxiant by displacing air., anesthetic effects, Difficulty in breathing, Headache, Dizziness, Prolonged or repeated contact with skin may cause:, defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears., Effects due to ingestion may include:, Gastrointestinal discomfort, Central nervous system depression, Paresthesia., Drowsiness, Convulsions, Conjunctivitis., Pulmonary edema. Effects may be delayed., Irregular breathing., Stomach/intestinal disorders, Nausea, Vomiting, Increased liver enzymes., Weakness, Heavy or prolonged skin exposure may result in the absorption of harmful amounts of material., Abdominal pain(Methylene chloride)
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Methylene chloride)

## SECTION 12: Ecological information

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | LC50 - Pimephales promelas (fathead minnow) - 193.00 mg/l - 96 h(Methylene chloride) |
| | NOEC - Cyprinodon variegatus (sheepshead minnow) - 130 mg/l - 96 h(Methylene chloride) |
| Toxicity to daphnia and other aquatic invertebrates | EC50 - Daphnia magna (Water flea) - 1,682.00 mg/l - 48 h(Methylene chloride) |

### 12.2 Persistence and degradability

| | |
|---|---|
| Biodegradability | Result: < 26 % - Not readily biodegradable.<br>(OECD Test Guideline 301C) |

### 12.3 Bioaccumulative potential
Does not bioaccumulate.

### 12.4 Mobility in soil
No data available(Methylene chloride)

### 12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

### 12.6 Other adverse effects

## SECTION 13: Disposal considerations

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

## SECTION 14: Transport information

**14.1 UN number**

| ADR/RID: | IMDG: | IATA: |
|---|---|---|

**14.2 UN proper shipping name**

ADR/RID:

IMDG:

IATA:

**14.3 Transport hazard class(es)**

| ADR/RID: | IMDG: | IATA: |
|---|---|---|

**14.4 Packaging group**

| ADR/RID: | IMDG: | IATA: |
|---|---|---|

**14.5 Environmental hazards**

| ADR/RID: | IMDG Marine pollutant: | IATA: |
|---|---|---|

**14.6 Special precautions for user**
No data available

## SECTION 15: Regulatory information

**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

**15.2 Chemical safety assessment**
For this product a chemical safety assessment was not carried out

## SECTION 16: Other information

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H335 | May cause respiratory irritation. |
| H336 | May cause drowsiness or dizziness. |
| H351 | Suspected of causing cancer. |
| H373 | May cause damage to organs through prolonged or repeated exposure if inhaled. |

**Further information**
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

# SAFETY DATA SHEET

Version 4.9
Revision Date 04/24/2018
Print Date 10/19/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Nickel

Product Number : 577995
Brand : Aldrich
Index-No. : 028-002-01-4

CAS-No. : 7440-02-0

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

| | |
|---|---|
| H317 | May cause an allergic skin reaction. |
| H351 | Suspected of causing cancer. |
| H372 | Causes damage to organs through prolonged or repeated exposure if inhaled. |
| H412 | Harmful to aquatic life with long lasting effects. |

Precautionary statement(s)

| | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |

| | |
|---|---|
| P260 | Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P270 | Do not eat, drink or smoke when using this product. |
| P272 | Contaminated work clothing should not be allowed out of the workplace. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P333 + P313 | If skin irritation or rash occurs: Get medical advice/ attention. |
| P363 | Wash contaminated clothing before reuse. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Formula | : | Ni |
| Molecular weight | : | 58.69 g/mol |
| CAS-No. | : | 7440-02-0 |
| EC-No. | : | 231-111-4 |
| Index-No. | : | 028-002-01-4 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Nickel, powder [particle diameter < 1 mm]** | | |
| | Skin Sens. 1; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H412 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture
No data available

### 5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information
No data available

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

### 6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections
For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Handle and store under inert gas. Keep in a dry place.
Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| Nickel, powder [particle diameter < 1 mm] | 7440-02-0 | TWA | 1.5 mg/m3 | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Dermatitis<br>Pneumoconiosis<br>Not suspected as a human carcinogen | | |

| | | | | |
|---|---|---|---|---|
| | | PEL | 0.5 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | TWA | 1 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | TWA | 0.015 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | Potential Occupational Carcinogen<br>See Appendix A | | |

### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: powder<br>Colour: grey |

| | | |
|---|---|---|
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point: 1,455 °C (2,651 °F) |
| f) | Initial boiling point and boiling range | 2,730 °C (4,946 °F) |
| g) | Flash point | Not applicable |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | 1 hPa (1 mmHg) at 1,810 °C (3,290 °F) |
| l) | Vapour density | No data available |
| m) | Relative density | 8.9 g/cm3 at 25 °C (77 °F) |
| n) | Water solubility | insoluble |
| o) | Partition coefficient: n-octanol/water | Not applicable for inorganic substances |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
acids, Oxidizing agents, Sulphur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminium, Fluorine, Ammonia

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Nickel/nickel oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

**Acute toxicity**

LD50 Oral - Rat - male and female - > 9,000 mg/kg
(OECD Test Guideline 401)

Dermal: No data available

No data available

**Skin corrosion/irritation**

Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

**Serious eye damage/eye irritation**

Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**

**Germ cell mutagenicity**

No data available

**Carcinogenicity**

Limited evidence of carcinogenicity in animal studies

| | |
|---|---|
| IARC: | 1 - Group 1: Carcinogenic to humans (Nickel, powder [particle diameter < 1 mm]) |
| | 2B - Group 2B: Possibly carcinogenic to humans (Nickel, powder [particle diameter < 1 mm]) |
| IARC: | 1 - Group 1: Carcinogenic to humans (Nickel, powder [particle diameter < 1 mm]) |
| | 2B - Group 2B: Possibly carcinogenic to humans (Nickel, powder [particle diameter < 1 mm]) |
| NTP: | RAHC - Reasonably anticipated to be a human carcinogen (Nickel, powder [particle diameter < 1 mm]) |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |

**Reproductive toxicity**

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

Inhalation - Causes damage to organs through prolonged or repeated exposure.

**Aspiration hazard**

No data available

**Additional Information**

| | |
|---|---|
| Repeated dose toxicity | Rat - male and female - Inhalation - LOAEL : 0.0001 mg/l - OECD Test Guideline 451 |

RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - 15.3 mg/l - 96 h |

### 12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

### 12.3 Bioaccumulative potential

### 12.4 Mobility in soil

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powders, flammable, n.o.s.
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

**IMDG**

**IATA**
UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powder, flammable, n.o.s.

## 15. REGULATORY INFORMATION

**SARA 302 Components**
This material does not contain any components with a section 302 EHS TPQ.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Nickel, powder [particle diameter < 1 mm] | 7440-02-0 | 2007-07-01 |

**SARA 311/312 Hazards**
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Nickel, powder [particle diameter < 1 mm] | 7440-02-0 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Nickel, powder [particle diameter < 1 mm] | 7440-02-0 | 2007-07-01 |

**California Prop. 65 Components**

| | | |
|---|---|---|
| , which is/are known to the State of California to cause cancer. | CAS-No. | Revision Date |
| For more information go to www.P65Warnings.ca.gov. | 7440-02-0 | 2007-09-28 |
| Nickel, powder [particle diameter < 1 mm] | | |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Carc. | Carcinogenicity |
| H317 | May cause an allergic skin reaction. |
| H351 | Suspected of causing cancer. |
| H372 | Causes damage to organs through prolonged or repeated exposure if inhaled. |
| H402 | Harmful to aquatic life. |
| H412 | Harmful to aquatic life with long lasting effects. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 0 |
| Chronic Health Hazard: | * |
| Flammability: | 1 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 0 |
| Fire Hazard: | 1 |
| Reactivity Hazard: | 0 |

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.9 Revision Date: 04/24/2018 Print Date: 10/19/2018

# SAFETY DATA SHEET

Version 4.11
Revision Date 06/28/2017
Print Date 11/10/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Tetrachloroethylene

Product Number : 371696
Brand : Sigma-Aldrich
Index-No. : 602-028-00-4

CAS-No. : 127-18-4

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

| | |
|---|---|
| H315 | Causes skin irritation. |
| H317 | May cause an allergic skin reaction. |
| H319 | Causes serious eye irritation. |
| H336 | May cause drowsiness or dizziness. |
| H351 | Suspected of causing cancer. |
| H411 | Toxic to aquatic life with long lasting effects. |

| Precautionary statement(s) | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P272 | Contaminated work clothing should not be allowed out of the workplace. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves/ protective clothing/ eye protection/ face protection. |
| P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P304 + P340 + P312 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P333 + P313 | If skin irritation or rash occurs: Get medical advice/ attention. |
| P337 + P313 | If eye irritation persists: Get medical advice/ attention. |
| P362 | Take off contaminated clothing and wash before reuse. |
| P391 | Collect spillage. |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**3.1 Substances**

| | | |
|---|---|---|
| Synonyms | : | Perchloroethylene<br>PCE |
| Formula | : | $C_2Cl_4$ |
| Molecular weight | : | 165.83 g/mol |
| CAS-No. | : | 127-18-4 |
| EC-No. | : | 204-825-9 |
| Index-No. | : | 602-028-00-4 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Tetrachloroethylene** | | |
| | Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 2; STOT SE 3; Aquatic Acute 2; Aquatic Chronic 2; H315, H317, H319, H336, H351, H411 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
No data available

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| Tetrachloroethylene | 127-18-4 | TWA | 25.000000 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Central Nervous System impairment<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Confirmed animal carcinogen with unknown relevance to humans | | |
| | | STEL | 100.000000 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | | Central Nervous System impairment<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Confirmed animal carcinogen with unknown relevance to humans | | |
| | | Potential Occupational Carcinogen<br>Minimize workplace exposure concentrations.<br>See Appendix A | | |
| | | See Table Z-2 | | |
| | | TWA | 100.000000 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | CEIL | 200.000000 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Peak | 300.000000 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | TWA | 25 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | | Central Nervous System impairment<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Confirmed animal carcinogen with unknown relevance to humans | | |
| | | STEL | 100 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | | Central Nervous System impairment<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Confirmed animal carcinogen with unknown relevance to humans | | |
| | | Potential Occupational Carcinogen<br>Minimize workplace exposure concentrations.<br>See Appendix A | | |
| | | See Table Z-2 | | |

| | | | | |
|---|---|---|---|---|
| | | TWA | 100 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | CEIL | 200 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Peak | 300 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | TWA | 25 ppm<br>170 mg/m3 | USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000 |
| | | STEL | 100 ppm<br>685 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | C | 300 ppm | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | PEL | 25 ppm<br>170 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| Tetrachloroethylene | 127-18-4 | Tetrachloroethylene | 3ppm | In end-exhaled air | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | Prior to shift (16 hours after exposure ceases) | | | |
| | | Tetrachloroethylene | 0.5000 mg/l | In blood | ACGIH - Biological Exposure Indices (BEI) |
| | | Prior to shift (16 hours after exposure ceases) | | | |
| | | Tetrachloroethylene | 3ppm | In end-exhaled air | ACGIH - Biological Exposure Indices (BEI) |
| | | Prior to shift (16 hours after exposure ceases) | | | |
| | | Tetrachloroethylene | 0.5 mg/l | In blood | ACGIH - Biological Exposure Indices (BEI) |
| | | Prior to shift (16 hours after exposure ceases) | | | |

## 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm

Break through time: 49 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid, clear<br>Colour: colourless |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: -22 °C (-8 °F) - lit. |
| f) | Initial boiling point and boiling range | 121 °C (250 °F) - lit. |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | 25.3 hPa (19.0 mmHg) at 25.0 °C (77.0 °F)<br>17.3 hPa (13.0 mmHg) at 20.0 °C (68.0 °F) |
| l) | Vapour density | No data available |
| m) | Relative density | 1.623 g/cm3 at 25 °C (77 °F) |
| n) | Water solubility | 0.15 g/l at 25 °C (77 °F) |
| o) | Partition coefficient: n-octanol/water | log Pow: 2.53 at 23 °C (73 °F) |
| p) | Auto-ignition temperature | No data available |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |

t) Oxidizing properties No data available

**9.2 Other safety information**

Surface tension 32.1 mN/m at 20 °C (68 °F)

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents, Strong bases

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - female - 3,385 mg/kg
(OECD Test Guideline 401)

Inhalation: No data available

Dermal: No data available

No data available

**Skin corrosion/irritation**
Skin - Rabbit
Result: Skin irritation - 4 h
(OECD Test Guideline 404)

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Mild eye irritation - 24 h

**Respiratory or skin sensitisation**
- Mouse
Result: May cause sensitisation by skin contact.
(OECD Test Guideline 429)

**Germ cell mutagenicity**
Hamster
ovary
Result: negative

OECD Test Guideline 474
Mouse - male
Result: negative

**Carcinogenicity**

Limited evidence of carcinogenicity in animal studies

IARC: 2A - Group 2A: Probably carcinogenic to humans (Tetrachloroethylene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Tetrachloroethylene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**
No data available

No data available

**Specific target organ toxicity - single exposure**
May cause drowsiness or dizziness.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**

| | |
|---|---|
| Repeated dose toxicity | Mouse - female - Oral - LOAEL : 390 mg/kg |

RTECS: KX3850000

narcosis, Liver injury may occur., Kidney injury may occur.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 5 mg/l - 96 h |
| Toxicity to daphnia and other aquatic invertebrates | EC50 - Daphnia magna (Water flea) - 7.50 mg/l - 48 h |
| Toxicity to algae | static test EC50 - Skeletonema costatum - > 16 mg/l - 7 h |

### 12.2 Persistence and degradability

| | |
|---|---|
| Biodegradability | aerobic - Exposure time 28 d<br>Result: 11 % - Not readily biodegradable.<br>(OECD Test Guideline 301C) |

### 12.3 Bioaccumulative potential

| | |
|---|---|
| Bioaccumulation | Lepomis macrochirus (Bluegill) - 21 d<br>- 0.00343 mg/l<br><br>Bioconcentration factor (BCF): 49 |

### 12.4 Mobility in soil
No data available

### 12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene
Reportable Quantity (RQ): 100 lbsReportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

**IMDG**
UN number: 1897 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TETRACHLOROETHYLENE
Marine pollutant: yes

**IATA**
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Tetrachloroethylene | 127-18-4 | 2007-07-01 |

**SARA 311/312 Hazards**
Acute Health Hazard, Chronic Health Hazard

:

**Reportable Quantity** D039 lbs

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Tetrachloroethylene | 127-18-4 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Tetrachloroethylene | 127-18-4 | 2007-07-01 |

| | CAS-No. | Revision Date |
|---|---|---|
| Tetrachloroethylene | 127-18-4 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Tetrachloroethylene | 127-18-4 | 2007-07-01 |

**California Prop. 65 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer. Tetrachloroethylene | 127-18-4 | 2007-09-28 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Carc. | Carcinogenicity |

| | |
|---|---|
| Eye Irrit. | Eye irritation |
| H315 | Causes skin irritation. |
| H317 | May cause an allergic skin reaction. |
| H319 | Causes serious eye irritation. |
| H336 | May cause drowsiness or dizziness. |
| H351 | Suspected of causing cancer. |
| H401 | Toxic to aquatic life. |
| H411 | Toxic to aquatic life with long lasting effects. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 3 |
| Chronic Health Hazard: | * |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.11 Revision Date: 06/28/2017 Print Date: 11/10/2018

# SAFETY DATA SHEET

Propylene

Airgas
an Air Liquide company

## Section 1. Identification

**GHS product identifier** : Propylene

**Chemical name** : propylene

**Other means of identification** : propylene; 1-Propene; propylene in gaseous state, impure; propylene liquefied, impure; propene, pure; propylene, pure

**Product type** : Gas.

**Product use** : Synthetic/Analytical chemistry.

**Synonym** : propylene; 1-Propene; propylene in gaseous state, impure; propylene liquefied, impure; propene, pure; propylene, pure

**SDS #** : 001046

**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** : propylene

**Other means of identification** : propylene; 1-Propene; propylene in gaseous state, impure; propylene liquefied, impure; propene, pure; propylene, pure

**Product code** : 001046

## CAS number/other identifiers

**CAS number** : 115-07-1

| Ingredient name | % | CAS number |
|---|---|---|
| propylene | 100 | 115-07-1 |

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 |
|---|---|
| propylene | **ACGIH TLV (United States, 3/2017).**<br>TWA: 500 ppm 8 hours.<br>**ACGIH TLV (United States, 1/2005).**<br>TWA: 500 ppm 8 hours. Form: All forms |

**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** : Mild.

**Odor threshold** : Not available.

**pH** : Not available.

**Melting point** : -185°C (-301°F)

**Boiling point** : -48°C (-54.4°F)

**Critical temperature** : 91.85°C (197.3°F)

**Flash point** : Closed cup: -107.78°C (-162°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: 2%
Upper: 11%

**Vapor pressure** : 136.6 (psig)

**Vapor density** : 1.5 (Air = 1)

**Specific Volume (ft $^3$/lb)** : 9.0909

**Gas Density (lb/ft $^3$)** : 0.11 (25°C / 77 to °F)

**Relative density** : Not applicable.

**Solubility** : Not available.

**Solubility in water** : 0.2 g/l

**Partition coefficient: n-octanol/water** : 1.77

**Auto-ignition temperature** : 455°C (851°F)

**Decomposition temperature** : Not available.

**Viscosity** : Not applicable.

**Flow time (ISO 2431)** : Not available.

**Molecular weight** : 42.09 g/mole

**Aerosol product**

**Heat of combustion** : -45803592 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

Not available.

### Irritation/Corrosion

Not available.

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Classification

| Product/ingredient name | OSHA | IARC | NTP |
|---|---|---|---|
| propylene | - | 3 | - |

### 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.

# Section 11. Toxicological information

**Information on the likely routes of exposure** : Not available.

## 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.

**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 |
|---|---|---|---|
| propylene | 1.77 | - | low |

## Section 12. Ecological information

**Mobility in soil**

**Soil/water partition coefficient ($K_{OC}$)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

## Section 14. Transport information

| | DOT | TDG | Mexico | IMDG | IATA |
|---|---|---|---|---|---|
| **UN number** | UN1077 | UN1077 | UN1077 | UN1077 | UN1077 |
| **UN proper shipping name** | PROPYLENE | PROPYLENE | PROPYLENE | PROPYLENE | PROPYLENE |
| **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.

# Section 14. Transport information

**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**: propylene

**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.

## SARA 313

| | Product name | CAS number | % |
|---|---|---|---|
| Form R - Reporting requirements | propylene | 115-07-1 | 100 |
| Supplier notification | propylene | 115-07-1 | 100 |

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

## 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

# Section 15. Regulatory information

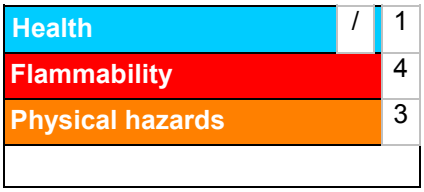
Not listed.

## 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.<br>**Japan inventory (ISHL)**: This material is listed or exempted. |
| **Malaysia** | : | Not determined. |
| **New Zealand** | : | This material is listed or exempted. |
| **Philippines** | : | This material is listed or exempted. |
| **Republic of Korea** | : | This material is listed or exempted. |
| **Taiwan** | : | This material is listed or exempted. |
| **Thailand** | : | Not determined. |
| **Turkey** | : | This material is listed or exempted. |
| **United States** | : | This material is listed or exempted. |
| **Viet Nam** | : | Not determined. |

# Section 16. Other information

## Hazardous Material Information System (U.S.A.)




**Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.**

**The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.**

## National Fire Protection Association (U.S.A.)




**Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.**

**Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.**

## Procedure used to derive the classification

| Classification | Justification |
|---|---|
| FLAMMABLE GASES - Category 1<br>GASES UNDER PRESSURE - Liquefied gas | Expert judgment<br>Expert judgment |

# Section 16. Other information

## History

| | | |
|---|---|---|
| **Date of printing** | : | 11/30/2017 |
| **Date of issue/Date of revision** | : | 11/30/2017 |
| **Date of previous issue** | : | No previous validation |
| **Version** | : | 1 |
| **Key to abbreviations** | : | ATE = Acute Toxicity Estimate<br>BCF = Bioconcentration Factor<br>GHS = Globally Harmonized System of Classification and Labelling of Chemicals<br>IATA = International Air Transport Association<br>IBC = Intermediate Bulk Container<br>IMDG = International Maritime Dangerous Goods<br>LogPow = logarithm of the octanol/water partition coefficient<br>MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)<br>UN = United Nations |
| **References** | : | Not available. |

**Indicates information that has changed from previously issued version.**

## Notice to reader

**To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.**
**Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.**

# SAFETY DATA SHEET

Version 4.10
Revision Date 01/04/2018
Print Date 11/10/2018

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

Product name : Trichloroethylene

Product Number : 251402
Brand : Sigma-Aldrich
Index-No. : 602-027-00-9

CAS-No. : 79-01-6

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

### 1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

| | |
|---|---|
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H336 | May cause drowsiness or dizziness. |
| H341 | Suspected of causing genetic defects. |
| H350 | May cause cancer. |
| H412 | Harmful to aquatic life with long lasting effects. |

| Precautionary statement(s) | |
|---|---|
| P201 | Obtain special instructions before use. |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P264 | Wash skin thoroughly after handling. |
| P271 | Use only outdoors or in a well-ventilated area. |
| P273 | Avoid release to the environment. |
| P280 | Wear eye protection/ face protection. |
| P280 | Wear protective gloves. |
| P281 | Use personal protective equipment as required. |
| P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P304 + P340 + P312 | IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell. |
| P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P332 + P313 | If skin irritation occurs: Get medical advice/ attention. |
| P337 + P313 | If eye irritation persists: Get medical advice/ attention. |
| P362 | Take off contaminated clothing and wash before reuse. |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P405 | Store locked up. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS** - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

| | | |
|---|---|---|
| Synonyms | : | TCE<br>Trichloroethene |
| Formula | : | $C_2HCl_3$ |
| Molecular weight | : | 131.39 g/mol |
| CAS-No. | : | 79-01-6 |
| EC-No. | : | 201-167-4 |
| Index-No. | : | 602-027-00-9 |

**Hazardous components**

| Component | Classification | Concentration |
|---|---|---|
| **Trichloroethylene** | | |
| | Skin Irrit. 2; Eye Irrit. 2A; Muta. 2; Carc. 1B; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H315, H319, H336, H341, H350, H412 | 90 - 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
No data available

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

**6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive. Handle and store under inert gas.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| Trichloroethylene | 79-01-6 | TWA | 10.000000 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | Central Nervous System impairment<br>cognitive decrement<br>Renal toxicity<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Suspected human carcinogen | | |
| | | STEL | 25.000000 ppm | USA. ACGIH Threshold Limit Values (TLV) |
| | | Central Nervous System impairment<br>cognitive decrement<br>Renal toxicity<br>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)<br>Suspected human carcinogen | | |
| | | Potential Occupational Carcinogen<br>See Appendix C<br>See Appendix A | | |
| | | See Table Z-2 | | |
| | | TWA | 100.000000 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.19-1967 | | |
| | | CEIL | 200.000000 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.19-1967 | | |
| | | Peak | 300.000000 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.19-1967 | | |
| | | TWA | 100 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.19-1967 | | |
| | | CEIL | 200 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.19-1967 | | |
| | | Peak | 300 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-2 |
| | | Z37.19-1967 | | |

| | | | | |
|---|---|---|---|---|
| | | STEL | 100 ppm<br>537 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | C | 300 ppm | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |
| | | PEL | 25 ppm<br>135 mg/m3 | California permissible exposure limits for chemical contaminants (Title 8, Article 107) |

**Biological occupational exposure limits**

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|---|---|---|---|---|---|
| | - | Trichloroacetic acid | 15.0000 mg/l | Urine | ACGIH - Biological Exposure Indices (BEI) |
| | Remarks | End of shift at end of workweek | | | |
| | | Trichloroethanol | 0.5000 mg/l | In blood | ACGIH - Biological Exposure Indices (BEI) |
| | | End of shift at end of workweek | | | |
| | | Trichloroethylene | | In blood | ACGIH - Biological Exposure Indices (BEI) |
| | | End of shift at end of workweek | | | |
| | | Trichloroethylene | | In end-exhaled air | ACGIH - Biological Exposure Indices (BEI) |
| | | End of shift at end of workweek | | | |

## 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: liquid, clear<br>Colour: colourless |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | Melting point/range: -84.8 °C (-120.6 °F) - lit. |
| f) | Initial boiling point and boiling range | 86.7 °C (188.1 °F) - lit. |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | Upper explosion limit: 10.5 %(V)<br>Lower explosion limit: 8 %(V) |
| k) | Vapour pressure | 81.3 hPa (61.0 mmHg) at 20.0 °C (68.0 °F) |
| l) | Vapour density | No data available |
| m) | Relative density | 1.463 g/mL at 25 °C (77 °F) |
| n) | Water solubility | No data available |
| o) | Partition coefficient: n-octanol/water | log Pow: 2.29log Pow: 5 |
| p) | Auto-ignition temperature | 410.0 °C (770.0 °F) |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

### 9.2 Other safety information
No data available

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Oxidizing agents, Strong bases, Magnesium

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

**Acute toxicity**

LD50 Oral - Rat - 4,920 mg/kg

LC50 Inhalation - Mouse - 4 h - 8450 ppm

LD50 Dermal - Rabbit - > 20,000 mg/kg

No data available

**Skin corrosion/irritation**
Skin - Rabbit
Result: Severe skin irritation - 24 h

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Eye irritation - 24 h

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

**Carcinogenicity**

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

| | |
|---|---|
| IARC: | 1 - Group 1: Carcinogenic to humans (Trichloroethylene) |
| NTP: | RAHC - Reasonably anticipated to be a human carcinogen (Trichloroethylene) |
| OSHA: | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |

**Reproductive toxicity**
No data available

No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: KX4550000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., Gastrointestinal disturbance, Kidney injury may occur., narcosis
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | LC50 - Pimephales promelas (fathead minnow) - 41 mg/l - 96.0 h |
| | LOEC - other fish - 11 mg/l - 10.0 d |
| | NOEC - Oryzias latipes - 40 mg/l - 10.0 d |
| Toxicity to daphnia and other aquatic invertebrates | EC50 - Daphnia magna (Water flea) - 18.00 mg/l - 48 h |
| Toxicity to algae | IC50 - Pseudokirchneriella subcapitata (green algae) - 175.00 mg/l - 96 h |

### 12.2 Persistence and degradability
No data available

### 12.3 Bioaccumulative potential
Does not bioaccumulate.

### 12.4 Mobility in soil
No data available

### 12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 1710 Class: 6.1 Packing group: III
Proper shipping name: Trichloroethylene
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

**IMDG**
UN number: 1710 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TRICHLOROETHYLENE

**IATA**
UN number: 1710 Class: 6.1 Packing group: III

Proper shipping name: Trichloroethylene

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Trichloroethylene | 79-01-6 | 2007-07-01 |

**SARA 311/312 Hazards**
Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Trichloroethylene | 79-01-6 | 2007-07-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Trichloroethylene | 79-01-6 | 2007-07-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Trichloroethylene | 79-01-6 | 2007-07-01 |

**California Prop. 65 Components**

| | CAS-No. | Revision Date |
|---|---|---|
| WARNING! This product contains a chemical known to the State of California to cause cancer.<br>Trichloroethylene | 79-01-6 | 2011-09-01 |
| WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.<br>Trichloroethylene | 79-01-6 | 2011-09-01 |

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Carc. | Carcinogenicity |
| Eye Irrit. | Eye irritation |
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |
| H336 | May cause drowsiness or dizziness. |
| H341 | Suspected of causing genetic defects. |
| H350 | May cause cancer. |
| H402 | Harmful to aquatic life. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Chronic Health Hazard: | * |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 2 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 01/04/2018 Print Date: 11/10/2018

# SAFETY DATA SHEET

**Creation Date** 16-Sep-2014 **Revision Date** 23-Jan-2018 **Revision Number** 3

## 1. Identification

**Product Name** **trans-1,2-Dichloroethylene, stabilized**

**Cat No. :** **AC406840000; AC406840250; AC406842500**

**CAS-No** 156-60-5
**Synonyms** trans-Acetylene dichloride

**Recommended Use** Laboratory chemicals.
**Uses advised against** Not for food, drug, pesticide or biocidal product use

**Details of the supplier of the safety data sheet**

**Company**
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

**Emergency Telephone Number**
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
**CHEMTREC** Tel. No.**US:**001-800-424-9300 / **Europe:**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)

| | |
|---|---|
| Flammable liquids | Category 2 |
| Acute oral toxicity | Category 4 |
| Acute Inhalation Toxicity - Vapors | Category 4 |

**Label Elements**

**Signal Word**
Danger

**Hazard Statements**
Highly flammable liquid and vapor
Harmful if swallowed
Harmful if inhaled



**Precautionary Statements**
**Prevention**
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
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
Wear protective gloves/protective clothing/eye protection/face protection
**Inhalation**
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
**Ingestion**
Rinse mouth
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
**Fire**
In case of fire: Use CO2, dry chemical, or foam for extinction
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
**Storage**
Store in a well-ventilated place. Keep cool
**Disposal**
Dispose of contents/container to an approved waste disposal plant
**Hazards not otherwise classified (HNOC)**
Harmful to aquatic life with long lasting effects

## 3. Composition/Information on Ingredients

| Component | CAS-No | Weight % |
|---|---|---|
| trans-1,2-Dichloroethylene | 156-60-5 | >95 |

## 4. First-aid measures

**Eye Contact** Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

**Skin Contact** Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

**Inhalation** Remove from exposure, lie down. Move to fresh air. 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. Obtain medical attention. If not breathing, give artificial respiration.

**Ingestion** Do not induce vomiting. Obtain medical attention.

**Most important symptoms and effects** Breathing difficulties. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

**Notes to Physician** Treat symptomatically

## 5. Fire-fighting measures

**Suitable Extinguishing Media** Water spray. Carbon dioxide ($CO_2$). Dry chemical. Chemical foam. Use water spray to cool unopened containers. Cool closed containers exposed to fire with water spray.

**Unsuitable Extinguishing Media** No information available

**Flash Point** 6 °C / 42.8 °F

**Method -** No information available

**Autoignition Temperature** 440 °C / 824 °F

**Explosion Limits**

**Upper** 12.80%

**Lower** 9.70%

**Sensitivity to Mechanical Impact** No information available

**Sensitivity to Static Discharge** No information available

**Specific Hazards Arising from the Chemical**

Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air. Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

**Hazardous Combustion Products**

Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide ($CO_2$) Phosgene

**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 | Flammability | Instability | Physical hazards |
|---|---|---|---|
| 2 | 3 | 0 | N/A |

## 6. Accidental release measures

**Personal Precautions** Remove all sources of ignition. Take precautionary measures against static discharges. Use personal protective equipment. Ensure adequate ventilation.

**Environmental Precautions** Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

**Methods for Containment and Clean Up** Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

## 7. Handling and storage

**Handling** Wear personal protective equipment. Ensure adequate ventilation. Avoid contact with skin and eyes. Use only in area provided with appropriate exhaust ventilation. Use explosion-proof equipment. Use only non-sparking tools. Keep away from open flames, hot surfaces and sources of ignition. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges.

**Storage** Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area. Keep container tightly closed in a dry and well-ventilated place.

## 8. Exposure controls / personal protection

**Exposure Guidelines**

| Component | ACGIH TLV | OSHA PEL | NIOSH IDLH | Mexico OEL (TWA) |
|---|---|---|---|---|
| trans-1,2-Dichloroethylene | TWA: 200 ppm | | | |

*Legend*

*ACGIH - American Conference of Governmental Industrial Hygienists*

**Engineering Measures** Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

**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.

**Hygiene Measures** Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

| | |
|---|---|
| **Physical State** | Liquid |
| **Appearance** | Colorless |
| **Odor** | aromatic |
| **Odor Threshold** | No information available |
| **pH** | 6.5-7.2 |
| **Melting Point/Range** | -50 °C / -58 °F |
| **Boiling Point/Range** | 48 °C / 118.4 °F @ 760 mmHg |
| **Flash Point** | 6 °C / 42.8 °F |
| **Evaporation Rate** | No information available |
| **Flammability (solid,gas)** | Not applicable |
| **Flammability or explosive limits** | |
| **Upper** | 12.80% |
| **Lower** | 9.70% |
| **Vapor Pressure** | 331 mmHg @ 25 °C |
| **Vapor Density** | 3.34 (Air = 1.0) |
| **Specific Gravity** | 1.260 |
| **Solubility** | Immiscible with water |
| **Partition coefficient; n-octanol/water** | No data available |
| **Autoignition Temperature** | 440 °C / 824 °F |
| **Decomposition Temperature** | No information available |
| **Viscosity** | No information available |
| **Molecular Formula** | C2 H2 Cl2 |
| **Molecular Weight** | 96.94 |

## 10. Stability and reactivity

**Reactive Hazard** None known, based on information available

**Stability** Stable under normal conditions.

**Conditions to Avoid** Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

**Incompatible Materials** Bases, Strong acids, Strong oxidizing agents

**Hazardous Decomposition Products** Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide ($CO_2$), Phosgene

**Hazardous Polymerization** Hazardous polymerization does not occur.

**Hazardous Reactions** None under normal processing.

## 11. Toxicological information

**Acute Toxicity**

**Product Information**

**Component Information**

| Component | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|---|---|---|
| trans-1,2-Dichloroethylene | LD50 = 1235 mg/kg ( Rat ) | >5 g/kg ( Rabbit ) | LC50 = 24100 ppm ( Rat ) 4 h |

**Toxicologically Synergistic Products** No information available

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Irritation** No information available

**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 |
|---|---|---|---|---|---|---|
| trans-1,2-Dichloroethylene | 156-60-5 | Not listed | Not listed | Not listed | Not listed | Not listed |

**Mutagenic Effects** No information available

**Reproductive Effects** No information available.

**Developmental Effects** No information available.

**Teratogenicity** No information available.

**STOT - single exposure** None known

**STOT - repeated exposure** None known

**Aspiration hazard** No information available

**Symptoms / effects,both acute and delayed** Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

**Endocrine Disruptor Information** No information available

**Other Adverse Effects** The toxicological properties have not been fully investigated.

## 12. Ecological information

**Ecotoxicity**

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

| Component | Freshwater Algae | Freshwater Fish | Microtox | Water Flea |
|---|---|---|---|---|
| trans-1,2-Dichloroethylene | Not listed | LC50: = 135 mg/L, 96h static | Not listed | Not listed |

| | | | | |
|---|---|---|---|---|
| | | (Lepomis macrochirus) | | |

**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 volatility.

| Component | log Pow |
|---|---|
| trans-1,2-Dichloroethylene | 1.48 |

## 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.

| Component | RCRA - U Series Wastes | RCRA - P Series Wastes |
|---|---|---|
| trans-1,2-Dichloroethylene - 156-60-5 | U079 | - |

## 14. Transport information

**DOT**

**UN-No** UN1150
**Proper Shipping Name** 1,2-DICHLOROETHYLENE
**Hazard Class** 3
**Packing Group** II

**TDG**

**UN-No** UN1150
**Proper Shipping Name** 1,2-DICHLOROETHYLENE
**Hazard Class** 3
**Packing Group** II

**IATA**

**UN-No** UN1150
**Proper Shipping Name** 1,2-DICHLOROETHYLENE
**Hazard Class** 3
**Packing Group** II

**IMDG/IMO**

**UN-No** UN1150
**Proper Shipping Name** 1,2-DICHLOROETHYLENE
**Hazard Class** 3
**Packing Group** II

## 15. Regulatory information

**International Inventories**

| Component | TSCA | DSL | NDSL | EINECS | ELINCS | NLP | PICCS | ENCS | AICS | IECSC | KECL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| trans-1,2-Dichloroethylene | X | X | - | 205-860-2 | - | | X | X | X | X | X |

**Legend:**
**X - Listed**
**E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.**
**F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.**
**N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.**
**P - Indicates a commenced PMN substance**
**R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.**
**S - Indicates a substance that is identified in a proposed or final Significant New Use Rule**
**T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.**
**XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).**
**Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.**
**Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants**

**that comprises one of the eligibility criteria for the exemption rule.**

**U.S. Federal Regulations**

**TSCA 12(b)** Not applicable

**SARA 313** Not applicable

**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 |
|---|---|---|---|---|
| trans-1,2-Dichloroethylene | - | - | - | X |

**Clean Air Act** Not applicable

**OSHA** Occupational Safety and Health Administration
Not applicable

**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 |
|---|---|---|
| trans-1,2-Dichloroethylene | 1000 lb 1 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 |
|---|---|---|---|---|---|
| trans-1,2-Dichloroethylene | X | - | X | - | - |

**U.S. Department of Transportation**

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

**U.S. Department of Homeland Security**
This product does not contain any DHS chemicals.

**Other International Regulations**

**Mexico - Grade** No information available

## 16. Other information

**Prepared By** Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

**Creation Date** 16-Sep-2014
**Revision Date** 23-Jan-2018
**Print Date** 23-Jan-2018
**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

**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

Version 5.8
Revision Date 10/12/2015
Print Date 05/01/2016

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

| | | |
|---|---|---|
| Product name | : | Zinc |
| Product Number | : | 96454 |
| Brand | : | Sigma-Aldrich |
| CAS-No. | : | 7440-66-6 |

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

| | | |
|---|---|---|
| Identified uses | : | Laboratory chemicals, Synthesis of substances |

### 1.3 Details of the supplier of the safety data sheet

| | | |
|---|---|---|
| Company | : | Sigma-Aldrich<br>3050 Spruce Street<br>SAINT LOUIS MO 63103<br>USA |
| Telephone | : | +1 800-325-5832 |
| Fax | : | +1 800-325-5052 |

### 1.4 Emergency telephone number

| | | |
|---|---|---|
| Emergency Phone # | : | (314) 776-6555 |

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**
Combustible dust,
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word: Warning

Hazard statement(s)

| | |
|---|---|
| | May form combustible dust concentrations in air |
| H410 | Very toxic to aquatic life with long lasting effects. |

Precautionary statement(s)

| | |
|---|---|
| P273 | Avoid release to the environment. |
| P391 | Collect spillage. |
| P501 | Dispose of contents/ container to an approved waste disposal plant. |

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.2 Mixtures

Formula : Zn
Molecular weight : 65.39 g/mol

**Hazardous components**

| Component | | Classification | Concentration |
|---|---|---|---|
| **Zinc powder (stabilized)** | | | |
| CAS-No.<br>EC-No.<br>Index-No. | 7440-66-6<br>231-175-3<br>030-001-01-9 | Aquatic Acute 1; Aquatic Chronic 1; H410 | <= 100 % |
| **Zinc oxide** | | | |
| CAS-No.<br>EC-No.<br>Index-No. | 1314-13-2<br>215-222-5<br>030-013-00-7 | Aquatic Acute 1; Aquatic Chronic 1; H410 | >= 5 - < 10 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media**
Special powder against metal fire Dry sandUse water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Unsuitable extinguishing media**
Water

### 5.2 Special hazards arising from the substance or mixture

Zinc/zinc oxides

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non Combustible Solids

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**

| Component | CAS-No. | Value | Control parameters | Basis |
|---|---|---|---|---|
| Zinc oxide | 1314-13-2 | TWA | 2.000000 mg/m3 | USA. ACGIH Threshold Limit Values (TLV) |
| | Remarks | metal fume fever | | |
| | | STEL | 10.000000 mg/m3 | USA. ACGIH Threshold Limit Values (TLV) |
| | | metal fume fever | | |

| | | | | |
|---|---|---|---|---|
| | | TWA | 5.000000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | TWA | 5.000000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | ST | 10.000000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | C | 15.000000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | TWA | 5.000000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | TWA | 15.000000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | TWA | 5.000000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | TWA | 5.000000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |

## 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: powder<br>Colour: grey |
| b) | Odour | odourless |
| c) | Odour Threshold | No data available |
| d) | pH | Not applicable |
| e) | Melting point/freezing point | Melting point/range: 420 °C (788 °F) - lit. |
| f) | Initial boiling point and boiling range | 907 °C (1,665 °F) - lit. |
| g) | Flash point | Not applicable |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | May form combustible dust concentrations in air |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | Not applicable |
| l) | Vapour density | No data available |
| m) | Relative density | 7.133 g/mL at 25 °C (77 °F) |
| n) | Water solubility | insoluble |
| o) | Partition coefficient: n-octanol/water | Not applicable |
| p) | Auto-ignition temperature | does not ignite |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | During processing, dust may form explosive mixture in air. |
| t) | Oxidizing properties | No data available |

### 9.2 Other safety information

| | |
|---|---|
| Bulk density | 1.8 - 3.2 kg/m3 |

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity
No data available

### 10.2 Chemical stability
Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions
Dust may form explosive mixture in air.

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents, Acids and bases

**10.6 Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

**Acute toxicity**
No data available (Zinc powder (stabilized))

Inhalation: No data available (Zinc powder (stabilized))

Dermal: No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

**Skin corrosion/irritation**
No data available (Zinc powder (stabilized))

**Serious eye damage/eye irritation**
No data available (Zinc powder (stabilized))

**Respiratory or skin sensitisation**
Did not cause sensitisation on laboratory animals. (Zinc powder (stabilized))

**Germ cell mutagenicity**
No data available (Zinc powder (stabilized))

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**
No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

**Specific target organ toxicity - single exposure**
No data available (Zinc powder (stabilized))

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available (Zinc powder (stabilized))

**Additional Information**
RTECS: ZG8600000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Effects due to ingestion may include:, chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness, Contact with eyes or skin may cause:, Irritation (Zinc powder (stabilized))

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | LC50 - Cyprinus carpio (Carp) - 450 µg/l - 96 h (Zinc powder (stabilized)) |
| Toxicity to daphnia and other aquatic invertebrates | LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h (Zinc powder (stabilized)) |
| | mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d (Zinc powder (stabilized)) |

### 12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

### 12.3 Bioaccumulative potential

| | |
|---|---|
| Bioaccumulation | Algae - 7 d<br>at 16 °C - 5 µg/l (Zinc powder (stabilized)) |
| | Bioconcentration factor (BCF): 466 |

### 12.4 Mobility in soil

No data available (Zinc powder (stabilized))

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

No data available

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Zinc powder (stabilized))
Reportable Quantity (RQ): 1020 lbs

Poison Inhalation Hazard: No

**IMDG**
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc powder (stabilized))
Marine pollutant:yes

**IATA**
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Zinc powder (stabilized))

**Further information**
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

## 15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|---|---|---|
| Zinc oxide | 1314-13-2 | 2007-03-01 |
| Zinc powder (stabilized) | 7440-66-6 | 1993-04-24 |

**SARA 311/312 Hazards**
No SARA Hazards

**Massachusetts Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Zinc powder (stabilized) | 7440-66-6 | 1993-04-24 |
| Zinc oxide | 1314-13-2 | 2007-03-01 |

**Pennsylvania Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Zinc powder (stabilized) | 7440-66-6 | 1993-04-24 |
| Zinc oxide | 1314-13-2 | 2007-03-01 |

**New Jersey Right To Know Components**

| | CAS-No. | Revision Date |
|---|---|---|
| Zinc powder (stabilized) | 7440-66-6 | 1993-04-24 |
| Zinc oxide | 1314-13-2 | 2007-03-01 |

**California Prop. 65 Components**
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

| | |
|---|---|
| | May form combustible dust concentrations in air |
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| H400 | Very toxic to aquatic life. |
| H410 | Very toxic to aquatic life with long lasting effects. |

**HMIS Rating**

| | |
|---|---|
| Health hazard: | 0 |
| Chronic Health Hazard: | |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| | |
|---|---|
| Health hazard: | 0 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

**Further information**
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1-800-521-8956

Version: 5.8 Revision Date: 10/12/2015 Print Date: 05/01/2016

# Appendix D:
## Quality Assurance Project Plan

# Quality Assurance Project Plan

## 10 Commerce Drive
## Parcel ID 1-238-0005
## New Rochelle, Westchester County, New York

## 1.0 PROJECT DESCRIPTION

This document presents the Quality Assurance Project Plan (QAPP) for the remedial action work plan (RAWP) for the proposed development at 10 Commerce Drive, New Rochelle, New York (Site).

The Site consists of a 0.96-acre commercial lot located at 10 Commerce Drive, New Rochelle, Westchester County, New York. The property is improved by a two-story vacant office building, associated asphalt parking areas, and landscaping. The Site is identified on tax map records as Parcel 1-238-0005. The Site is located in a commercial area with similar commercial properties to the east, south, and west of the Site. The closest surface water body is Echo Bay and its associated tributaries located approximately 0.5 miles east of the Site. The Site is bound to the north by Renewal Place, beyond which lies commercial property and railroad property; and to the east, south and west by commercial properties and associated asphalt parking areas. The Site topography is generally flat and slopes gently downward from the northwest to the southeast.

The planned new construction for the Site will be a multi-story residential apartment building.

## 2.0 PROJECT ORGANIZATION

The RAWP will be conducted by Soils Engineering Services, Inc. (SESI), on behalf of BRP 10 Commerce LLC (Volunteer). The organization of SESI's key project management and field staff, and respective areas of responsibility, is presented below.

### 2.1 Project Principal

Michael St. Pierre, P.E.

Provide technical and administrative oversight and guidance throughout the project, assist in securing company resources, participate in technical review of deliverables, and attend key meetings as needed.

### 2.2 Principal Engineer

Fuad Dahan, PhD, P.E.

Provide technical guidance and review of reports, analytical data. Will have key involvement in screening and development of remedial alternatives.

### 2.3 Project Manager

Jesse Mausner, PG, LSRP

Responsible for maintaining the day-to-day schedule for completing the fieldwork and deliverables according to BCP program requirements and client expectations.

### 2.4 Remedial Action Program Manager

Jesse Mausner, PG, LSRP

Responsible for coordinating and directing field efforts of SESI staff and subcontractors, and for maintaining that work is done according to QAPP specifications.

### 2.5 Field Team Leader

Joe Scardino

Responsible for overseeing field work during the RI and IRM, including observing subcontractors, maintaining field notes, and collecting samples of various environmental media, in accordance with the NYSDEC-approved Work Plan.

### 2.5 Quality Assurance Officer

Joe Scardino

Responsible for will reviewing sampling procedures and certify that the data was collected and analyzed using the appropriate procedures.

## 3.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

In cases where NYSDOH ELAP Certification exists for a specific group or category of parameters, the laboratories performing analysis in connection with this project will have appropriate NYSDOH ELAP Certification. For analysis of samples where Analytical Service Protocol (ASP, June 2000) Category B deliverables are required.

Detection limits set by NYSDEC-ASP (June 2000) will be used for all sample analyses unless otherwise noted. If NYSDEC-ASP-dictated detection limits prove insufficient to assess project goals (i.e., comparison to drinking water standards or attainment of ARARs), then ASP Special Analytical Services (SAS) or other appropriate methods will be utilized.

The quality assurance/quality control objectives for all measurement data include completeness, representativeness, comparability, precision and accuracy.

### *3.1 COMPLETENESS*

The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. Data must meet QC acceptance criteria for 100 percent or more of requested determinations.

### *3.2 REPRESENTATIVENESS*

Samples must be taken of the population and, where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where Target Compound List (TCL) volatiles are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory, will accompany each set of sample bottles from the laboratory to the field and back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for TCL volatile organic compounds along with the groundwater samples to ensure that contamination with TCL volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for TCL volatile organic compounds. The TCL compounds are identified in the United States Environmental Protection Agency (USEPA) Contract Laboratory Program dated 7/85 or as periodically updated.

The analysis results obtained from the determination of identical parameters in field duplicate samples can be used to further assess the representativeness of the sample data.

### *3.3 COMPARABILITY*

Consistency in the acquisition, preparation, handling and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To ensure the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by NYSDEC-approved methods. The NYSDEC-ASP mandated holding times for various analyses will be strictly adhered to.

### *3.4 PRECISION AND ACCURACY*

The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), colorimetry, atomic spectroscopy, gravimetric and titrametric techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control. All data evaluations will be consistent with NYSDEC-ASP procedures (June 2000). Data will be 100 percent compliant with NYSDEC-ASP requirements.

The number of duplicate, spiked and blank samples analyzed will a minimum of 1 duplicate for every 20 samples per each medium of groundwater and soil. The inclusion and frequency of analysis of field blanks will be on the order of one per every 20 samples (soil) but not more than one per day. For the aqueous matrix field blanks will be collected at a frequency of one per day. Samples to be analyzed for volatile organic compounds will be accompanied by a trip blank for each shipment and field blanks (water matrix) or field blanks (soil).

Quality assurance audit samples will be prepared and submitted by the laboratory QA manager for each analytical procedure used. The degree of accuracy and the recovery of analyte to be expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis, and compound or element being determined. The concentration of the analyte relative to the detection limit is also a major factor in determining the accuracy of the measurement. The lower end of the analytical range for most analyses is generally accepted to be five times the detection limit. At or above this level, the determination and spike recoveries for metals in water samples will be expected to range from 75 to 125 percent. The recovery of organic surrogate compounds and matrix spiking compounds determined by GC/MS will be compared to the guidelines for recovery of individual compounds as established by the United States Environmental Protection Agency Contract Laboratory Program dated 7/85 or as periodically updated.

The quality of results obtained for inorganic ion and demand parameters will be assessed by comparison of QC data with laboratory control charts for each test.

## 4.0 SAMPLING PROCEDURES

### *4.1 SAMPLING PROGRAM*

The sampling program for this project will include soil, groundwater and soil vapor. Soil samples will be collected from split spoon sampling or macro-core devices retrieved from soil borings. Groundwater samples will be collected from groundwater monitoring wells using low flow purging techniques. Soil vapor samples will be collected from vapor points screened in the vadose zone using Summa Canisters.

#### 4.1.1 Drilling/Sampling Procedures

Soil and groundwater samples will be collected by means of a soil boring program. Soil borings shall be completed using the hollow stem auger drilling methods, direct push methods, or rotary drilling methods, whichever methods are determined to be best suited to site conditions by the SESI project manager and SESI field team leader.

Soil samples will be collected from soil borings and analyzed in accordance with the NYSDEC-approved Work Plan. Monitoring wells for groundwater sample collection will be installed in select completed soil borings. Either hollow stem auger (HSA) or direct push drilling methods may be utilized for monitoring well completion.

Samples of the encountered overburden materials shall be collected continuously during drilling so that a complete soil profile is examined and described by the SESI field geologist. The sampling method employed shall be ASTM D-1586/Split Barrel Sampling using a standard 2-foot long, 2-inch outside diameter split- spoon sampler with a 140-pound hammer, in cases where HSA methods are used. When direct-push methods are used, samples will be obtained using a 4-foot or 5-foot long, 2-inch outside diameter macro-core sampler in acetate sleeves. Upon retrieval of the sampling barrel or sleeve, the samples shall be collected from appropriate intervals and placed in glass jars or EnCore devices and labeled, stored on site (on ice in a cooler if necessary), and transmitted to the appropriate testing laboratory or storage facility. Chain-of-custody procedures will be practiced following Section 15, EPA-600/4-82-029, Handbook for Sampling and Sample Preservation of Water and Waste Waters.

A geologist or engineer will be on site during the drilling operations to fully describe each soil sample, following the New York State Soil Description Procedure, and to retain representative portions of each sample.

The drilling contractor will be responsible for obtaining accurate and representative samples, informing the geologist of changes in drilling pressure, keeping a separate general log of soils encountered including blow counts [i.e., the number of blows from a soil sampling drive weight (140 pounds)] required to drive the split-spoon sampler in 6-inch increments and installing monitoring wells to levels directed by the supervising geologist following specifications further outlined in this protocol.

### 4.1.2 Monitoring Well Completion

Monitoring wells will be constructed of 0.010-inch slot size PVC well screen and riser casing. Other materials utilized for completion will be washed silica sand (Q-Rock No. 4 or approved equivalent) bentonite grout, Portland cement, and a protective steel locking well casing and cap with locks. The depth of the wells will be determined based on the depth to water, type of contaminant and field conditions encountered.

The monitoring well installation method for wells installed within unconsolidated sediments shall be to place the screen and riser assembly into the casing once the screen interval has been selected. At that time, a washed silica sand pack will be placed around the well screen if required to prevent screen plugging. If a sand pack is not warranted, the auger string will be pulled back to allow the native aquifer material to collapse 2 to 3 feet above the top of the screen. Bentonite pellets will then be added to the annulus between the casing and the inside auger to insure proper sealing. Cement/bentonite grout will continue to be added during the extraction of the augers until the entire aquifer thickness has been sufficiently sealed off from horizontal and/or vertical flow above the screened interval. During placement of sand and bentonite pellets, frequent measurements will be made to check the height of the sand pack and thickness of bentonite layers by a weighted drop tape measure.

A bolt-down protective curb box will be installed, flush with the ground, or steel “stick-up” protective casing and secured by a Portland cement seal. The cement seal shall extend laterally at least 1 foot in all directions from the protective casing and shall slope gently away to drain water away from the well.

### 4.1.3 Well Development

All monitoring wells will be developed or cleared of all fine-grained materials and sediments that have settled in or around the well during installation so that the screen is transmitting representative portions of the groundwater. The development will be by one of two methods, pumping or bailing groundwater from the well until it yields relatively sediment-free water. Wells will be developed at least one day after installation.

A decontaminated pump or bailer will be used and subsequently decontaminated after each use following procedures outlined in the Decontamination Protocol. Pumping or bailing will cease when the turbidity falls below 50 NTUs or until specific conductivity, pH, and temperature are stable (i.e., consecutive readings are within 10 percent with no overall upward or downward trends in measurements). Well development water will be disposed of on the ground surface at each well location or contained in drums as conditions warrant.

### *4.1.4 Decontamination*

All drilling equipment and associated tools including augers, drill rods, sampling equipment, wrenches and any other non-dedicated equipment or tools that have come in contact with contaminated materials will be decontaminated before any drilling on site begins, between each well, and prior to removing any equipment from the site. The preferred decontamination procedure will be to scrape the equipment from any residual soils and then rinse with water and Alconox®. Every effort will be made to minimize the generation of contaminated water. All onsite decontamination activities will be conducted on a properly constructed decontamination pad.

## *4.2 Groundwater Sampling Program.*

### 4.2.1 Well Purging

Prior to sampling a monitoring well, the static water level will be recorded. All well data will be recorded on a field sampling record. The wells will be sampled in accordance with the USEPA guidelines for the Low Flow Purging Sampling (LFPS). The purpose of LFPS is to collect groundwater samples from monitoring wells that are representative of ambient groundwater conditions in the aquifer. The LFPS method reduces turbidity which is needed particularly when sampling for metals.

### 4.2.2 Sampling Procedure

The wells will be sampled using the LFPS technique. A flow rate of 100 ml to 250 ml per minute is used to purge the wells. Drawdown should not exceed 0.3 feet. QED bladder pumps are used for this method. The pump intake is lowered to the mid-point of the water column or as subsurface features such as bedrock fractures or more permeable zones warrant. At the initiation of low flow purging a water level is recorded as well as field parameters. Field parameters are then monitored every five minutes during low flow purging using a flow through cell. When three consecutive measurements of pH differ by 0.1 units or less, with ORP within 10 mv or less, turbidity varies 10 percent or less, conductivity differs by 3 percent or less and dissolved oxygen by 10 percent or less, sampling may begin. Flow through cells are used so continuous real time readings are made. When the parameters stabilize the flow through cell is disconnected and sample bottles are filled directly from the tubing.

In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of 40 ml VOA vials, as follows:

A trip blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each

shipment of samples where sampling and analysis for TCL volatiles is planned (water matrix only). The trip blank will be analyzed for TCL volatile organic compounds as a measure of the internal laboratory procedures and their effect on the results.

### *4.3 Soil Vapor Sampling*

Soil vapor sampling will be conducted in accordance with the Guidance for Evaluating Soil Vapor Intrusion in the State of New York, with updates (SVI Guidance). Soil vapor samples will be collected in the vadose zone from shallow (5 feet) vapor points. Each vapor point will be installed in a shallow boring drilled either by hand-operated equipment (e.g. hand auger or percussion hammer drill), or by a small truck-mounted drill rig. Drilling equipment used shall be based on soil conditions, and the method that provides the most practical approach.

Each vapor point will consist of an inert sampling tube (polyethylene, stainless steel, or Teflon®) with a 6-inch screened section at the bottom through which soil vapors can be sampled. The screen slot size will be 0.0075 inches. A sampling zone will be created around the screened section by backfilling with 1 to 2 feet of porous course sand or glass beads, and at least three feet of bentonite will be placed above the porous sampling zone to form a seal from the surface. Native clean soil will be packed around the remaining annulus to the ground surface.

Each designated soil vapor sampling location will be purged of a minimum of three volumes using a low volume pump, and then attached to a regulator, and secured with a clamp. The regulator will then be attached to a 1-liter summa canister.

The regulator will be set to collect a soil vapor sample at a flow rate not to exceed 0.2 liters per minute, with a maximum 1-hour sample duration. After the summa canister is filled, the valve will be closed.

Each canister will be listed according to a specific sample I.D. on a chain of custody form. Sample canisters will be delivered to the laboratory within 24 hours and analyzed for VOCs by method TO-15. The detection limit for VOCs will be 1 µg/m3 or less.

The soil vapor sampling effort will include the use inert helium tracer gas to verify that the soil vapor samples are not diluted by ambient air. The atmosphere around the sampling tube will be enriched with the tracer gas, and the soil vapor sample will be collected in the presence of the enriched tracer atmosphere. This will be accomplished by placing an inverted plastic pail over the sampling point and filling the pail with the tracer gas via a small tube penetrating the side of the pail. Refer to the SVI Guidance.

Weather conditions in the 48 hours prior to the test, and during the test, will be noted, including average wind speed, precipitation, temperature, and barometric pressure.

### *4.4 SAMPLE PRESERVATION AND SHIPMENT*

Since all bottles will contain the necessary preservatives as shown in Table 4.1, they need only be filled. The 40 ml VOA vials must be filled brim full with no air bubbles. The other bottles should be filled to within about 1 inch from the top.

The bottles will be sent from the laboratory in coolers which will be organized on a per site basis. Following sample collection, the bottles should be placed on ice in the shipping cooler. The samples will be cooled to 4°C, but not frozen.

Final packing and shipment of coolers will be performed in accordance with guidelines outlined in the ASP.

## 5.0 *SAMPLE CUSTODY*

The program for sample custody and sample transfer is in compliance with the NYSDEC-ASP, as periodically updated. If samples may be needed for legal purposes, chain-of-custody procedures, as defined by NEIC Policies and Procedures (USEPA-330/9-78-001-R, Revised June 1988) will be used. Sample chain-of-custody is initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples should be minimized.

### *5.1 FIELD SAMPLE CUSTODY*

A chain-of-custody record accompanies the samples from initial sample container selection and preparation at the laboratory, shipment to the field for sample containment and preservation, and return to the laboratory. Two copies of this record follow the samples to the laboratory. The laboratory maintains one file copy and the completed original is returned to the site inspection team. Individual sample containers provided by the laboratory are used for shipping samples. The shipping containers are insulated and ice is used to maintain samples at approximately 4°C until samples are returned and in the custody of the laboratory. All sample bottles within each shipping container are individually labeled and controlled. Samples are to be shipped to the laboratory within 24-48 hours of the day of collection depending on parameter holding times.

Each sample shipping container is assigned a unique identification number by the laboratory. This number is recorded on the chain-of-custody record and is marked with indelible ink on the outside of the shipping container. The field sampler will indicate the sample designation/location number in the space provided on the appropriate chain-of-custody form for each sample collected. The shipping container is closed and a seal provided by the laboratory is affixed to the latch. This seal must be broken to open the container, and this indicates possible tampering if the seal is broken before receipt at the laboratory. The laboratory will contact the site remedial action team leader and the sample will not be analyzed if tampering is apparent.

### *5.2 LABORATORY SAMPLE CUSTODY*

The site remedial action team leader or Project Quality Assurance Officer notifies the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample program meets the following criteria:

1. The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
2. Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody record and records the date and time received.
3. Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the site remedial action team leader as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.
4. The samples are stored in a secured area at a temperature of approximately 4°C until analyses are to commence.
5. A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
6. A copy of the chain-of-custody form will accompany the laboratory report and will become a permanent part of the project records.

### *5.3 FINAL EVIDENCE FILES*

Final evidence files include all originals of laboratory reports and are maintained under documented control in a secure area.

A sample or an evidence file is under custody if:

- It is in your possession; it is in your view, after being in your possession.
- It was in your possession and you placed it in a secure area.
- It is in a designated secure area.

## 6.0 CALIBRATION PROCEDURES

Instruments and equipment used to gather, generate or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the appropriate manufacturer's specifications or project specific requirements. The procedures for instrument calibration, calibration verification, and the frequency of calibrations are described in the ASP. The calibration

of instruments used for the determination of metals will be as described in the appropriate CLP standard operating procedures.

Calibration of other instruments required for measurements associated with these analyses will be in accordance with the manufacturer's recommendations and the standard operating procedures of the laboratory.

## 7.0 ANALYTICAL PROCEDURES

Analytical procedures shall conform to the most recent revision of the NYSDEC-ASP (June 2000) and are summarized on Table 7.1. In the absence of USEPA or NYSDEC guidelines, appropriate procedures shall be submitted for approval by NYSDEC prior to use.

The procedures for the sample preparation and analysis for organic compounds are as specified in the NYSDEC-ASP. Analytical cleanups are mandatory where matrix interferences are noted. No sample shall be diluted any more than 1 to 5. The sample shall be either re-extracted, re-sonicated, re-stream distilled, etc. or be subjected to any one analytical cleanup noted in SW846 or a combination thereof. The analytical laboratory shall expend such effort and discretion to demonstrate good laboratory practice and demonstrate an attempt to best achieve the method detection limit.

### *7.1 VOLATILE ORGANICS (VOA)*

For the analysis of water samples for Target Compound List (TCL), volatile organic compounds (VOCs), no sample preparation is required. The analytical procedure for volatiles is detailed in NYSDEC-ASP (Volume I, Section D-I). A measured portion of the sample is placed in the purge and trap apparatus and the sample analysis is performed by gas chromatography/mass spectrometry for the first round. USEPA Method 8260 will be used, plus tentatively identified compounds (TICs). USEPA Methods 8010 or 8020 (gas chromatography with different detectors) will be used if subsequent rounds with lower limits of detection are warranted.

### *7.2 SEMI-VOLATILE ORGANIC COMPOUNDS*

The extraction and analytical procedures used for preparation of water, soil and sediment samples for the analysis of the TCL semi-volatile organic compounds are described in NYSDEC-ASP Volume I, Section D-III. USEPA Method 8270 will be used, plus tentatively identified compounds (TICs).

Instrument calibration, compound identification, and quantitation are performed as described in Section 6 of this document and in the NYSDEC-ASP.

### *7.3 PESTICIDE AND PCB COMPOUNDS*

The sample preservation procedures for gas chromatography for pesticides and PCB's will be as described in the NYSDEC-ASP methods (Section D-IV). The analysis of

standard mixes, blanks and spiked samples will be performed at the prescribed frequency with adherence to the 72-hour requirement described in the method.

### *7.4 METALS*

Water, soil and waste samples will be analyzed for the metals listed in Table 7.1. The detection limits for these metals are as specified in the NYSDEC-ASP, Section D-V. The instrument detection limits will be determined using calibration standards and procedures specified in the NYSDEC-ASP. The detection limits for individual samples may be higher due to the sample matrix. The procedures for these analyses will be as described in the NYSDEC-ASP.

The analyses for metals will be performed by atomic absorption spectroscopy (AAS) or inductively-coupled plasma emission spectroscopy (ICPES), as specified in the ASP with regard to AAS flame analysis.

### *7.5 SITE SPECIFICITY OF ANALYSES*

Work plans prepared for remedial action waste sites contain recommendations for the chemical parameters to be determined for each site. Thus, some or all of the referenced methods will apply to the analysis of samples collected at the individual waste sites. Analyses of Target Compound List (TCL) analytes will be performed on all samples.

## TABLE 4.1 – SAMPLE CONTAINERIZATION

| PARAMETER & ANALYTICAL METHOD | NO. | CONTAINER TYPE | PRESERVATIVE(1) | HOLDING TIME |
|---|---|---|---|---|
| **Aqueous Samples** | | | | |
| SVOCs (BNAs) – USEPA 8270C | 2 | 1-liter amber glass bottle | None | 7 days (until extraction)<br>40 days (extracted) |
| Pesticides – USEPA 8081A | 2 | 1-liter amber glass bottle | None | 7 days (until extraction)<br>40 days (extracted) |
| PCBs – USEPA 8082 | 2 | 1-liter amber glass bottle | None | 7 days (until extraction)<br>40 days (extracted) |
| VOCs – USEPA 8260B | 2 | 40 mL, glass vial with septum cap | Hydrochloric Acid to pH <2 | 14 days |
| Metals(2) | 1 | 1-liter, plastic bottle | Nitric acid to pH <2 | 180 days<br>Mercury: 28 days |
| Cyanide – SM 4500-CN-E | 1 | 1-liter, plastic | Sodium Hydroxide to pH >12 | 14 days |
| PFAS Compounds – USEPA 537 | 2 | 500 ml HDPE or Polypropylene with non-Teflon lid | None | |
| **Soil, Sediment, Solid Waste Samples** | | | | |
| VOCs – USEPA 8260B | 3 | 15-gram EnCore samplers | None | 14 days |
| SVOCs (BNAs) – USEPA 8270C | 1 | 4-oz. glass jar with Teflon lid | None | 7 days (until extraction, 40 days extracted) |
| Pesticides – USEPA 8081A | 1 | 4-oz. glass jar with Teflon lid | None | 7 days (until extraction)<br>40 days (extracted) |
| PCBs – USEPA 8082 | 1 | 4-oz. glass jar with Teflon lid | None | 7 days (until extraction)<br>40 days (extracted) |
| Metals(2) | 1 | 4-oz. glass jar with Teflon lid | None | 180 days<br>Cyanide: 14 days<br>Mercury: 28 days |
| PFAS Compounds – USEPA 537 | 2 | 500 ml HDPE or Polypropylene with non-Teflon lid | None | |
| **Soil Vapor / Indoor Air Samples** | | | | |
| VOCs – USEPA TO-15 | 1 | Summa Canister | None | 30 days |

(1) All samples will be preserved with ice during collection and shipment.
(2) From verified time of sample receipt by the analytical laboratory (within 24 to 48 hours of collection).
(3) A complete list of compounds is provided on Table 7.1.

**TABLE 4.2 – SAMPLING PROCEDURE FOR MONITORING WELLS USING VOLUME AVERAGED PURGING**

1. Initial static water level recorded with an electric contact probe accurate to the nearest 0.1 foot.

2. Sampling device and electric contact probe decontaminated.
    a. Sampling device and probe are rinsed with pesticide-grade methanol and distilled water.
    b. Methanol is collected into a large funnel which empties into a five- gallon container.

3. Sampling device lowered into well.
    a. Bailer lowered by dedicated PVC or polypropylene line.

4. Sample taken.
    a. Sample is poured slowly from the open end of the bailer and the sample bottle tilted so that aeration and turbulence are minimized.
    b. Duplicate sample is collected when appropriate.

5. Samples are capped, labeled and placed in laboratory coolers with ice packs or bagged ice.

6. All equipment is cleaned with successive rinses of pesticide-grade methanol and distilled water.
    a. Dedicated line is disposed of or left at well site.

7. Equipment/wash blanks are collected when non-dedicated sampling equipment is used.

8. Chain-of-custody forms are completed in triplicate.
    a. The original and one carbon copy are put into a zip-lock bag and placed into the cooler.

9. The original will be returned following sample analysis.
    a. A second carbon copy is kept on file.

10. Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of sample.

**TABLE 4.3 – SAMPLING PROCEDURE FOR MONITORING WELLS USING LOW-STESS (LOW-FLOW) METHODS**

1. Initial static water level recorded with an electric contact probe accurate to the nearest 0.1 foot.

2. Sampling device is lowered into well. Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well. Pump intake must be no less than 2 feet from the bottom of the well to prevent disturbance and resuspension of sediments which may be at the bottom of the well.

3. Measure water level again: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

4. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

5. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

    a. 0.1 for pH
    b. 3% for specific conductance (conductivity)
    c. 10 mv for redox potential
    d. 10% for DO and turbidity

6. Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

7. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.

8. Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and

equal volume of water (e.g., 40 ml). Groundwater purged from the well prior to sampling can be used for this purpose.

9. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.

10. Measure and record well depth.

11. Close and lock the well.

12. Samples are capped, labeled and placed in laboratory coolers with ice packs or bagged ice.

13. All equipment is cleaned with successive rinses of pesticide-grade methanol and distilled water.

    a. Dedicated line is disposed of or left at well site.

14. Equipment/wash blanks are collected when non-dedicated sampling equipment is used.

15. Chain-of-custody forms are completed in triplicate.

    a. The original and one carbon copy are put into a zip-lock bag and placed into the cooler. The original will be returned following sample analysis.
    b. A second carbon copy is kept on file.

16. Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of sample.

## TABLE 7-1 – CONTRACT-REQUIRED QUANTITATION LEVELS AND ANALYTICAL METHODS FOR ASP INORGANICS, ASP VOLATILES, ASP SEMI-VOLATILES, ASP PESTICIDES, AND PCBS

### Target Compound List (TCL) and Contract-Required Quantitation Limit

| SECTION 1 - ASP INORGANICS Method: NYSDEC-ASP-91-4 | | | | | |
|---|---|---|---|---|---|
| | METALS (GW) | REPORTING LIMIT * (µg/l) | | METALS (GW) | REPORTING LIMIT* (µg/l) |
| 1. | Aluminum | 10 | 13. | Magnesium | 70 |
| 2. | Antimony | 4 | 14. | Manganese | 1 |
| 3. | Arsenic | 0.5 | 15. | Mercury | 0.2 |
| 4. | Barium | 0.5 | 16. | Nickel | 2 |
| 5. | Beryllium | 0.5 | 17. | Potassium | 100 |
| 6. | Cadmium | 0.2 | 18. | Selenium | 5 |
| 7. | Calcium | 100 | 19. | Silver | 0.4 |
| 8. | Chromium | 1 | 20. | Sodium | 100 |
| 9. | Cobalt | 0.5 | 21. | Thallium | 0.5 |
| 10. | Copper | 1 | 22. | Vanadium | 5 |
| 11. | Iron | 50 | 23. | Zinc | 10 |
| 12. | Lead | 1 | 24. | Cyanide | 5 |

| VOLATILES (GROUNDWATER) | REPORTING LIMIT (ug/L) | VOLATILES (GROUNDWATER) | REPORTING LIMIT (ug/L) |
|---|---|---|---|
| 1,2-Dibromo-3-chloropropane | 2.5 | Benzene | 0.5 |
| 1,4-Dioxane | 250 | Toluene | 0.75 |
| 1,2-Dibromoethane | 2 | Ethylbenzene | 0.5 |
| Methylene chloride | 2.5 | Chloromethane | 2.5 |
| 1,1-Dichloroethane | 0.75 | Bromomethane | 1 |
| Chloroform | 0.75 | Vinyl chloride | 0.2 |
| Carbon tetrachloride | 0.5 | Chloroethane | 1 |
| 1,2-Dichloropropane | 1 | 1,1-Dichloroethene | 0.5 |
| Dibromochloromethane | 0.5 | trans-1,2-Dichloroethene | 0.75 |
| 1,1,2-Trichloroethane | 0.75 | Trichloroethene | 0.5 |
| Tetrachloroethene | 0.5 | 1,2-Dichlorobenzene | 2.5 |
| Chlorobenzene | 0.5 | 1,3-Dichlorobenzene | 2.5 |
| Trichlorofluoromethane | 2.5 | 1,4-Dichlorobenzene | 2.5 |
| 1,2-Dichloroethane | 0.5 | Methyl tert butyl ether | 1 |
| 1,1,1-Trichloroethane | 0.5 | p/m-Xylene | 1 |
| Bromodichloromethane | 0.5 | o-Xylene | 1 |
| trans-1,3-Dichloropropene | 0.5 | Xylene (Total) | 1 |
| cis-1,3-Dichloropropene | 0.5 | cis-1,2-Dichloroethene | 0.5 |
| 1,3-Dichloropropene, Total | 0.5 | 1,2-Dichloroethene (total) | 0.5 |
| Bromoform | 2 | Styrene | 1 |
| 1,1,2,2-Tetrachloroethane | 0.5 | Dichlorodifluoromethane | 5 |

| PCBs (Groundwater) | REPORTING LIMIT (ug/L) |
|---|---|
| Aroclor 1016 | 0.25 |
| Aroclor 1221 | 0.25 |
| Aroclor 1232 | 0.25 |
| Aroclor 1242 | 0.25 |
| Aroclor 1248 | 0.25 |
| Aroclor 1254 | 0.25 |
| Aroclor 1260 | 0.25 |
| Aroclor 1262 | 0.25 |
| Aroclor 1268 | 0.25 |
| PCBs, Total | 0.25 |

| SVOCs (Groundwater) | REPORTING LIMIT (ug/L) | SVOCs (Groundwater) | REPORTING LIMIT (ug/L) |
|---|---|---|---|
| Acenaphthene | 2 | Benzo(a)pyrene | 2 |
| 3-Methylphenol/4-Methylphenol | 5 | Benzo(b)fluoranthene | 2 |
| Hexachlorobenzene | 2 | Benzo(k)fluoranthene | 2 |
| Bis(2-chloroethyl)ether | 2 | Chrysene | 2 |
| 2-Chloronaphthalene | 2 | Acenaphthylene | 2 |
| 2,4-Dinitrotoluene | 5 | Anthracene | 2 |
| 2,6-Dinitrotoluene | 5 | Benzo(ghi)perylene | 2 |
| Fluoranthene | 2 | Fluorene | 2 |
| 4-Chlorophenyl phenyl ether | 2 | Phenanthrene | 2 |
| Bis(2-chloroisopropyl)ether | 2 | Dibenzo(a,h)anthracene | 2 |
| Bis(2-chloroethoxy)methane | 5 | Indeno(1,2,3-cd)Pyrene | 2 |
| Hexachlorobutadiene | 2 | Pyrene | 2 |
| Hexachlorocyclopentadiene | 20 | 4-Chloroaniline | 5 |
| Hexachloroethane | 2 | 2-Nitroaniline | 5 |
| Isophorone | 5 | 3-Nitroaniline | 5 |
| Naphthalene | 2 | 4-Nitroaniline | 5 |
| Nitrobenzene | 2 | 4,6-Dinitro-o-cresol | 0.7 |
| NitrosoDiPhenylAmine(NDPA)/DPA | 2 | Benzo(a)anthracene SIM | 0.1 |
| n-Nitrosodi-n-propylamine | 5 | Benzo(a)pyrene SIM | 0.1 |
| Bis(2-Ethylhexyl)phthalate | 3 | Benzo(b)fluoranthene SIM | 0.1 |
| Butyl benzyl phthalate | 5 | Benzo(k)fluoranthene SIM | 0.1 |
| Di-n-butylphthalate | 5 | Dibenzo(a,h)anthracene SIM | 0.1 |
| Di-n-octylphthalate | 5 | Indeno(1,2,3-cd)Pyrene SIM | 0.1 |
| Diethyl phthalate | 5 | Hexachlorobenzene SIM | 0.02 |

| | | | |
|---|---|---|---|
| Dimethyl phthalate | 5 | Pentachlorophenol SIM | 0.3 |
| Benzo(a)anthracene | 2 | Hexachlorobutadiene SIM | 1 |
| **Pesticides (Groundwater)** | **REPORTING LIMIT (ug/L)** | **Pesticides (Groundwater)** | **REPORTING LIMIT (ug/L)** |
| Delta-BHC | 0.02 | 4,4'-DDE | 0.04 |
| Lindane | 0.02 | 4,4'-DDD | 0.04 |
| Alpha-BHC | 0.02 | 4,4'-DDT | 0.04 |
| Beta-BHC | 0.02 | Endosulfan I | 0.02 |
| Heptachlor | 0.02 | Endosulfan II | 0.04 |
| Aldrin | 0.02 | Endosulfan sulfate | 0.04 |
| Heptachlor epoxide | 0.02 | Methoxychlor | 0.2 |
| Endrin | 0.04 | Toxaphene | 0.2 |
| Endrin aldehyde | 0.04 | Chlordane | 0.2 |
| Endrin ketone | 0.04 | cis-Chlordane | 0.02 |
| Dieldrin | 0.03 | trans-Chlordane | 0.02 |

| **PFAS (Groundwater)** | **REPORTING LIMIT (ng/L)** |
|---|---|
| Perfluorobutanoic Acid (PFBA) | 2 |
| Perfluoropentanoic Acid (PFPeA) | 2 |
| Perfluorobutanesulfonic Acid (PFBS) | 2 |
| Perfluorohexanoic Acid (PFHxA) | 2 |
| Perfluoroheptanoic Acid (PFHpA) | 2 |
| Perfluorohexanesulfonic Acid (PFHxS) | 2 |
| Perfluorooctanoic Acid (PFOA) | 2 |
| Perfluorooctanesulfonic Acid (PFOS) | 2 |

| **Metals (Soil)** | **REPORTING LIMIT (mg/kg)** | **Metals (Soil)** | **REPORTING LIMIT (mg/kg)** |
|---|---|---|---|
| Aluminum, Total | 4 | Lead, Total | 2 |
| Antimony, Total | 2 | Magnesium, Total | 4 |
| Arsenic, Total | 0.4 | Manganese, Total | 0.4 |
| Barium, Total | 0.4 | Nickel, Total | 1 |
| Beryllium, Total | 0.2 | Potassium, Total | 100 |
| Cadmium, Total | 0.4 | Selenium, Total | 0.8 |
| Calcium, Total | 4 | Silver, Total | 0.4 |
| Chromium, Total | 0.4 | Sodium, Total | 80 |
| Cobalt, Total | 0.8 | Thallium, Total | 0.8 |
| Copper, Total | 0.4 | Vanadium, Total | 0.4 |
| Iron, Total | 2 | Zinc, Total | 2 |

| **PCBs (soil)** | **REPORTING LIMIT (mg/kg)** |
|---|---|

| | |
|---|---|
| Aroclor 1016 | 0.0335 |
| Aroclor 1221 | 0.0335 |
| Aroclor 1232 | 0.0335 |
| Aroclor 1242 | 0.0335 |
| Aroclor 1248 | 0.0335 |
| Aroclor 1254 | 0.0335 |
| Aroclor 1260 | 0.0335 |
| Aroclor 1262 | 0.0335 |
| Aroclor 1268 | 0.0335 |
| PCBs, Total | 0.0335 |

| VOCs (soil) | REPORTING LIMIT (mg/kg) | VOCs (soil) | REPORTING LIMIT (mg/kg) |
|---|---|---|---|
| 1,2-Dibromo-3-chloropropane | 0.003 | Benzene | 0.0005 |
| 1,4-Dioxane | 0.08 | Toluene | 0.001 |
| 1,2-Dibromoethane | 0.001 | Ethylbenzene | 0.001 |
| Methylene chloride | 0.005 | Chloromethane | 0.004 |
| 1,1-Dichloroethane | 0.001 | Bromomethane | 0.002 |
| Chloroform | 0.0015 | Vinyl chloride | 0.001 |
| Carbon tetrachloride | 0.001 | Chloroethane | 0.002 |
| 1,2-Dichloropropane | 0.001 | 1,1-Dichloroethene | 0.001 |
| Dibromochloromethane | 0.001 | trans-1,2-Dichloroethene | 0.0015 |
| 1,1,2-Trichloroethane | 0.001 | Trichloroethene | 0.0005 |
| Tetrachloroethene | 0.0005 | 1,2-Dichlorobenzene | 0.002 |
| Chlorobenzene | 0.0005 | 1,3-Dichlorobenzene | 0.002 |
| Trichlorofluoromethane | 0.004 | 1,4-Dichlorobenzene | 0.002 |
| 1,2-Dichloroethane | 0.001 | Methyl tert butyl ether | 0.002 |
| 1,1,1-Trichloroethane | 0.0005 | p/m-Xylene | 0.002 |
| Bromodichloromethane | 0.0005 | o-Xylene | 0.001 |
| trans-1,3-Dichloropropene | 0.001 | Xylene (Total) | 0.001 |
| cis-1,3-Dichloropropene | 0.0005 | cis-1,2-Dichloroethene | 0.001 |
| 1,3-Dichloropropene, Total | 0.0005 | 1,2-Dichloroethene (total) | 0.001 |
| Bromoform | 0.004 | Styrene | 0.001 |
| 1,1,2,2-Tetrachloroethane | 0.0005 | Dichlorodifluoromethane | 0.01 |

| SVOCs (soil) | REPORTING LIMIT (mg/kg) | SVOCs (soil) | REPORTING LIMIT (mg/kg) |
|---|---|---|---|
| Acenaphthene | 0.1332 | Di-n-butylphthalate | 0.1665 |
| 2-Chloronaphthalene | 0.1665 | Di-n-octylphthalate | 0.1665 |
| Hexachlorobenzene | 0.047952 | Diethyl phthalate | 0.1665 |

| | | | |
|---|---|---|---|
| Bis(2-chloroethyl)ether | 0.05994 | Dimethyl phthalate | 0.1665 |
| 3,3'-Dichlorobenzidine | 0.127872 | Benzo(a)anthracene | 0.055944 |
| 2,4-Dinitrotoluene | 0.082917 | Benzo(a)pyrene | 0.121878 |
| 2,6-Dinitrotoluene | 0.065934 | Benzo(b)fluoranthene | 0.041958 |
| Fluoranthene | 0.0999 | Benzo(k)fluoranthene | 0.034965 |
| 4-Chlorophenyl phenyl ether | 0.1665 | Chrysene | 0.0999 |
| Bis(2-chloroisopropyl)ether | 0.1998 | Acenaphthylene | 0.1332 |
| Bis(2-chloroethoxy)methane | 0.17982 | Anthracene | 0.0999 |
| Hexachlorobutadiene | 0.061938 | Benzo(ghi)perylene | 0.1332 |
| Hexachlorocyclopentadiene | 0.47619 | Fluorene | 0.1665 |
| Hexachloroethane | 0.080919 | Phenanthrene | 0.0999 |
| Isophorone | 0.055944 | Dibenzo(a,h)anthracene | 0.057942 |
| Naphthalene | 0.1665 | Indeno(1,2,3-cd)Pyrene | 0.06993 |
| Nitrobenzene | 0.073926 | Pyrene | 0.0999 |
| NitrosoDiPhenylAmine(NDPA)/DPA | 0.040959 | 4-Chloroaniline | 0.1665 |
| n-Nitrosodi-n-propylamine | 0.041958 | 2-Nitroaniline | 0.1665 |
| Bis(2-Ethylhexyl)phthalate | 0.1665 | 3-Nitroaniline | 0.1665 |
| Butyl benzyl phthalate | 0.1665 | 4-Nitroaniline | 0.1665 |

| **Pesticides (soil)** | **REPORTING LIMIT (mg/kg)** | **Pesticides (soil)** | **REPORTING LIMIT (mg/kg)** |
|---|---|---|---|
| Delta-BHC | 0.0016008 | 4,4'-DDE | 0.0016008 |
| Lindane | 0.000667 | 4,4'-DDD | 0.0016008 |
| Alpha-BHC | 0.000667 | 4,4'-DDT | 0.0030015 |
| Beta-BHC | 0.0016008 | Endosulfan I | 0.0016008 |
| Heptachlor | 0.0008004 | Endosulfan II | 0.0016008 |
| Aldrin | 0.0016008 | Endosulfan sulfate | 0.000667 |
| Heptachlor epoxide | 0.0030015 | Methoxychlor | 0.0030015 |
| Endrin | 0.000667 | Toxaphene | 0.030015 |
| Endrin aldehyde | 0.002001 | Chlordane | 0.01334 |
| Endrin ketone | 0.0016008 | cis-Chlordane | 0.002001 |
| Dieldrin | 0.0010005 | trans-Chlordane | 0.002001 |

| **PFAS (Soil)** | **REPORTING LIMIT (ug/kg)** |
|---|---|
| Perfluorobutanoic Acid (PFBA) | 1.5 |
| Perfluoropentanoic Acid (PFPeA) | 1.5 |
| Perfluorobutanesulfonic Acid (PFBS) | 1.5 |
| Perfluorohexanoic Acid (PFHxA) | 1.5 |
| Perfluoroheptanoic Acid (PFHpA) | 1.5 |
| Perfluorohexanesulfonic Acid (PFHxS) | 1.5 |
| Perfluorooctanoic Acid (PFOA) | 1.5 |
| Perfluorooctanesulfonic Acid (PFOS) | 1.5 |