SESI
CONSULTING ENGINEERS

Geotechnical
Environmental
Site Civil

959 Route 46E, Fl 3, Ste 300
Parsippany, NJ 07054
973.808.9050
www.sesi.org

Remedial Design Work Plan

Ossining Gas Works DPW Site
30 Water Street,
Ossining, Westchester County, NY
BCP Site No. C360172

Prepared for:

WB 30 Water Street LLC

SESI Project No:
11498

Date:
June 2025

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 Design 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	6/24/2025	
NYS Professional Engineer (# 090531)	Date	Signature

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education

TABLE OF CONTENTS

LIST OF ACRONYMS ..... **i**

1.0 INTRODUCTION **1**

1.1 NATURE AND EXTENT OF IMPACTS 4

1.2 SELECTED REMEDY 8

1.3 IDENTIFICATION OF STANDARDS, CRITERIA, AND GUIDANCE 12

1.4 GREEN REMEDIATION EVALUATION 14

2.0 DESIGN INVESTIGATIONS **18**

2.1 REQUIRED ANALYTICAL PROCEDURES, SPECIAL CONSIDERATIONS FOR DESIGN EFFORT 18

2.1.1 DELINEATION OF PAH-IMPACTED AREAS PRE-REMEDIATION 18

2.1.2 DELINEATION OF EASTERN EXCAVATION 19

2.2 INVESTIGATION PLAN TO DELINEAT PILOT CELL J(B) 21

2.3 GOVERNING DOCUMENTS 22

2.4 REPORTING 22

3.0 DESIGN SCOPE **23**

3.1 PROJECT ORGANIZATION 23

3.2 SOIL MANAGEMENT PLAN 23

3.2.1 SOIL SCREENING METHODS 24

3.2.2 STOCKPILE METHODS FOR CONTAMINATED SOILS 24

3.2.3 SOIL EROSION AND SEDIMENT CONTROL 24

3.2.4 MATERIALS LOAD OUT 25

3.2.5 MATERIALS TRANSPORT OFF SITE 26

3.2.6 MATERIALS DISPOSAL OFF SITE 26

3.2.7 BACKFILL FROM OFF SITE SOURCES 28

3.3 AIR MONITORING 29

3.3.1 ODOR, DUST AND NUISANCE CONTROL PLAN 29

3.4 UTILITIES 31

3.5 DEWATERING PLAN 32

3.6 ISS 33

3.6.1 ISS IMPLEMENTATION SEQUENCING 33

3.6.2 ISS MIXING SEQUENCING 35

3.6.3 PRE-CLEARING OF CELLS 35

3.6.4 REMEDIATION OF PILOT CELLS -D AND -J(A) 36

3.6.5 ISS ADJACENT THE BROOK SEQUENCING 36
3.7 PILOT STUDY 37
3.7.1 QA/QC CORING FINDINGS 37
3.8 EXCAVATION 40
3.9 PRODUCT RECOVERY WELLS 40
3.10 GROUNDWATER MONITORING WELLS 41
3.11 COMBINED SYSTEM COVER (CCS) 42
4.0 PERMITS OR AUTHORIZATIONS 43
5.0 SCHEUDLE 44
6.0 POST CONSTRUCTION PLANS 45
6.1 REQUIREMENTS OF SITE MANAGEMENT PLAN (SMP) 45
6.2 INSTITUTIONAL CONTROLS 45
6.3 SSDS POST-CONSTRUCTION SAMPLING 46

FIGURES

FIGURE 1.1A TREATMENT AREAS GEOLOGIC CROSS-SECTIONS SITE PLAN
FIGURE 1.1B TREATMENT AREAS GEOLOGIC CROSS-SECTIONS
FIGURE 2.1 PROPOSED REMEDIAL DESIGN SAMPLE LOCATIONS
FIGURE 3.1 PROPOSED CELL LAYOUT WITH SURVEY LOCATIONS
FIGURE 3.2 PROPOSED POST-EXCAVATION SAMPLE LOCATIONS
FIGURE 3.3 PROPOSED WELL LOCATIONS
FIGURE 3.4 CAPPING PLAN
FIGURE 6.1 DRAFT SSDS DESIGN

TABLES

TABLE 2.1 PROPOSED REMEDIAL DESIGN SAMPLE SUMMARY (EMBEDDED)
TABLE 2.2 PROPOSED BORING SAMPLE SUMMARY (EMBEDDED)
TABLE 3.1 PROJECT PERSONNEL (EMBEDDED)
TABLE 3.2 TARGET SURVEY DEPTH
TABLE 3.3 ISS PILOT GRID VERIFICATION SAMPLING (EMBEDDED)
TABLE 3.4 ISS PILOT CORING OBSERVATIONS
TABLE 3.5 PROPOSED PRODUCT RECOVERY WELL CONSTRUCTION (EMBEDDED)
TABLE 3.6 PROPOSED GROUNDWATER MONITORING WELL CONSTRUCTION (EMBEDDED)
TABLE 5.1 REMEDIAL ACTION SCHEDULE (EMBEDDED)

APPENDICES

APPENDIX A SITE PERMITS AND FACILITY APPROVALS
APPENDIX B NYSDEC EMAIL AND WORKPLAN APPROVALS
APPENDIX C QUALITY ASSURANCE PROJECT PLAN
APPENDIX D HEALTH AND SAFETY PLAN
APPENDIX E COMMUNITY AIR MONITORING PLAN
APPENDIX F SOIL EROSION AND SEDIMENT CONTROL PLANS
APPENDIX G ISS IMPLEMENTATION PLAN (RENOVA)
APPENDIX H EXISTING GRADE SURVEY (INSITE)

LIST OF ACRONYMS

Acronym	Definition
amsl	above mean sea level
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CCS	Combined Cover System
Con Edison	Consolidated Edison Company of New York, Inc.
CY	Cubic yard
DCE	Cis-1,2-dichloroethene
DER	Division of Environmental Remediation
DER-10	NYSDEC Technical Guidance for Site Investigation & Remediation
ECs	Engineering Controls
EE	Environmental Easement
FER	Final Engineering Report
ft-bgs	Feet below ground surface
GGBFS	Ground Granulated Blast Furnace Slag
HASP	Health and Safety Plan
ICs	Institutional Controls
ISS	In Situ Solidification Stabilization
ISSPSWP	ISS Pilot Study Workplan
MGP	Manufactured Gas Plant
MNA	Monitored Natural Attenuation
MW	Monitoring Well
NAPL	Non-Aqueous Phase Liquid

Acronym	Definition
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
ODPW	Ossining Department of Public Works
OU	Operable Unit
PAH	Polyaromatic Hydrocarbons
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PFAS	Per and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PoGWSCO	Protection of Groundwater Soil Cleanup Objective
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
QAPP	Quality Assurance Project Plan
RAWP	Remedial Action Work Plan
RDWP	Remedial Design Work Plan
RRSCO	Restricted Residential Use Soil Cleanup Objectives
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objectives
SESC	Soil Erosion and Sediment Control
SESI	SESI Consulting Engineers, DPC

Acronym	Definition
SMP	Site Management Plan
SSDS	Sub-Slab Depressurization System
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TOGS	Technical and Operations Guidance Series
UCS	Unconfined Compressive Strength
ug/m3	micrograms per meter cubed
VOCs	Volatile Organic Compounds
WCDOH	Westchester County Department of Health

1.0 INTRODUCTION

WB 30 Water Street, LLC (the "Volunteer") entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) on April 8, 2024 to investigate and remediate a portion of the Former Ossining Works Site, Operable Unit 1 (OU-1), which is now known as the Former Ossining Gas Works DWP BCP Site No. C360172 (hereinafter referred to as the "Site" or "BCP Site"). The Site, along with the remainder of OU-1 and Operable Units OU-2 and OU-3, has previously been subject to Consent Order No. CO 0-20180516-519 with Consolidated Edison Company of New York, Inc. ("Con Edison" or "Consolidated Edison"). The Site has been removed from the Consent Order in order for the Site to enter the Brownfield Cleanup Program (BCP) but the remainder of OU-1, OU-2 and OU-3 remain subject to the Con Edison Consent Order.

This document is a Remedial Design Work Plan (RDWP), which is prepared in accordance with DER-10 Section 5.1, Section 5.2(a), and Section 5.2(b). Thie RDWP details the implementation of the Site remediation activities as described in the Remedial Action Work Plan (RAWP), which was prepared by SESI and dated February 19, 2025 and approved with the Decision Document dated February 25, 2025.

Site Description

The site is located in the Village of Ossining, New York. The site is in a mixed-use commercial, residential, and industrial neighborhood. Central Avenue and a Con Edison substation are located north of the site. Water Street, a residential structure and commercial structures are located west of the site. Main Street and residential dwellings are located south of the site. Residential properties are located east of the site.

Site Features

The site is located within a fenced area and consists of four (4) lots in the Village of Ossining. The Sing Sing Kill, which runs through the center of the site, has been excluded from the site as it is underwater land. The Sing Sing Kill runs west to the Hudson River, which is approximately 0.189 miles west of the site. A retaining wall is present along the western portion of the Sing Sing Kill sidewalls. Additionally, steep, nearly vertical bedrock walls run along areas of the Sing Sing Kill. The site is located in a flood zone and the eastern portion of the site is undeveloped.

All buildings and structures on the site have been demolished. The site is mostly covered with asphalt

and concrete pads.

Current Zoning and Land Use

The site is currently located in the PW-b: Central Waterfront - Transient Oriented Subdistrict. This zoning district permits recreational, open space, commercial, business, and residential uses. The site is currently vacant. The area south of Sing Sing Kill is mostly covered with asphalt and concrete pads. The area north of the Sing Sing Kill is mostly covered with asphalt.

Past Use of the Site

Lot 26

Sanborn maps between January 1881 and August 1924 reveal multiple buildings were present on this small lot. Historical documents are unclear about the use of these buildings, but these buildings were likely ancillary buildings for the Manufactured Gas Plant (MGP) operations as Consolidated Edison's predecessors, Northern Westchester Lighting Company and then Westchester Lighting Gas Manufacturing Co., appear to have commenced ownership of this lot in 1860. Consolidated Edison sold this lot, and the remaining lots that make up the site, to the Village of Ossining in late 1957. The lot appears to have remained vacant until 1971, when a portion of a building is present on the lot. The remaining portion of the building was present on Lot 27. Historic documents suggest the building was used originally for truck repair by the Ossining Department of Public Works (ODPW) as of 1971, then for truck and general equipment storage later.

Lot 27

In 1868, the Issac Terwillinger Sash and Blind Shop occupied the lot. Historical documentation is unclear as to the exact nature of this business, but later occupants suggest the business may have been associated with the lumber yard present on the lot from approximately July 1886 until August 1924. The name of the company also suggests that it was a lumber-based operation to make windows and doors. Records indicate the sale from Anna Terwillinger to Northern Westchester Lighting Company occurred in Fall of 1923. Between 1930 and 1942, based on Sanborn maps, multiple buildings, gas holders, and oil tanks were present on the lot. Some of the buildings were used for storage related to the production of manufactured gas. In 1949, no buildings remained on the lot, and by 1954, all aboveground portions of all gas holders and tanks were removed from this lot. New buildings were present on the lot in 1960, and in 1971, a portion of a building was present on the lot with the other portion of the building on Lot 26. As of 1971, the lot appears to be operated by the ODPW for truck repair, storage, and general storage. In May 2002, the lot contained two (2)

adjacent truck repair/storage buildings and associated paved areas. Road salt was stored on the lot during winter months. Historically, there was a petroleum bulk storage (PBS) facility used by ODPW to fuel vehicles that was present on this lot, based on interviews with ODPW staff who recalled the location of the fueling facility. The PBS facility was closed in 2005 according to closure documentation from Westchester County.

Lot 28

Lot 28 was historically occupied by Ossining Heat, Light and Power Company and Sing Sing Gas Manufacturing Company dating back as far back as 1901 and then later by Northern Westchester Lighting Company and Westchester Lighting Gas Manufacturing Co., the predecessors of Consolidated Edison of New York, Inc., which conducted MGP operations from approximately the mid-1800s until 1929. During that period, the MGP experienced changes in the type and size of production. Maps from January 1881 until November 1897 show the operation initially consisted of a single gas holder as well as a coal gas production building. Over time, additional gas holders and buildings were added to this lot. On-site buildings contained retorts, purification facilities, boilers, gas meters, generator houses, and storage tanks. Other buildings were used as tenement buildings, a carpenter shop, dwellings, storage, and other miscellaneous uses associated with the MGP. In 1901, the MGP began producing carbureted water in conjunction with coal gas production. In 1904, the operations transitioned into carbureted gas production exclusively. In 1926, the MGP was placed on standby. Between 1926 and 1942, some of the on-site buildings were removed. In 1943, the MGP retired from service and other portions of the MGP were removed after this time. In 1959, the buildings remaining on the lot were switched to natural gas. Maps from 1971 depict multiple small buildings on this lot but then later all buildings were demolished, and this lot was mostly paved. The lot is currently vacant.

Lot 29

Between January 1881 and August 1924, multiple buildings were present on this lot. The deed suggests Northern Westchester Lighting Company acquired Lot 29 in early 1922. Historical documents are unclear about the use of these buildings. The known occupants during that period (Terwilliger & Allison Gasn. Doors) suggest that the buildings were associated with the lumber yard operations present on Lot 27. The lot is depicted as vacant between 1924 and 1949. The lot was later used by the ODPW for storage.

Site Geology and Hydrogeology

Surface elevations at the site range from approximately 15 feet above mean sea level (amsl) along North Water Street to 50 feet amsl along Main Street. Site soils consist of a 2 to 18-foot-thick fill layer of reworked soil and fill with building remnants, underlain by areas of a sand and gravel layer, silt and clay/peat layer, and/or glacial deposits, all ranging in thickness from 8 to 28 feet. Bedrock, classified as metamorphic schist, is present at depths ranging from 15 feet-below ground surface (ft-bgs) to greater than 40 ft-bgs. There are outcroppings of exposed bedrock in several locations on the site.

Groundwater was encountered at the site between 5 and 8 ft-bgs. Groundwater flows west-southwest towards the Hudson River. Most on-site surface drainage currently flows to the Sing Sing Kill, which flows through the site about five (5) feet lower than the surrounding asphalt cover.

1.1 NATURE AND EXTENT OF IMPACTS

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The Remedial Investigation report presents a detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors.

Soil, sediments, groundwater, and soil vapor samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyl (PCBs), pesticides, per- and polyfluoroalkyl substances (PFAS), and cyanide. Based upon these investigations, the primary contaminants of concern are VOCs and SVOCs in soil, groundwater, and soil vapor.

Soil

MGP coal tar in the form of non-aqueous phase liquid (NAPL) was observed in soils and at the top of bedrock adjacent to the Sing Sing Kill and the former gas holders, ranging from 5 to 47 ft-bgs.

Benzene was detected in soil at concentrations up to 1,600 parts per million (ppm), exceeding the Restricted Residential Soil Cleanup Objective (RRSCO) of 4.8 ppm and the Protection of Groundwater Soil Cleanup Objective (PoGWSCO) of 0.06 ppm; toluene was found as high as 3,000 ppm, exceeding the RRSCO of 100 ppm and the PoGWSCO of 1 ppm; ethylbenzene was found as high as 3,500 ppm, exceeding the RRSCO of 41 ppm and PoGWSCO of 1 ppm; total xylene was

found as high as 3,400 ppm, exceeding the RRSCO of 100 ppm and the PoGWSCO of 1.6 ppm.

The compound 1,3,5-trimethylbenzene was detected up to 61 ppm and 1,2,4-trimethylbenzene was detected up to 190 ppm, exceeding the RRSCO of 52 ppm for both compounds, as well as their respective PoGWSCOs of 8.4 ppm and 3.6 ppm.

Total polycyclic aromatic hydrocarbon (PAH) contamination was detected up to 6,280 ppm. Naphthalene was detected up to 6,500 ppm, exceeding the RRSCO of 100 ppm and PoGWSCO of 12 ppm. Benzo(a)anthracene was detected up to 65 ppm, exceeding the RRSCO and PoGWSCO of 1 ppm. Benzo(a)pyrene was detected up to 51 ppm, exceeding the RRSCO of 1 ppm and the PoGWSCO of 22 ppm. Benzo(b)fluoranthene was detected up to 60 ppm, exceeding the RRSCO of 1 ppm and the PoGWSCO of 1.7 ppm. Benzo(k)fluoranthene was detected up to 16 ppm, exceeding the RRSCO of 3.9 ppm and PoGWSCO of 1.7 ppm. Chrysene was detected up to 57 ppm, exceeding the RRSCO of 3.9 ppm and PoGWSCO of 1 ppm. Dibenzo(a,h)anthracene was detected up to 7 ppm, exceeding the RRSCO of 0.33 ppm. Indeno(1,2,3-cd)pyrene was detected up to 36 ppm, exceeding the RRSCO of 0.5 ppm and PoGWSCO of 8.2 ppm.

Total mercury was detected up to 2.3 ppm, exceeding the RRSCO of 0.81 ppm. Total arsenic was detected up to 31.5 ppm, exceeding the RRSCO of 16 ppm.

Cyanide was detected in only one (1) location at 46 ppm, exceeding the RRSCO of 27 ppm and the PoGWSCO of 40 ppm.

Pesticides and PCBs were not detected above their RRSCOs.

PFAS was not detected in soil samples.

Based on the available environmental data, there are no off-site impacts in soil related to this site.

Groundwater

VOCs, SVOCs, metals, cyanide, and PFAS were detected in groundwater above the Ambient Water Quality Standards (AWQS).

Benzene was detected up to 7.9 parts per billion (ppb), exceeding the AWQS of 1 ppb, ethylbenzene

was detected up to 100 ppb, total xylenes were detected up to 55 ppb, isopropylbenzene was detected up to 7.3 ppb, 1,3,5 trimethylbenzene was detected up to 9.9 ppb, and 1,2,4 trimethylbenzene was detected up to 36 ppb, all exceeding their AWQS of 5 ppb. Naphthalene was detected up to 1,200 ppb, exceeding the AWQS of 10 ppb.

Acenaphthene was detected up to 140 ppb, exceeding the AWQS of 10 ppb. Benzo(a)anthracene was detected up to 22 ppb, benzo(a)pyrene was detected up to 16 ppb, benzo(b)fluoranthene was detected up to 11 ppb, benzo(k)fluoranthene was detected up to 4.7 ppb, chrysene was detected up to 18 ppb, and indeno(1,2,3-cd)pyrene was detected up to 7.2 ppb, all exceeding the AWQS of 0.002 ppb. Fluorene was detected up to 66 ppb, exceeding the AWQS of 50 ppb. Phenanthrene was detected up to 150 ppb and pyrene was detected up to 68 ppb, both exceeding the AWQS of 50 ppb. Phenol was detected up to 4.6 ppb, exceeding the AWQS of 1 ppb.

Total cyanide was detected up to 435 ppb, exceeding the AWQS of 200 ppb. Lead was detected up to 81.58 ppb, exceeding the AWQS of 25 ppb.

PFAS compounds perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were reported at concentrations of up to 104 and 83.9 parts per trillion (ppt), exceeding the 6.7 ppt and 2.7 ppt respective water quality guidance values. 1,4-dioxane was detected up to 0.062 ppb, which is below the 0.35 ppb water quality guidance value.

Pesticides and PCBs were not detected above their AWQS.

Based on the available environmental data, groundwater contamination will likely migrate off-site, west-southwest, until the source area of the contamination is remediated.

Soil Vapor

In November 2019, soil vapor intrusion samples (i.e., collocated indoor air and sub-slab samples) were collected from off-site locations, and later in June 2021, additional soil gas samples were collected on-site.

During the 2019 off-site soil vapor intrusion sampling event, benzene was detected in sub-slab and indoor air samples up to 5.8 micrograms per meter cubed (ug/m3) and 0.83 ug/m3, respectively. Toluene was detected in sub-slab and indoor air samples up to 10 ug/m3 and 5.2 ug/m3, respectively.

Ethylbenzene was detected in sub-slab and indoor air samples up to 6.6 ug/m3 and 0.72 ug/m3, respectively. Total xylene was detected in indoor air and sub-slab samples up to 34.1 ug/m3 and 3.55 ug/m3, respectively. Tetrachloroethene (PCE) was detected in sub-slab and indoor air samples up to 18 ug/m3 and 0.18 ug/m3, respectively. Trichloroethene (TCE) was detected in sub-slab samples up to 0.29 ug/m3 and not present in indoor air samples. Cis-1,2-dichloroethene (DCE) was detected in sub-slab samples up to 0.065 ug/m3 and not detected in indoor air samples. Vinyl chloride was not detected in sub-slab or indoor air samples. When this data is compared to the New York State Department of Health (NYSDOH) Soil Vapor Intrusion Guidance Values, no further action is recommended.

Based upon the June 2021 sampling event, PCE was detected in soil gas samples, not collected from beneath a building slab, up to 116 ug/m3 near the northwest property boundary. TCE was detected up to 12.7 ug/m3, DCE was detected up to 99.5 ug/m3, and vinyl chloride was detected up to 246 ug/m3 in soil gas samples not collected from beneath a building slab. TCE, DCE and vinyl chloride were detected in a soil gas sample collected from the former south building footprint; this sample was collected from a central location on-site and not near the site perimeter and was not a sub-slab sample.

During the on-site sampling event, benzene was detected up to 191 ug/m3, toluene was detected up to 104 ug/m3, ethylbenzene was detected up to 23.3 ug/m3, and total xylene was detected up to 169.1 ug/m3 in soil gas samples. All detections were from samples collected along the south and southwest perimeter of the site and not collected from beneath a building slab.

Based on the environmental data from the off-site samples collected in November 2019, soil vapor intrusion from site contamination is not a concern for off-site buildings.

Sediments

Total PAHs were detected up to 7,270 ppb, exceeding the Class B sediment guidance value of 4,000 ppb.

Based upon an assessment completed by Fish and Wildlife, the detections of PAHs in off-site sediments are within an acceptable range to be addressed by natural attenuation and do not require additional remedial action.

1.2 SELECTED REMEDY

The elements of the selected remedy per the Decision Document (February 25, 2025) are as follows:

Excavation

Soils in the upper two feet which exceed the restricted residential or protection of groundwater soil cleanup objectives (RRSCOs or PoGWSCOs) will be excavated and transported off-site for disposal or re-used on Site with NYSDEC approval.

All on-site soils below two feet in areas which are not part of the in-situ solidification (ISS) treatment, as described in remedial element 5, which exceed the PoGWSCOs will be excavated and transported off-site for disposal. Approximately 440 cubic yards of contaminated soil will be removed from the site. Collection and analysis of confirmation samples at the remedial excavation depth will be used to verify that soil cleanup objectives (SCOs) for the site have been achieved. If confirmation sampling indicates that SCOs were not achieved at the stated remedial depth, the Applicant must notify the NYSDEC, submit the sample results, and, in consultation with the NYSDEC, determine if further remedial excavation is necessary. Excavation for development will proceed after confirmation samples demonstrate that SCOs for the site have been achieved.

Excavation of site soils to a depth of five (5) feet below grade will be completed in portions of the site to accommodate the ISS treatment described in remedy element 5. Approximately 8,600 cubic yards of soil will be excavated to facilitate ISS implementation. All soils excavated within the ISS treatment areas which exceed RRSCOs or PoGWSCOs will be disposed of off-site at a permitted facility.

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

Backfill

On-site soil which does not exceed the RRSCOs or PoGWSCOs may be used below the cover system described in remedy element 4 to backfill the excavation to the extent that a sufficient

volume of on-site soil is available. This material should not be used within one (1) foot of the groundwater table.

Backfill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

The site will be re-graded to accommodate installation of a cover system as described in remedy element 4.

Cover System

A site cover will be required in areas where the upper two (2) feet of exposed surface soil will exceed the RRSCOs, to allow for future restricted residential use of the site. Where a soil cover is to be used, it will be a minimum of two (2) feet of soil placed over a demarcation layer, with the upper six (6) inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four (4) feet of soil to ensure the underlying monolith remains below the frost line and protected from the freeze-thaw cycle. A building and its foundation are considered suitable cover to protect the ISS monolith. Where a building and its foundation are considered part of the site cover, the ISS design should include considerations for drainage between the ISS and building foundation and the potential need to design the ISS for a higher strength. f the ISS monolith extends beyond the building footprint, the design shall include a soil cover consisting of a minimum of four (4) feet of soil for that portion. Consistent with the remainder of the site cover, the upper two (2) feet will meet the SCOs for restricted residential use outside the ISS monolith area. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material.

In-Situ Solidification

ISS is a process that binds the soil particles in place, creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying reagents or other binding reagents using an excavator or augers. Often Portland Cement is used as the primary binder, although less carbon-intensive amendments will be considered. The soil and binding reagents are mixed to produce a solidified mass resulting in a low permeability monolith. ISS will be implemented in areas as indicated on **Figure 1.1A/B**. An approximately 5-foot soil cut will need to be excavated in the areas where ISS will be applied to contain the ISS spoils and increased soil volume created by the soil mixing

Typical design requirements are that solidified mass would produce a hydraulic conductivity (K) of 1.0 X 10^{-6} cm/sec or less and would also result in an unconfined compressive strength of 50 psi or higher for areas that will be below the planned building development. The solidified mass will then be covered with a cover system as described in remedy element 4 to prevent direct exposure to the solidified mass. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination.

Coal Tar Recovery

Installation and operation of coal tar recovery wells is planned along the western site boundary and north of the Sing Sing Kill west of the former gas holder footprint to remove potentially mobile coal tar from the subsurface. Coal tar will be collected periodically from each well; however, if wells are determined by the NYSDEC to accumulate large quantities of coal tar over extended time periods, they may be converted to automated collection.

Monitored Natural Attenuation

Groundwater contamination remaining after active remediation detailed in remedy element 2 and remedy element 5 will be addressed with monitored natural attenuation (MNA). Groundwater will be monitored for site-related contamination and for MNA indicators, which will provide an understanding of the biological activity breaking down the contamination. Reports of the attenuation will be provided at five (5) and ten (10) years, and active remediation will be proposed if it appears that natural processes alone will not address the contamination. The contingency remedial action will depend on the information collected.

Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property designated by the non-roadway tax parcel which will:

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

Site Management Plan

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

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

   Institutional Controls: Environmental Easement and all local use restrictions discussed in remedy element 8 above, and

   Engineering Controls: The cover system as discussed in remedy element 4, coal tar recovery wells as discussed in remedy element 6, and monitoring wells.

   This plan includes, but may not be limited to:

   - an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
   - a provision should redevelopment occur to ensure no soil exceeding PoGWSCOs will remain below stormwater retention basin or infiltration structures;
   - descriptions of the provisions of the environmental easement including any land use, groundwater, or surface water use restrictions;

- a provision for evaluation of the potential for soil vapor intrusion for any occupied buildings on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and NYSDEC notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b) A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
- monitoring of coal tar recovery well performance to assess the performance and effectiveness of the remedy;
- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- a contingency to address contamination should the rate of coal tar recovery be unsatisfactory; and
- a schedule of monitoring and frequency of submittals to the NYSDEC; and
- monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c) An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system. The plan includes, but is not limited to:
- procedures for operating and maintaining the system; and
- compliance inspection of the system to ensure proper O&M as well as providing the data for any necessary reporting.

1.3 IDENTIFICATION OF STANDARDS, CRITERIA, AND GUIDANCE

The following standards and criteria typically will apply to Site Characterizations, Remedial Investigations, remedy selection, UST closures, 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 NYSDEC
- 6 NYCRR Part 257 - Air Quality Standards

- 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 (Final October 2006; amended February 2024)
- 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
- OSWER Technical Guide For Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air (USEPA June 2015)
- Site Characterization and Technology Selection for CERCLA sites with Volatile Organic Compounds in Soils (September 1993)
- 6 NYCRR Part 612 - Registration of Petroleum Storage Facilities (February 1992)
- 6 NYCRR Part 613 - Handling and Storage of Petroleum (February 1992)
- 6 NYCRR Part 614 - Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992)
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Subpart 374-2 - Standards for the Management of Used Oil (November 1998)
- 6 NYCRR 375 Table 375-6.8(a) and Table 375-6.8(b)
- 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- 40 CFR Part 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks
- STARS #1 - Petroleum-Contaminated Soil Guidance Policy
- STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects
- SPOTS #14 - Site Assessments at Bulk Storage Facilities (August 1994)

- Spill Response Guidance Manual
- Permanent Closure of Petroleum Storage Tanks (July 1988)
- NYSDOH Environmental Health Manual CSFP-530: “Individual Water Supplies - Activated Carbon Treatment Systems”
- 40 CFR Part 144: Underground Injection Control Program
- 10 NYCRR Part 67: Lead
- 12 NYCRR Part 56: Industrial Code Rule 56 (Asbestos)
- 6 NYCRR Part 175: Special Licenses and Permits--Definitions and Uniform Procedures
- 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)
- 6 NYCRR Subpart 374-1: Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Subpart 374-3: Standards for Universal Waste (November 1998)
- 6 NYCRR Part 608: Use and Protection of Waters
- TAGM 4013: Emergency Hazardous Waste Drum Removal/ Surficial Cleanup Procedures (March 1996)
- TAGM 4059: Making Changes to Selected Remedies (May 1998)
- TOGS 1.3.8: New Discharges to Publicly Owned Treatment Works
- TOGS 2.1.2: Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites
- OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)
- CP-43: Groundwater Monitoring Well Decommissioning Policy (November 2009)
- Sampling, Analysis, and Assessment of Per-and-Polyfluoroalkyl Substances (April 2023).
- 2023 Addendum to June 1998 Division of Water Technical and Operational Guidance Series (TOGS) NO. 1.1.1

1.4 GREEN REMEDIATION EVALUATION

ISS of soil is often undertaken at contaminated MGP sites to address the risk to human health and the environment and to address a contaminant source material for which other remedies may be infeasible due to high costs and other technical constraints. Although ISS is an effective and potentially economically preferred technology, it can also produce a large amount of carbon dioxide, including with the use of Portland cement and the mixing process. The design will include

clear green/sustainable best management practices to be implemented on materials, equipment, disposal/recycling options, traffic, community impacts and energy. To promote implementation of green and sustainable remediation principles, an environmental footprint analysis will be completed.

The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWiseTM (available in the Sustainable Remediation Forum [SURF] library). Design and construction considerations should reference NYSDEC standard specification 01 89 29 – Green Remediation Practice and the associated Form A – Summary of Green Remediation Metrics will be used to track actual metrics for the footprint analysis. Contractors will also pay attention to the carbon emissions used in the material generation and transportation to reduce the carbon footprint and recycling applicability where possible. This extends to the use of drilling fluids that are biodegradable and chemicals that are not harmful or hazardous during site operations. Contractors will reference the ISS Factsheet provided by the NYSDEC when selecting materials, methods and general operations for this work.

Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated when possible, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be established for the site management activities, as appropriate. Further, progress with respect to green and sustainable remediation metrics will be tracked when possible, and reported in periodic reports, as part of the site management program, and opportunities to further reduce the environmental footprint of the project will be identified as appropriate.

<u>The following Best Management Practices will be or were considered for the design of the ISS on this project:</u>

- Minimize overly conservative design assumptions: The treatment area was delineated through several investigation rounds including RI and PDIs to collect sufficient data to fully bound the areas to be remediated.
- Develop compliance points, associated performance standards and supplemental mitigation steps.

- Identify vendors with operation centers local to the Site to minimize fuel consumption associated with travel to and from the Site.
- Estimate volume of swell and identify how and where swell can be managed, to increase on-Site reuse and reduce off-site disposal, if possible. Consider if swell can be relocated to another area or if ground surface can be raised post remediation efforts.
- Assess future Site use options to determine if ISS is an appropriate remedy.
- Evaluate sensitive, local human and ecological receptors which require protection from COCs, traffic, noise, dust and odors during the implementation. An enhanced Community Air Monitoring Plan will be implemented.
- The contractor may characterize on-Site groundwater and surface water, if acceptable, for possible use in ISS grout, to potentially replace or reduce potable water use and will consider flow rates, pH, hardness, and organic contents.
- The design mix includes ground granulated blast furnace slag (GGBFS), which will reduce the use of Portland Cement.
- Bench testing was conducted and pilot testing was conducted to optimize the mix design.
- Consider all resources used and use available guidance documents and experts to support sustainability considerations and offsets.
- Identify and incorporate Site Owner and Stakeholder programs/requirements for sustainable remediation, including future potential redevelopment opportunities.
- Specify geotextile bags or nets, when possible, to assure containment of excavated sediment during dewatering and to increase efficiency when handling and transporting the dewatered sediment.
- Specify chemicals or agents, where applicable, that are not harmful or hazardous to aquatic environments and the subsurface, are readily biodegradable, and/or can help to improve site geochemical conditions.
- Reclaim and stockpile uncontaminated soil for use as infill.
- Salvage organic debris that is uncontaminated and free of pests or disease, for use as supplemental infill, mulch or compost.

- Salvage uncontaminated objects with potential recycle, resale, donation or onsite infrastructure value, such as steel, concrete and granite.
- Designate collection points for recycling single-use items such as metal, plastic and glass containers; paper and cardboard; and other consumable items.

2.0 DESIGN INVESTIGATIONS

2.1 REQUIRED ANALYTICAL PROCEDURES, SPECIAL CONSIDERATIONS FOR DESIGN EFFORT

The following are workplans approved by the NYSDEC in May 2025 to delineate PAH impacts (**Appendix B**):

2.1.1 DELINEATION OF PAH-IMPACTED AREAS PRE-REMEDIATION

The information below details the boring delineation prior to remediating three (3) areas for PAH impacts. Pre-excavation delineation sampling around B-10 (Excavation C), B-11 (Excavation B) and SB-23B (Excavation D) are planned to be completed as outlined in **Table 2.1** below. Samples will be collected for PAHs only.

Table 2.1 Proposed Remedial Design Sample Summary

Location	**Sample ID**	**Depth of Sample (ft-bgs)**	**Analytical Procedures** Sampling Method
Excavation B	B-11-10'N (2.5-3')	2.5-3.0	PAHs (EPA Method 8270) Grab
Excavation B	B-11-10'E (2.5-3')	2.5-3.0	
Excavation B	B-11-10'S (2.5-3')	2.5-3.0	
Excavation B	B-11-10'W (2.5-3')	2.5-3.0	
Excavation C	B-10-10'N (10.5-11')	10.5-11.0	
Excavation C	B-10-10'E (10.5-11')	10.5-11.0	
Excavation C	B-10-10'S (10.5-11')	10.5-11.0	
Excavation C	B-10-10'W (10.5-11')	10.5-11.0	
Excavation D	SB-23B-10'N (5.5-6.2')	5.5-6.2	
Excavation D	SB-23B-10'E (5.5-6.2')	5.5-6.2	
Excavation D	SB-23B-10'S (5.5-6.2')	5.5-6.2	
Excavation D	SB-23B-10'W (5.5-6.2')	5.5-6.2	
QA/QC	Duplicate-1	TBD	
QA/QC	MS/MSD-1	TBD	

- Up to one (1) duplicate sample and one (1) Matrix Spike/Matrix Spike Duplicate (MS/MSD) will be collected for every 20 samples for QA/QC. Therefore, it is anticipated that one (1) duplicate and one (1) MS/MSD will be required for this sampling as noted in **Table 2.1** above.
- All borings will be documented for lithology; visual observations including products, staining etc.; odors and PID readings.

- The sample analytical results will be compared to the PoGWSCO and the results will determine the extent of remediation required by excavation or if the remedy should be modified to include these area(s) for ISS.
- Should bedrock be encountered prior to the sample depth in any area, an additional boring will be advanced adjacent to confirm the bedrock refusal depth. Bedrock will then be documented in lieu of sample collection.
- All spoils will be placed in 55-gallon drums and all reuseable equipment will be properly decontaminated.
- Each boring will be backfilled upon completion.

The proposed boring sample locations are provided as **Figure 2.1**

2.1.2 DELINEATION OF EASTERN EXCAVATION

The information below details the Geoprobe direct push boring sampling delineation of the eastern four (4)-foot excavation. The remediation plan for this area included 4-foot excavation per the RAWP and the collection of post excavation samples. The 4-ft excavation was completed on April 8, 2025. The post excavation samples were collected on April 11, 2025 and resulted in PoGWSCO exceedances of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. As a result, one (1) additional foot of soil was excavated vertically, two (2) additional feet horizontally to the east and one (1) additional foot of soil to the south. Post-excavation samples were then collected on April 18, 2025. The second round of post-excavation samples resulted in exceedances of the PoGWSCOs, specifically for the same PAHs, with the exception of naphthalene, which is not considered a PAH contaminant of concern per the RAWP.

The excavation is currently below the groundwater table and below the Sing Sing Brook grade. Further vertical excavation is not practical because of the water and the proximity to the Sing Sing Brook. SESI is proposing ISS - mixing this area in lieu of further excavation. Therefore, further investigation is required to determine the vertical depth of the PoGWSCO exceedances to determine the ISS mixing depth.

- One (1) boring will be completed at the center of the existing excavation for vertical delineation. Two (2) borings will be completed 5 ft-bgs and 10 ft-bgs east of the eastern sidewall for horizontal delineation.
- Borings will each be excavated to 10 ft-bgs with samples collected at 2-foot intervals below the existing excavation grade as noted in **Table 2.2** below:

Table 2.2 Proposed Boring Sample Summary

Location*	**Sample ID****	**Depth of Sample (ft-bgs)**	**Analytical Procedures** Sampling method
TP-1	TP-1 (6-6.5')	6.0-6.5	PAHs (EPA Method 8270) Grab
TP-1	TP-1 (8-8.5')*	8.0-8.5	
TP-1	TP-1 (10-10.5')*	10.0-10.5	
TP-2	TP-2 (6-6.5')	6.0-6.5	
TP-2	TP-2 (8-8.5')*	8.0-8.5	
TP-2	TP-2 (10-10.5')*	10.0-10.5	
TP-3	TP-3 (6-6.5')*	6.0-6.5	
TP-3	TP-3 (8-8.5')*	8.0-8.5	
TP-3	TP-3 (10-10.5')*	10.0-10.5	
QA/QC	Duplicate-2	TBD	
QA/QC	MS/MSD-2	TBD	

**Sample locations and IDs were noted as "TP"; however, soil borings are planned in lieu of test pits (with the same intended IDs per the approved workplan)*

***Sample collected and placed on hold; contingent on other sample results*

- Samples at 6-6.5' will be run for PAHs of concern that exceeded the PoGWSCO in the initial post-excavation sampling of this area. These consist of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. Samples will be released from vertical and horizontal intervals based on the results of the initial round.
- Up to one (1) duplicate sample and one (1) MS/MSD will be collected for every 20 samples for QA/QC. Therefore, it is anticipated that one (1) duplicate and one (1) MS/MSD will be required for this sampling as noted in **Table 2.2** above.
- Horizontal delineation will be concluded when sample results are below the PoGWSCOs or reach the property boundary to the east.
- Vertical delineation will be concluded when sample results are below the PoGWSCOs.

- Sampling is not anticipated to the west due to the remedial ISS-B area. Sampling is not anticipated to the south due to the rock wall and buttress. Sampling is not anticipated to the north due to the retaining wall and the Sing Sing Brook.
- Each Geoprobe direct push boring will be backfilled immediately upon completion, with the same material to minimize exposure before proceeding to the next location.
- Each Geoprobe direct push boring will be continuously logged and observation of any free product, PID readings and odors will be reported.

2.2 INVESTIGATION PLAN TO DELINEATE PILOT CELL J(B)

In an email dated May 8, 2025, the NYSDEC approved the following investigation plan to delineate Pilot Cell J(B) (**Appendix B**):

a) Delineate the horizontal and vertical extent of the observed debris in Pilot J(B);
b) Determine if the tank bottom is still present and if so, the extent; and
c) Develop a remediation plan for Pilot J (B) based on the findings of this investigation.

Based on the test pit probing conducted on April 30, 2025, Pilot Cell J(B) was found to predominantly consist of construction debris (e.g. bricks, stones and concrete chunks). The plan is to delineate the horizontal extent of the debris using test pits, while actively using odor and dust controls:

- Starting on the northern side of Piot J(B) a line of test pits (20 ft apart from each other) will be conducted approximately 10-ft away from Pilot J(A). Test pits will be conducted at centers in the eastern and western directions until significant debris is no longer observed or until reaching the property boundary. The test pits will also be conducted southward to the extent of the Pilot J(B). The test pits will be at minimum 20-ft separation in the south direction or to the extent of the test pit. See the attached plan with planned test pit locations.
- The width of each test pit will be limited to the bucket width to the extent possible.
- Each test pit will be extended to a depth of the tank bottom, if present, to confirm its presence and its extent.
- Dewatering by pumping water directly from the excavation will be conducted as needed to facilitate the observations and the investigative work.
- One (1) of the CAMP stations will be placed downwind adjacent to the Pilot J(B) work activities.
- Odor control foam will be applied at each test pit and at any temporary soil stockpiles, as needed.

- Each test pit will be backfilled immediately upon completion, with the same material to minimize exposure before proceeding to the next location.
- Each test pit will be continuously logged and observation of any free product, PID readings and odors will be reported.
- The approximate location and depth of each test pit will be measured to determine the extent of the encountered debris and the tank bottom.
- All work will be conducted under the CAMP and HASP of the approved RAWP.

This investigation will be conducted with an excavator and no direct push-drilling methods will be used**.** Direct-push drilling methods are likely to encounter frequent refusal due to debris. Additionally, previous borings installed by Arcadis were not conclusive on the nature and extent of the debris or the nature and extent and the presence of the tank bottoms.

2.3 GOVERNING DOCUMENTS

The documents governing the RDWP consist of the Quality Assurance Project Plan (QAPP, provided as **Appendix C**), the Health and Safety Plan (HASP, provided as **Appendix D**), and the Community Air Monitoring Plan (CAMP, provided as **Appendix E**).

2.4 REPORTING

The design investigations noted above will be reported in the final engineering report (FER).

3.0 DESIGN SCOPE

The RAWP includes a detailed description of the remedial action and the remedial technologies for which the design is to be provided. This RAWP was resubmitted in February 2025, and the Decision Document was approved on February 25, 2025.

3.1 PROJECT ORGANIZATION

WB 30 Water Street, LLC is the BCP Volunteer and redeveloper of the Site. SESI is the environmental consultant for the Volunteer. A table summarizing the various personnel associated with the project is included as **Table 3.1** below.

Table 3.1 – Project Personnel

Name	Company	Project Position	Address	Phone Number
James Wendling	WB 30 Water Street, LLC	Volunteer Contact	480 Bedford Road Chappaqua, NY 10514	(914) 263-0079
Fuad Dahan, PE	SESI Consulting Engineers, P.C.	Environmental Consultant's Project Manager	959 Route 46E, Floor 3, Suite 300 Parsippany, NJ 07054	(973) 808-9050
Fuad Dahan, PE	SESI Consulting Engineers, P.C.	Remedial Engineer	959 Route 46E, Floor 3, Suite 300 Parsippany, NJ 07054	(973) 808-9050
Caroline Jalanti	NYSDEC	Project Manager	625 Broadway, 12th floor Albany, NY 12233-7015	(518) 402-9650

3.2 SOIL MANAGEMENT PLAN

Removal of all contaminated soils under the Remedial Action for the Site will be implemented in accordance SESI's RAWP (February 2025). As result of the remediation and ISS preparation excavations, transport and off-site disposal of 9,036 cubic yards (CY) This material is as follows:

- 120 tons of construction and demolition debris;
- Transporting an estimated 6,777 CY (10,166 tons) of excavated material (75% of the excavated soil) off-Site for disposal as a non-hazardous waste; and
- Transporting an estimated 2,259 CY (3,389 tons) of excavated material (25% of the excavated soil) for treatment/disposal as hazardous.

3.2.1 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed by a qualified professional during all remedial and development excavations. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the Certificate of Completion.

3.2.2 STOCKPILE METHODS FOR CONTAMINATED SOILS

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced. Soil stockpiles will be encircled with silt fences or silt socks. Hay bales will be used as needed near catch basins, surface waters and other discharge points. Stockpiles of contaminated materials, if needed, will be inspected at a minimum once each week and after every storm event. Accumulated sediment behind silt fencing will be removed, when needed, to refresh the silt fences. The removed sediments will be treated as contaminated and will be sampled for off-site disposal. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. Soil Erosion and Sediment Control (SESC) plans are included as **Appendix F** and include the proposed locations of the stockpiles.

3.2.3 SOIL EROSION AND SEDIMENT CONTROL

Prior to commencement of land disturbance, temporary SESC measures will be installed. The elements of the proposed SESC measures will be designed and installed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control and described in the SWPPP. SESC plans are included as **Appendix F.**

SESC measures will be employed utilizing Best Management Practices including silt fencing, hay bale dikes, storm drain inlet protection, stabilized construction entrances, exits and dust control measures. The SESC measures will be installed, as required, and in strategic locations based on visual observation of stormwater flow patterns and the topography of work areas in order to control sediment entrained stormwater from exiting or entering work areas. During remedial construction, SESC measures will be inspected by the Remediation Engineer on a daily basis and following precipitation events. The remedial contractor will implement corrective actions identified. Accumulated sediment will be removed from the erosion and sediment controls, as needed. Sediment will be removed from behind the silt fence and hay bales when it accumulates to a depth

greater than 0.5 ft in depth behind the barrier. The removed sediments will be stockpiled with the Site soils on polyethylene sheeting and covered with polyethylene sheeting in preparation for export to an approved facility.

Silt fence and hay bales will be installed around the perimeter of the Site. Additional Site fence and hay bale dikes will be installed around the limit of work areas, the perimeter of any stockpile areas as well as in strategic locations based on visual observation of stormwater flow patterns and topography.

3.2.4 MATERIALS LOAD OUT

The Remediation Engineer or a qualified environmental professional under his/her supervision will oversee all invasive work and the excavation and load-out of excavated material. The Volunteer and its contractors are solely responsible for safe execution of invasive and other work performed under this Plan.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash associated with construction activities will be operational during construction. A truck wash is always required for soil excavation projects such as this. The Remediation Engineer will be responsible for ensuring that outbound trucks are not causing any off-site tracking of the contaminated soils. Locations where vehicles enter or exit the Site will be inspected daily for evidence of off-Site sediment tracking.

The Remediation Engineer will ensure that egress points for truck and equipment transported from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Inspection will be conducted daily for the egress points. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Site-derived materials that are tracked off-site to the adjacent street will be collected and returned to the site for proper disposal.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of invasive

work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations).

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

3.2.5 MATERIALS TRANSPORT OFF SITE

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

Truck transport routes will be included in the SOP. Trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes. Proposed in-bound and out-bound truck routes to the Site will take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.
Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development. Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose- fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

3.2.6 MATERIALS DISPOSAL OFF SITE

Approval from appropriate disposal facilities will be received prior to start of work. Soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. An appropriate facility will be determined to meet project requirements. Unregulated off-Site management of materials from this Site will not be undertaken without formal NYSDEC approval. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or Volunteer to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Materials Management (DMM) in NYSDEC to be Construction and Demolition (C/D) materials. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification to the NYSDEC. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a remediation Site, that the soil material is contaminated and that it must not be redirected to on-site or off-site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

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

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

Hazardous wastes, if any, derived from on-site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.

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

Waste characterization will be performed for off-site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and quality assurance/quality control will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

All transport permits and disposal facility approval documentation will be provided to the NYSDEC Project Manager before the materials are transported off-site. Current facility approvals are included in **Appendix A**.

3.2.7 BACKFILL FROM OFF SITE SOURCES

Backfill must meet the requirements of 6 NYCRR 375-6.7(d) and meet the following criteria in accordance with Division of Environmental Remediation, Technical Guidance for Site Investigation and Remediation (DER-10):

- Comply with Remedial Action Objectives;
- Be free of extraneous debris or solid waste;
- Be recognizable soil or other unregulated material as set forth in 6 NYCRR Part 360 and materials for which NYSDEC has issued a beneficial use determination;
- Not exceed the allowable constituent levels for imported fill or soil; and
- Be tested as described below.

The imported material, if needed, will be sampled in accordance with DER-10 Section 5.4 (e) Table 5.4 (e)10 and paragraph 10. The samples will be analyzed for Target Compound List (TCL) VOCs, TCL SVOCs, pesticides, PCBs, and Target Analyte List (TAL) metals including cyanide. The soil

may be used as cover material provided that all parameters meet the RRSCOs, per the NYSDEC regulatory requirements. In addition, composite samples will be collected for emerging contaminants in accordance with the NYSDEC Sampling, Analysis, and Assessment of Per-and-Polyfluoroalkyl Substances (April 2023).

All materials proposed for importing onto the Site will meet the RRSCO, will be approved by the Remedial Engineer and will follow provisions in the approved RAWP prior to receipt at the Site. A "Soil Reuse/Import" form will be submitted to the NYSDEC for pre-approval prior to importing any soils on -Site. Bills of Lading or equivalent documentation will be obtained to track the amount of soil arriving onto the Site and verify the source of soil being imported.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site. All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC will be construed as an approval for this purpose.

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan will be construed as an approval for this purpose.

Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

3.3 AIR MONITORING

Air monitoring will be performed during the implementation of the remedial actions to protect the health and safety of Site workers and to confirm that air impacts from Site-related activities are not migrating off-Site. The monitoring program will include monitoring for vapor, odors, and dust.

3.3.1 ODOR, DUST AND NUISANCE CONTROL PLAN

Odor, dust and nuisance control will be in accordance with the site-specific Health and Safety Plan included in the RAWP and presented as **Appendix D** of this document.

The FER will include the following certification by the Remedial Engineer: “I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan.”

Odor Control Plan

This odor control plan is designed to control emissions of nuisance odors off-Site. If nuisance odors are identified, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Applicant’s Remediation Engineer, who is responsible for certifying the Final Engineering Report.

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

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

Should odors be evident leaving the site, it is important to control these odors using foam suppression techniques, covering soils/materials with polyethylene sheeting or another method approved by the NYSDEC. Should odors persist, work will be halted until the odors are controlled. Work may resume once proper odor controls are in place and effectively suppressing the odors during remedial action.

Dust Control Plan

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

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to local noise control standards.

3.4 UTILITIES

Prior to Site remedial activities, an underground utility survey was conducted. Dig Safely New York was contacted as well. The underground utilities that are inactive or abandoned were disconnected. Active utilities will be re-routed if they are present in the work areas or will remain in place and be protected during construction. If pipes are encountered, they will investigated and treated per the plan approved in an email from the NYSDEC dated April 24, 2025 (**Appendix B**) as described below:

- Remove product via high CFM Vacuum truck (Vactor, Guzzler etc.). This may need to be done through a vacuum box or drum.
- The vacuumed material from the pipe will be stored in a lined roll-off container
- The pipe will be gauged vertically with a rod and horizontally with a mix of soft excavation, i.e, shovel, and machine if safe.
- Excavate around the pipe after the pipe has been evacuated of material to determine the path and remove accordingly. Piping path investigation may necessitate excavation into adjacent structural and environmental grids. Material that is excavated from adjacent grids

will be stockpile accordingly based on disposal facility. All the material from MGP-4 will be stockpiled for disposal to Waste Management Emelle. All other grids will be stockpiled for disposal to Waste Management Fairless.

- If the pipe extends beneath the current truck pads, the pad will be removed temporary or moved to another location if needed.
- The sludge will be stabilized by mixing with a drying agent with an excavator bucket inside the roll-off container until the free liquids are absorbed.
- Once the material is stabilized with no free liquids, it will be mixed with the existing approved material for offsite disposal into Waste Management Emelle.
- The vacuum truck will be decontaminated on site and the liquid waste dumped into the roll-off.

Once the pipe is delineated the plan is to remove it all before the ISS in any area: structural or remediation.

If any spill occurs during the pipe removal, it will be stabilized immediately by blocking the pipe section from which it is spilled. The spilled material will removed and placed either in the roll-off or in a stabilized stockpiled.

- The liquids in the roll off will be stabilized with Portland Cement or power pellets.
- The removed pipe pieces will be placed in a stabilized stockpile underlain and covered with plastic sheeting and surrounded with haybales.

3.5 DEWATERING PLAN

Groundwater encountered during retaining wall excavation will be managed appropriately. A construction dewatering system will be mobilized and set up on-site for pretreatment of encountered groundwater. The dewatering system will be overseen by Griffon Construction with the assistance of Renova Environmental. The dewatering system shall include submersible sump/dewatering pumps, pretreatments system, carbon media filtration system, and storage tanks. Renova will tie-in to the existing Westchester DPW 4” sanitary line located in the NW corner of the existing building. Treated water will be disposed of into this sewage system. Sumps and dewatering pumps will be installed, as necessary, at appropriate locations along the retaining wall subgrade for water removal. Water from the south side of the Sing Sing will be pumped and treated prior to disposal within the sewage system. The dewatering flow system diagram is included as Appendix B of **Appendix G**.

3.6 ISS

A Bench-Scale Treatability Study was performed to identify the design mix. Results and findings of the Treatability Study indicated that all mixes passed the Unconfined Compressive Strength (UCS) criterion (> 50 psi) and permeability criterion ($<10^{-6}$ cm/sec). However, the UCS tests for Mix #2 (6% Holcim PC and 2% Holcim GGBFS, dry weight) were selected and the Pilot Study Workplan using this mix was approved in January 2024. A Pilot Study has been completed in ISS-J, ISS-H, ISS-D and ISS-C in accordance with the December 2024 and April 2025 Pilot Study Work Plans, approved by the NYSDEC On January 24, 2025 and April 24, 2025 correspondingly. The monoliths were sampled and resulted in passing Pilot-H and Pilot C cells, while other cells need to be addressed during the full-scale operations. A Pilot Study Report will be submitted to the NYSDEC under a separate cover noting the results of the Study prior to the commencement of full-scale ISS.

ISS will be performed using bucket mixing, and verification samples will be collected with coring. The sequencing and implementation of the ISS is outlined in Renova's ISS Implementation Plan as **Appendix G.**

3.6.1 ISS IMPLEMENTATION SEQUENCING

a) Demolition of structures on the northern portion of the Site and removal of areas of concern (such as hydraulic lifts etc.) within the structures. Completed on November 7, 2024 with the permit terminated based on an inspection on December 26, 2024 (**Appendix A**).

b) Other Site preparation activities, if any required, such as potential erosion control or other mitigation near the Brook and along the southern area of the Site as needed

c) Pre-ISS soil excavation including top 5-ft excavation in the final ISS areas. Per the ISS implementation plan the 5-ft excavation will be conducted per cell not site-wide prior to each ISS mixing per cell.

d) Pre-clearing of each cell from large debris and possible structures (e.g. pre-existing foundations, pipes. holder tank bottoms, etc.). If pre-clearing of any cell requires effort lasting more than one (1) day, the ISS mixing of other cells in the sequence will commence while clearing is on-going.

e) ISS mixing areas approved by the NYSDEC.

f) Schedule QA/QC coring before the completion of 25% of the proposed mixing.

g) Installation of the coffer dam in the Sing Sing Brook

h) Stabilization and/or replacement of applicable portions of the Brook walls to the extent necessary to conduct the ISS treatment.

i) Soil removal to implement ISS treatment for areas behind the existing Brook wall that require treatment.

j) Replacement of any removed retaining wall sections to stabilize the Brook.

k) Site grading

l) Installation of downgradient Property Boundary DNAPL recovery wells.

m) Installation of groundwater monitoring wells.

The attached **Table 3.2** will be used for all ISS cells during the full-scale operations to record the survey elevations before ISS, after ISS and prior to any QA/QC coring. The InSite survey used to calculate the starting grade elevations in February 2025 is included as **Appendix H**. The Renova cell split colored by depth is included in Figure 4 of **Appendix G**. The split cells overlayed with the Insight survey are included in **Figure 3.1**.

If bedrock is encountered in the mixing depth, the entire monolith bottom will be mixed to competent rock. Additionally, as part of QA/QC coring, a split spoon sample will be collected from below the monoliths that do not extend to bedrock. All monoliths that extend to competent bedrock will also be cored at least one (1)-foot into competent rock. Furthermore, boulders and debris greater than one (1)-foot in diameter will be removed from any cell and will not be returned to the cell at the completion of mixing. Rocks smaller than 1-foot diameter will be returned to the cell from which they originated; however, keeping the total volume of rocks in a mixed cell no greater than 10%.

In the event there is a disproportionate volume of soil to rock in a mixing cell that would compromise the final integrity of the monolith, no rocks may be returned to the cell they were originally from and must be disposed of or reused on site in accordance with applicable guidance, rules and regulations. No rocks may be returned to the cell they originated from until an appropriate amount of time has passed to allow the ISS mix to set in such a way to allow rocks to be suspended to the

monolith treatment column and not settle to the bottom of the monolith.

3.6.2 ISS MIXING SEQUENCING

Per Section 13.0 of Renova's ISS implementation plan, the mixing cells with start from the southeast to the southwest and then from the northeast to the northwest. The general sequencing plan is included in the following summary table:

Sequence Order	ISS Area	Cell ID	Sequence Order	ISS Area	Cell ID
1	ISS-F	F-2	19	ISS-J1	J1-1
2	ISS-G	G-1	20	ISS-B	B
3	ISS-F	F-1	21	ISS-I	I1-2
4	ISS-A	A	22	ISS-B1	B1-1
5	ISS-2	2-2	23	ISS-K	K-3
6	ISS-G	G-2	24	ISS-B1	B1-2
7	ISS-2	2-3	25	ISS-I	I1-1
8	ISS-1	1A-1	26	ISS-C	C1
9	ISS-2	2-1	27	ISS-K	K-4
10	ISS-J	J-4	28	ISS-C	C
11	ISS-1	1A-2	29	ISS-L	L-2
12	ISS-J	J-3	30	ISS-D	D
13	ISS-1	1B-1	31	ISS-K	K-2
14	ISS-J	J-2	32	ISS-I	I
15	ISS-1	1B-2	33	ISS-L	L-1
16	ISS-J	J-1	34	ISS-E	E-1
17	ISS-J1	J1-2	35	ISS-K	K-1
18	ISS-E	E-2			

The sequencing is further discussed in the implementation plan attached as **Appendix G** and depicted in Figure 3 of **Appendix G.**

3.6.3 PRE-CLEARING OF CELLS

The debris and other large sized material will be excavated from the ISS cells prior to mixing.. The cell will be dewatered, as needed, to complete the removal of this material. The water will be treated for disposal in the Village combined sewage system or stored for off-site disposal. The removed debris will be stockpiled in a stabilized stockpile and characterized for off-site disposal. If a tank

bottom is identified within the cell, it will be broken and removed. The cell will then be ISS mixed and if fill is needed it will be used from the Site existing fill as approved by the NYSDEC. A fill Re-Use form will be submitted to the NYSDEC for pre-approval prior to reuse of any onsite fill.

3.6.4 REMEDIATION OF PILOT CELLS -D AND -J(A)

The cells will be treated to the required treatment depth per the Remedial Action Work Plan (RAWP). The contractor is proposing two (2) corrective measure treatment alternatives:

Option 1 – Remove and Replace: Under this option, the Contractor will apply foam and then break and pulverize the failed ISS cell monolith into pieces no larger than two (2) feet in size. This material will be excavated and removed down to the designed treatment depth. To control airborne dust and potential contaminants during this process, adequate amounts of foam and/or water will be utilized. Once pulverized, the material will be loaded and transported off-site to the Waste Management Fairless facility for disposal. Any free product encountered during excavation will be removed and transported to a NYSDEC-approved facility for disposal and/or treatment. Following confirmation that the excavation is free of contamination, NYSDEC-approved clean backfill material (either stone or earth) will be imported and placed in 12-inch lifts.

To prevent cross contamination of adjacent, untreated cells into the newly excavated Pilot Cell area, the excavation will be implemented after the adjacent cells have undergone ISS treatment and the monoliths have sufficiently stabilized.

Option 2 - Pulverize and Remix: The Contractor will foam, break and pulverize the cells' monolith into pieces small enough to filter through the excavator's skeleton bucket. Once the existing monolith is broken down, the cell will be remixed using the same reagents prescribed within the RAWP and in conformance with the additional corrective means and methods outlined below.

3.6.5 ISS ADJACENT THE BROOK SEQUENCING

Per Section 10.0 of Renova's ISS implementation plan, a Sing Sing Kill bypass will be constructed to remediate along the Kill. Page 56 of Renova's implementation plan also includes steps for ISS and South Recon Walls Construction Sequence. The sequencing is further described in Appendix F of the implementation plan (**Appendix G**).

3.7 PILOT STUDY

The ISS pilot study reported, under a separate cover, the details and description of the pilot study conducted prior to the full-scale remediation as discussed in the RAWP that was approved by the NYSDEC in February 2025. The report documents the field work conducted per the initial ISS pilot study workplan (ISSPSWP) that was approved by the NYSDEC on January 24, 2025 and the addendum ISSPSWP that was approved by the NYSDEC on April 24, 2025. The ISSPSWP included proposed work to treat areas Pilot-H, -D and -J(A). The addendum ISSPSWP included proposed work to treat Pilot-C (adjacent Pilot-D) and Pilot-J(B) (adjacent Pilot-J(A)).

The ISS-mixing conducted in Pilot H, Pilot-D and Pilot-J(B) was reported to the NYSDEC in the initial pilot study report dated March 2025. The NYSDEC in letter dated April 3, 2024, determined that Pilot H was properly treated, and Pilot-D and Pilot-J(A) required additional remediation based on the reported results.

The results of Pilot-C were reported in the final pilot study report. Pilot-J(B) was determined to be not remediated as during pre-clearing it was determined that it contained a significant quantity of debris. Accordingly, SESI submitted to the NYSDEC a workplan to investigate the extent of the debris in Pilot J(B). This workplan was approved by the NYSDEC in an email correspondence on May 19, 2025 and the NYSDEC agreed that the investigation work of Pilot J(B) and its remediation may be conducted under the full-scale work (**Appendix B**).

3.7.1 QA/QC CORING FINDINGS

Coring was completed during the Pilot Study events and is depicted in **Table 3.3** below**.** Each sample was analyzed for UCS (ASTM D1633) and Permeability or Hydraulic Conductivity (ASTM D5084) at intervals of 7 and 28 days.

Table 3.3 – ISS Pilot Grid Verification Sampling

Sample Date	Pilot Area	Sample 1 Collection depth (feet)	Sample 2 Collection depth (feet)	Days	UCS Results >50 psi		Permeability Results <10^{-6} cm/sec	
					Sample 1	Sample 2	Sample 1	Sample 2
2/7/2025	H	6-8	12-14	7	204	208	$2.5x10^{-7}$	$3.6x10^{-7}$
				28	468	392	$2.5x10^{-7}$	$2.7x10^{-7}$
2/12/2025	D	6-8	12-14	7	170	114	$3.2x10^{-7}$	$9.5x10^{-7}$

Sample Date	Pilot Area	Sample 1 Collection depth (feet)	Sample 2 Collection depth (feet)	Days	UCS Results >50 psi		Permeability Results <10^{-6} cm/sec	
					Sample 1	Sample 2	Sample 1	Sample 2
				28	395	265	$3.1x10^{-7}$	$3.6x10^{-9}$
2/27/2025	J(A)	6-8	12-14	7	60	40	$2.5x10^{-6}$	$6.2x10^{-6}$
				28	179	129	$2.3x10^{-6}$	$2.6x10^{-6}$
4/29/2025	C	6-8	12-14	7	610	572	$1.0x10^{-7}$	$9.2x10^{-9}$
				28	908	1157	$9.5x10^{-8}$	$6.7x10^{-9}$

The results of the ISS pilot study were evaluated using the following multiple lines of evidence to determine the performance of the regent and the mixing:

- Quantities of reagents added during the mixing compared to the planned mix
- Daily field observations
- UCS
- Permeability
- Core observations:
    - Evidence of free product
    - Evidence of mixing through the soil column in the core
    - Percent recovery, which can be impacted by the amount of gravel and rock in the soil

Results for Pilot H

Based on the multiple lines of evidence, the mixing of Pilot H was completed per the RAWP and ISSPSWP. The QA/QC results, as detailed below, have met all the multiple lines of evidence to prove that the resulting monolith is homogeneous and met the required testing criteria.

- Volume Treated = 301 CY; Proposed Amendments = 47.7 Tons PC, 8.7 Tons GGBFS; Actual Amendments = 26.4 Tons PC, 8.8 Tons GGBFS
- The field observation of the mixing, as described in daily reports and photos, has shown complete and homogeneous mixing of ISS-H.
- UCS >50 psi after 7 days (Passed)
- Permeability <10^{-6} cm/sec after 7 days (Passed)
- Core observations:
    - No free product observed within the monolith
    - The mix was observed to be homogenous throughout the core column
    - Percent recoveries of the cores within the monolith were all greater than the required 60%, as shown in **Table 3.4**.

Results for Pilot D

- Volume Treated = 502 CY; Proposed Amendments = 43.7 Tons PC, 14.6 Tons GGBFS; Actual Amendments = 44.4 Tons PC, 14.8 Tons GGBFS
- The field observation of the mixing, as described in daily reports and photos, has shown complete and homogeneous mixing of Pilot-D.
- UCS >50 psi after 7 days (Passed)
- Permeability <10^{-6} cm/sec after 7 days (Passed)
- Core observations:

- Some NAPL was observed within the monolith starting at approximately 0.26 ft- amsl of core "Pilot-D(NE)"
- The mix was not observed to be homogenous throughout the core column as core photos from "Pilot-D(NE)" show intermixed rock starting at 1.758 ft-amsl underlain by NAPL coated material.
- Percent recovery was poor, as shown in **Table 3.4**.

Results for Pilot J(A)

- Volume Treated = 281 CY; Proposed Amendments = 24.4 Tons PC, 8.1 Tons GGBFS; Actual Amendments = 26.4 Tons PC, 8.8 Tons GGBFS
- The field observation of the mixing, as described in daily reports and photos, has shown complete and homogeneous mixing of Pilot J (A). However, a high content of rock and gravel was observed. Also, shallow water and wetter than usual conditions were observed in Pilot J(A).
- UCS >50 psi after 28 days (Passed)
- Permeability $<10^{-6}$ cm/sec after 28 days (Failed)
- Core observations:
  - Some free product was observed within the monolith as NAPL was reported in the drill mud tub at approximately 4.84 ft-amsl. The treatment depth for Pilot-J(A) is 0.34 ft-amsl, indicating NAPL was present within the monolith, or the monolith did not achieve design treatment depth.
  - The mix was observed not to be fully homogenous throughout the core column. Intermixed rock starting approximately 7.34 ft-amsl. Additionally, the coring drill was observed to quickly drop at approximately 4.84 ft-amsl, indicating a potential void within the monolith, or that the monolith did not achieve design treatment depth.
  - Percent recovery was poor, as shown in **Table 3.4**.

Results for Pilot C

- Volume Treated = 277 CY; Proposed Amendments = 19.3 Tons PC, 6.4 Tons GGBFS; Actual Amendments = 24.9 Tons PC, 24.9 Tons GGBFS
- The field observation of the mixing, as described in daily reports and photos, has shown complete and homogeneous mixing of Pilot-C.
- UCS >50 psi after 7 days (Passing)
- Permeability $<10^{-6}$ cm/sec after 7 days (Passing)
- Core observations:
  - No free product observed within the monolith
  - The mix was observed to be homogenous throughout the core column
  - Percent recoveries of the cores within the monolith were all greater than the required 60%, as shown in **Table 3.4**.

Results for Pilot J(B)

- This cell was excavated to 14 ft-amsl and then a portion of this cell was sifted to 0 ft-amsl. This sifting revealed the cell primarily consisted of brick, concrete and cobbles. Upon communicating these observations with the NYSDEC, it was determined that this cell will be remediated during the full-scale operations. Therefore, no ISS was completed in this cell and further delineation of the observed debris will be conducted under a separate workplan.

3.8 EXCAVATION

In accordance with the selected remedial action, excavation is required to remove approximately 5,400 tons of material to depths up to five (5) ft-bgs to facilitate ISS treatment and/or to address shown subsurface soil containing contaminants of concern at concentrations greater than 6NYCRR Part 375 restricted residential SCOs and/or significant quantities of NAPL. The area that will be excavated is shown on **Figure 1.1A/B**. Spoils resulting from the ISS swell, which is an unknown quantity at this time, will also have to be removed.

The Same volumes include 5,268 CY (7,902 tons) of the 5-foot soil excavation to prepare for the ISS treatment (1,317 CY of which are anticipated to be non-hazardous and 3,951 CY of which are expected to be hazardous) and 14,424 CY for ISS treatment.

The PoGWSCO soil exceedances will be remediated with excavation and off-site disposal after further delineation during the remedial design. If excavation proves to be impractical, because of the depth of the impacted soils, ISS will be considered for this area. The additional ISS volume of this area is 119 CY based on 13 ft treatment depth and 20x20 ft around B-10 and considering a 5-foot initial cut pre-ISS.

Excavation confirmation sampling will be completed for Excavation A, B, C, D and other areas that are indicated to be excavated without ISS in **Figure 1.1A/B**. The proposed post-excavation samples are depicted in **Figure 3.2.**

3.9 PRODUCT RECOVERY WELLS

NAPL recovery wells will be installed in the downgradient portion of OU-1 and within BB-3 to facilitate the monitoring and recovery of potentially mobile NAPL that accumulates into the newly installed recovery wells. It is expected that up to nine (9) recovery wells will be installed as shown in **Figure 3.3**; however, the final number and location of the wells will be determined post ISS treatment based on the observed NAPL during implementation of the remedial activities. It is anticipated that recovery wells will be placed downgradient of BB-1 and BB-2 and at BB-3 in lieu of remedial excavation or ISS at this depth.

The wells will be constructed with 6-inch stainless steel casing. As discussed in the RAWP, there will be 15 feet of stainless-steel screen, terminating above five (5) feet of sump. For wells within the ISS monolith, a drill rig will be used to penetrate the monolith and install these wells, and then grout

will extend from the surface to match the depth of the ISS monolith in the associated area. The construction details may be adjusted based on observations in the field. The recovery wells including the sump will be terminated above bedrock and will not be drilled into the rock. The recovery wells will not be placed through monolith; their location will be adjusted to be downgradient from the edge of monolith. After installation, water will be pumped out of the wells to confirm the groundwater flow in the wells. The pumped water will be treated as investigative derived waste for containment and disposal. **Table 3.5** below indicates the approximate elevations of the proposed product recovery well construction materials. The elevation of the ISS monolith and existing elevation may differ based on site and treatment conditions.

Table 3.5 – Proposed Product Recovery Well Construction*

Recovery Well ID	Pre-Existing Grade Elevation (ft-amsl)	Rationale with Elevation (ft-amsl)	Proposed Screen Elevation (ft-amsl)	Proposed Sump Elevation (ft-amsl)
PRW-1	15	Bottom of monolith at -12	-12 to -27	-27 to -32
PRW-2				
PRW-3	15	Bottom of monolith at -1	-1 to -16	-16 to -21
PRW-4				
PRW-5	13	BB-3 amber staining at -12 to -17	-7 to -22	-22 to -27
PRW-6	13	BB-2 amber product blebs up to -31	-19 to -34	-34 to -39
PRW-7				
PRW-8	13	BB-1-S1 and BB-1-W1 blebs up to -17	-6 to -21	-21 to -26
PRW-9				

*Well depth will be field adjusted so the well and its sump are placed above the bedrock in each well location

Note that as DNAPL is most likely to be found at the interface of the overburden and bedrock, the wells adjacent are placed to the south and west of BB-1 and BB-2 to capture any DNAPL from these areas migrating towards the Sing Sing Kill as this is the direction of bedrock topography sloping downwards. The depth of bedrock may vary depending on the well locations. Should drilling reach the bedrock before the proposed well depth, the well and the well sump will be installed in the overburden only, and the depth of the well and screen will be adjusted in the field accordingly.

3.10 GROUNDWATER MONITORING WELLS

The groundwater monitoring wells will be used to establish a groundwater monitoring network and will be utilized to monitor the groundwater quality and to demonstrate the reduction in groundwater contamination to asymptotic levels. These groundwater monitoring wells will be installed using auguring or Sonic drilling methods based on availability and sit constraints. **Table 3.6** below

indicates the approximate elevations of the proposed groundwater monitoring well construction details. The elevation of the ISS monolith and existing elevation may differ based on site and treatment conditions. **Figure 3.3** contains the proposed locations of the monitoring wells.

Table 3.6 – Proposed Groundwater Monitoring Well Construction

Well ID	Existing Elevation (ft-amsl)	Bottom of ISS Elevation (ft-amsl)	Top of Screen Elevation (ft-amsl)	Bottom of Well Elevation (ft-amsl)
PR-MW-01	TBD	NA	8.2	-1.8
PR-MW-03	TBD	NA	1.0	-9.0
PR-MW-04	TBD	-4.0	-6.0	-16.0
PR-MW-05	TBD	NA	-6.0	-16.0

3.11 COMBINED SYSTEM COVER (CCS)

The CCS will consist of hard surfaces or 2-foot of material that meet the RRSCO. First, any deeper excavations will backfilled, as required depending on the location of the area on the Site in relation to the development project and the required depth of the excavation for the remediation, with material that meets the RRSCOs. The hard surfaces will be a combination of the two (2) buildings' foundations and concrete or asphalt paved surfaces. The two-foot cover material will be covered with a demarcation layer and a two (2) feet of fill that meet the RRSCO. The two-foot cover will formed of the top six (6) inches of soil suitable for vegetation cover in the landscape areas or properly stabilized. **Figure 3.4** presents the distribution of the CCS at the Site.

Surface soil samples collected during the pre-design investigation suggest that, although there was one (1) lead exceedance of the of the RRSCO, a cover system will not be required in the undeveloped eastern area. Rather, a small excavation will be conducted to remove the soils exceeding the RRSCOs. This area will be excavated down to one (1) foot (depending on endpoint sample results) and backfilled with the 1 (1) foot of soil that meet the RRSCOs. All imported soils will follow the requirement of the soil management plan in this document.

4.0 PERMITS OR AUTHORIZATIONS

Soils excavated from the Site can be mixed into ISS cells with the appropriate approvals from the NYSDEC. SESI will submit a "Request to Import/Reuse Fill or Soil" form to the NYSDEC for approval prior to re-use on Site. Excavated soils that are not reused, surplus material generated or soils not approved by the NYSDEC for reuse on this Site will be disposed of off-site at a permitted facility. Supplemental waste characterization sampling will be performed exclusively for the purposes of off-site disposal in a manner suitable to receiving facilities and in conformance with applicable federal, state and local laws, rules, regulations, and facility-specific permits. A discharge permit has also been acquired from Westchester County for dewatering purposes. Any air permits will be acquired should these be needed post vapor mitigation evaluation. Furthermore, the decision document was approved by the NYSDEC on February 25, 2025 per the provided RAWP. All permits obtained are included in **Appendix A.**

5.0 SCHEUDLE

The proposed remedial action schedule is included in **Table 5.1** below.

Table 5.1 – Remedial Action Schedule

Task	Date
NYSDEC RAWP Approval / Decision Document	February 2025
Start of Site Prep Work	February 2025
Remedial Action Start	May 2025
Soil Excavation Start	May 2025
Dewatering Start	May 2025
ISS Start	June 2025
QA/QC Coring	June 2025
Stabilization/Replacement of portions of the Brook Wall	June 2025
Complete Soil Excavation and ISS	July 2025
Submission of Environmental Easement and SMP	August 2025
Draft FER, Submit FER	October 2025
Certificate of Completion	December 2025

6.0 POST CONSTRUCTION PLANS

Post-remedial action activities will be conducted upon completion of the remediation. A description of these activities is included in this section.

6.1 REQUIREMENTS OF SITE MANAGEMENT PLAN (SMP)

To address these needs, this SMP will include five 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; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC; and (5) an excavation plan. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002, and the guidelines provided by NYSDEC.

The SMP will be approved by the NYSDEC prior to the approval of the FER.

6.2 INSTITUTIONAL CONTROLS

Institutional controls will be implemented for the Site, in particular an Environmental Easement (EE). An EE as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination remains on-Site after the Remedial Action is complete and will be established for the Site since environmental media impacted by concentrations exceeding applicable regulatory standards will remain in-place after the completion of the remedial activities. The EE will serve to:

- Implement, maintain and monitor the engineering controls, including the CCS and sub-slab depressurization system (SSDS) (ECs);
- Prevent exposure to the remaining MGP-related impacts;
- Limit the future use and development of the property to restricted residential, commercial and industrial, or as defined in 6 NYCRR Part 375-1.8(g) subject to local zoning laws;
- Require compliance with the Site Management Plan;
- Restrict the use of groundwater as a source of potable or process water without necessary treatment as determined by the NYSDEC, NYSDOH, or Westchester County Department of Health (WCDOH); and
- Require the property owner to complete and submit a periodic certification of the institutional

and engineering controls to the NYSDEC.

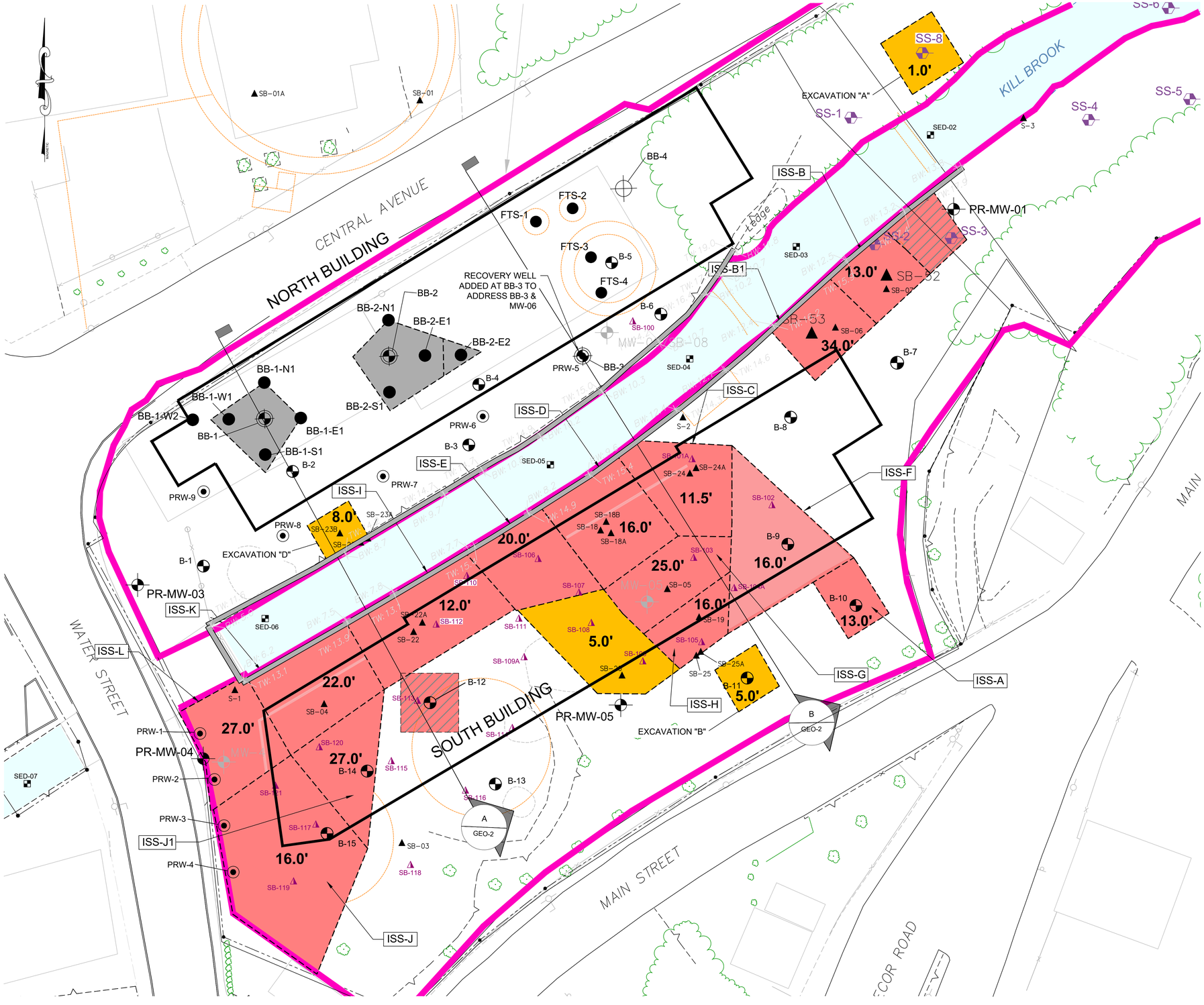
The Environmental Easement will be submitted as part of the FER.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded before the Certificate of Completion can be issued by NYSDEC. A series of Institutional Controls are required under this remedy to implement, maintain and monitor these Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to restricted residential use(s) only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan, which provides all of the methods and procedures to be followed to comply with this remedy.

6.3 SSDS POST-CONSTRUCTION SAMPLING

The Site Management Plan and the Final Engineering Report will include a soil vapor evaluation after the construction and enclosure of the ground floor of the building to confirm the cover system including the SSDS and soil vapor barrier has been properly installed and is adequately functioning. An assessment will also be conducted to determine if an air permit is required associated with the SSDS venting. If it is determined that an air permit is required, it will be obtained from the WCDOH prior to construction and initiation of the SSDS. The SSDS will include four (4) sub-slab soil vapor samples, four (4) collocated indoor air samples and one (1) ambient air sample to assess vapor intrusion into the building once the space is enclosed and the HVAC is running. The proposed details of the SSDS and associated sampling locations are included as **Figure 6.1**.

Figures



LEGEND:

- OPERABLE UNIT OUTLINE
- EXISTING STRUCTURE
- WATER
- TREE
- HISTORICAL MGP STRUCTURE
- 5.0' — EXCAVATION AREA AND DEPTH FROM EXISTING GRADE
- 16' — ISS TREATMENT AREA AND DEPTH FROM EXISTING GRADE (FT)
- ISS TREATMENT AREA (DEPTH TO BE DETERMINED)
- TREATMENT AREA WITH PRODUCT RECOVERY WELLS
- B-1 — SESI PHASE II BORING LOCATIONS AND RESULTS
- BCP BOUNDARY
- BB-1 — GEOTECHNICAL BORING FOR COAL TAR VISUAL
- DELINEATION BORING COMPLETED ON 10/28 - 10/30, 11/22, 11/25/2024
- PR-MW-03 — POST REMEDIATION MONITORING WELLS - PROPOSED LOCATION
- NAPL RECOVERY WELL - PROPOSED LOCATION [1]

NOTES:
1. RECOVERY WELLS CURRENTLY WITHIN ANY ISS MONOLITH WILL BE RELOCATED TO THE WEST SHOULD THE ISS MONOLITH EXTEND TO BEDROCK FOR TREATMENT. NO RECOVERY WELLS SHALL BE ADVANCED WITHIN BEDROCK

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.

© SESI CONSULTING ENGINEERS 2025
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

REFERENCE:
1. FOUNDATION INFORMATION WAS TAKEN FROM STRUCTURAL PLANS PROVIDED BY CHRISTIE ENGINEERING, DATED 11/29/2023.
CIVIL INFORMATION WAS TAKEN FROM CIVIL/SITE PLANS PROVIDED BY INSITE ENGINEERING DATED 12/22/23.

SITE PLAN

Scale: 1"= 20'

0 10 20 40 60 80

rev	date	description	by
			JMR

dwg by: KBV
chk by: CCM
scale: AS NOTED
date: 06/24/2025

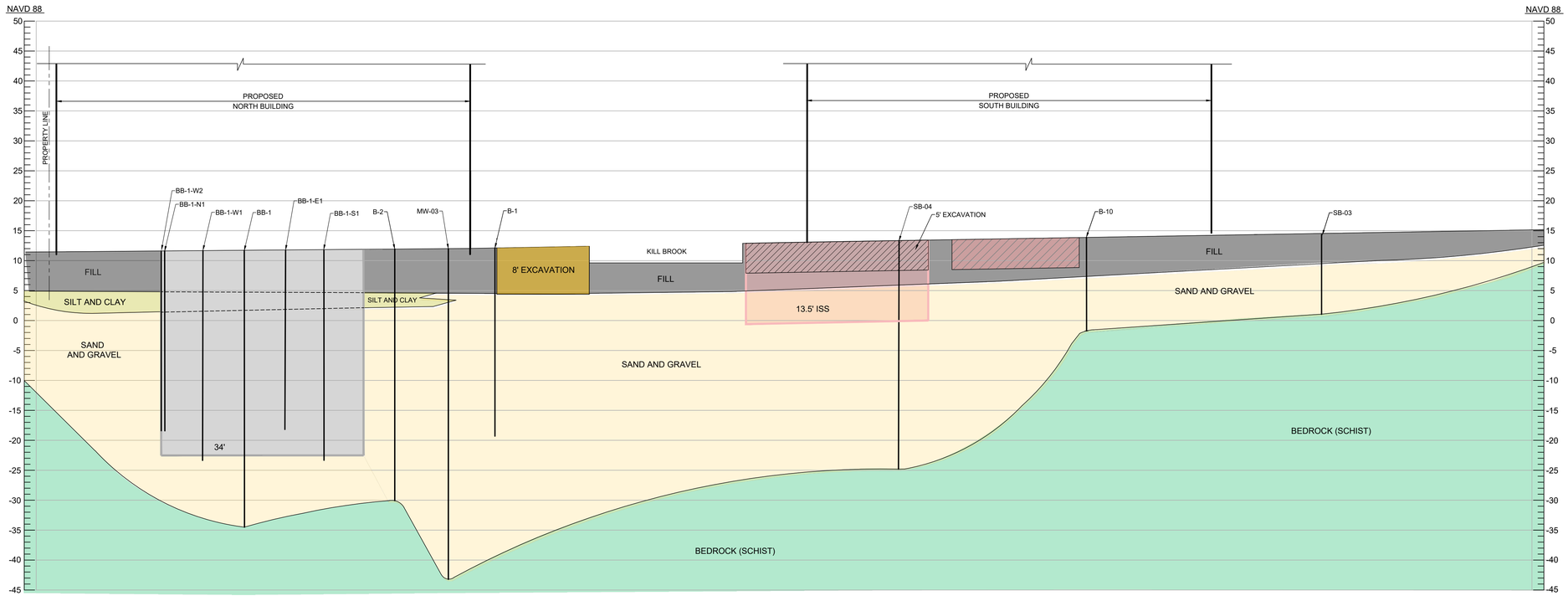
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

PROPOSED RESIDENTIAL DEVELOPMENT
OSSINING DPW SITE
OSSINING, NY

title: TREATMENT AREAS GEOLOGIC CROSS-SECTIONS SITE PLAN

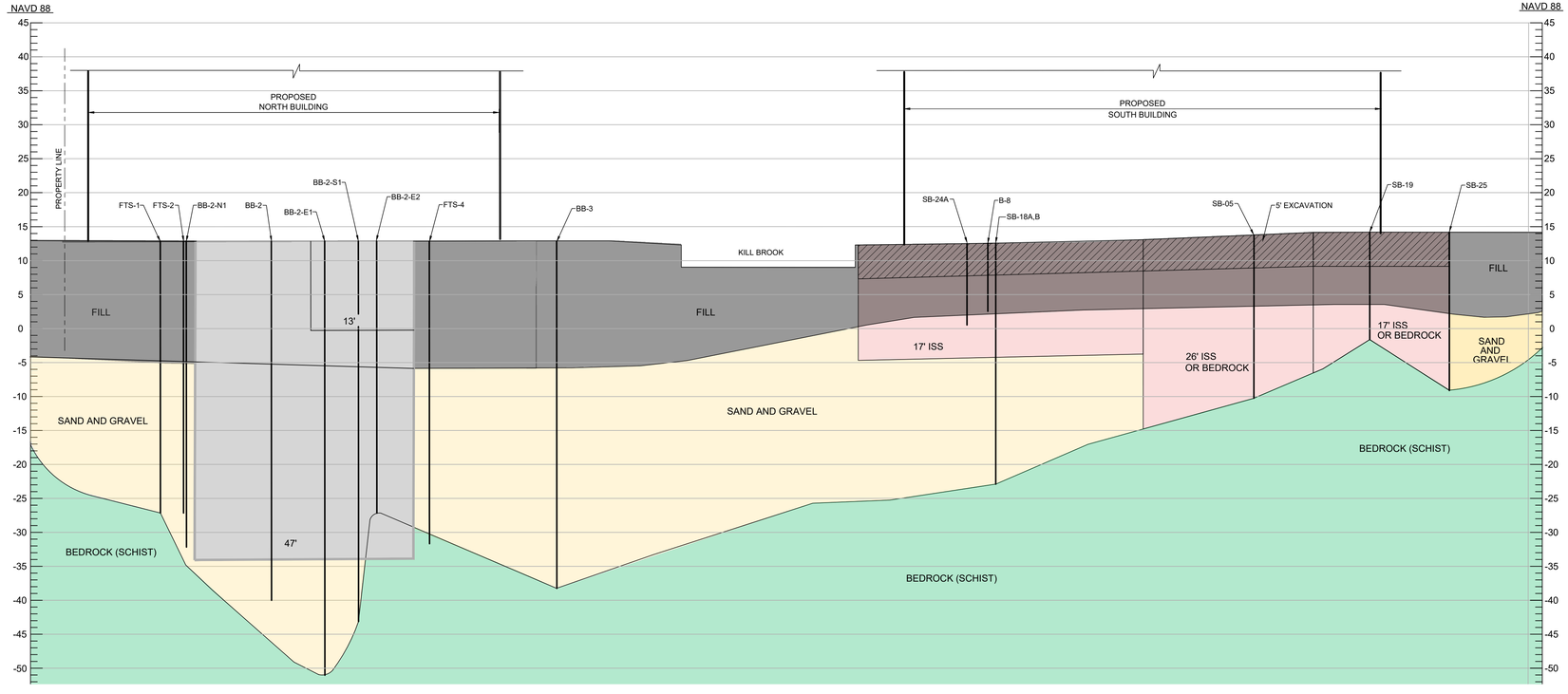
job no. 11498
drawing no. FIG 1.1A

N:\ACAD\11498\CAD\ENVIRONMENTAL BASE\DWG\11498-DWG-BASE FOR ENVIRONMENTAL FIGURES-V2.DWG 06/24/25 08:37:47PM, kim.vanderkolk, LAYOUT:X-SECT SITE PLAN



SECTION A

Scale: 1"= 10'



SECTION B

Scale: 1"= 10'

LEGEND:

- FILL
- SILT AND CLAY
- SAND AND GRAVEL
- BEDROCK (SCHIST)
- ISS TREATMENT AREAS (RAWP +1 FT)
- ISS TREATMENT AREAS (DEPTH TO BE DETERMINED)
- TREATMENT AREA WITH PRODUCT RECOVERY WELLS
- PRE-ISS EXCAVATION AREAS

REFERENCE:

1. SECTION INFORMATION TAKEN FROM ARCADIS, "GEOLOGIC CROSS SECTIONS C-C' AND C-C'", PLOT DATED DECEMBER 2, 2020.

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.

© SESI CONSULTING ENGINEERS 2025
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

N:\CAD\11498\CAD\ENVIRONMENTAL BASE\WDMP\11498 SWPPP BASE GEOLOGIC CROSS SECTIONS V2.DWG 09/24/25 08:36:48PM Jvanvoorsholn, LAYOUT:ES-2

rev	date	description	by
			JMR

dwg by: KBV
chk by: CCM
scale: AS NOTED
date: 06/24/2025

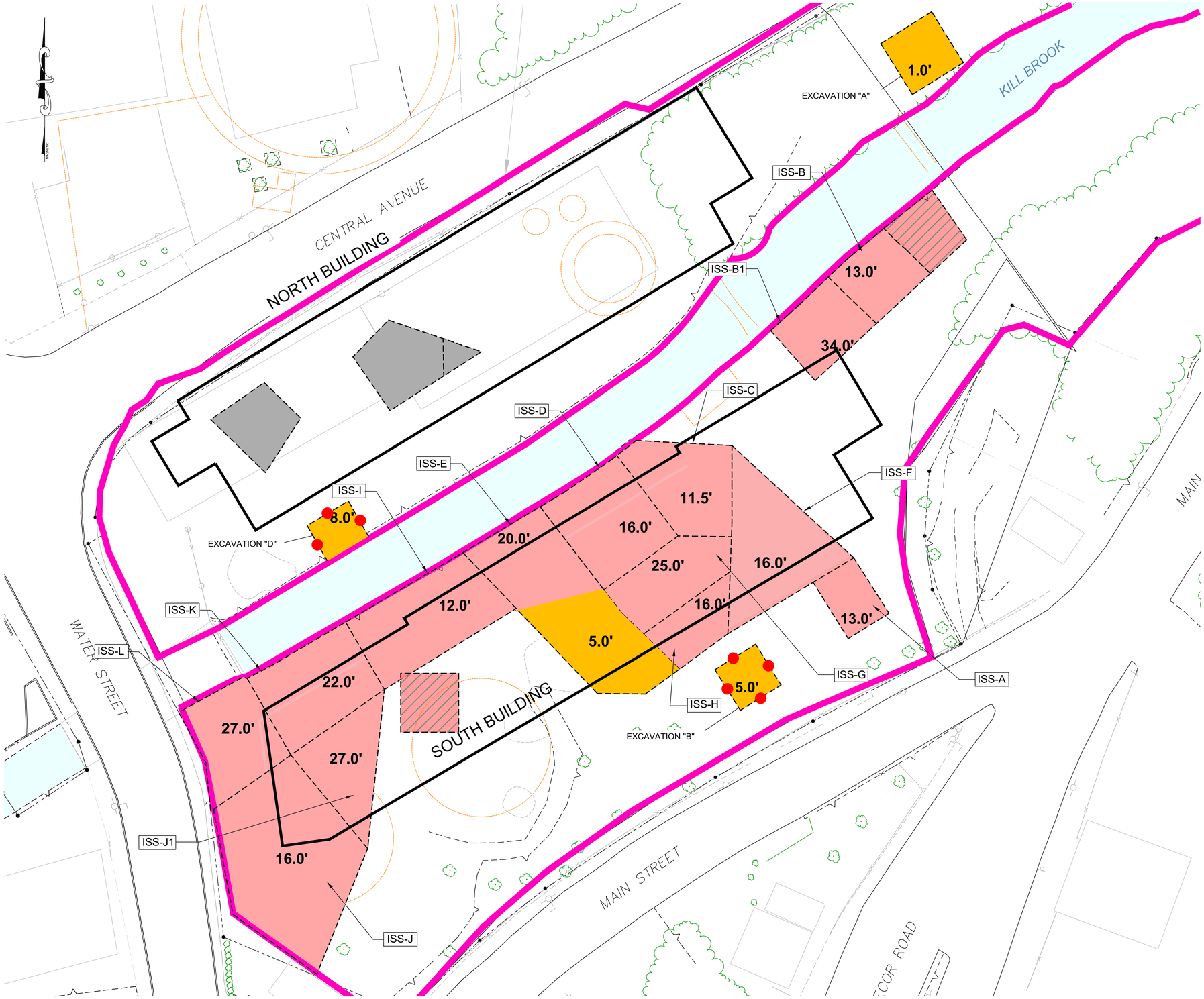
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

PROPOSED RESIDENTIAL DEVELOPMENT
OSSINING DPW SITE
OSSINING, NY

title: TREATMENT AREAS GEOLOGIC CROSS-SECTIONS

job no. 11498
drawing no.

FIG 1.1B



LEGEND:

- OPERABLE UNIT OUTLINE
- EXISTING STRUCTURE
- WATER
- TREE
- HISTORICAL MGP STRUCTURE
- 5.0' — EXCAVATION AREA AND DEPTH FROM EXISTING GRADE (FT)
- 16' — ISS TREATMENT AREA WITH INITIAL 5' EXCAVATION FROM EXISTING GRADE (FT)
- ISS TREATMENT AREA (DEPTH TO BE DETERMINED)
- TREATMENT AREA WITH PRODUCT RECOVERY WELLS
- BCP BOUNDARY
- PROPOSED DELINEATION SAMPLING LOCATIONS

SITE PLAN

Scale: 1"= 20'

0 10 20 40 60 80

REFERENCE:

1. FOUNDATION INFORMATION WAS TAKEN FROM STRUCTURAL PLANS PROVIDED BY CHRISTIE ENGINEERING, DATED 11/29/2023.
   CIVIL INFORMATION WAS TAKEN FROM CIVIL/SITE PLANS PROVIDED BY INSITE ENGINEERING DATED 12/22/23.

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.

© SESI CONSULTING ENGINEERS 2025
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

rev	date	description	by
			JMR

dwg by: KBV
chk by: CCM
scale: AS NOTED
date: 06/24/2025

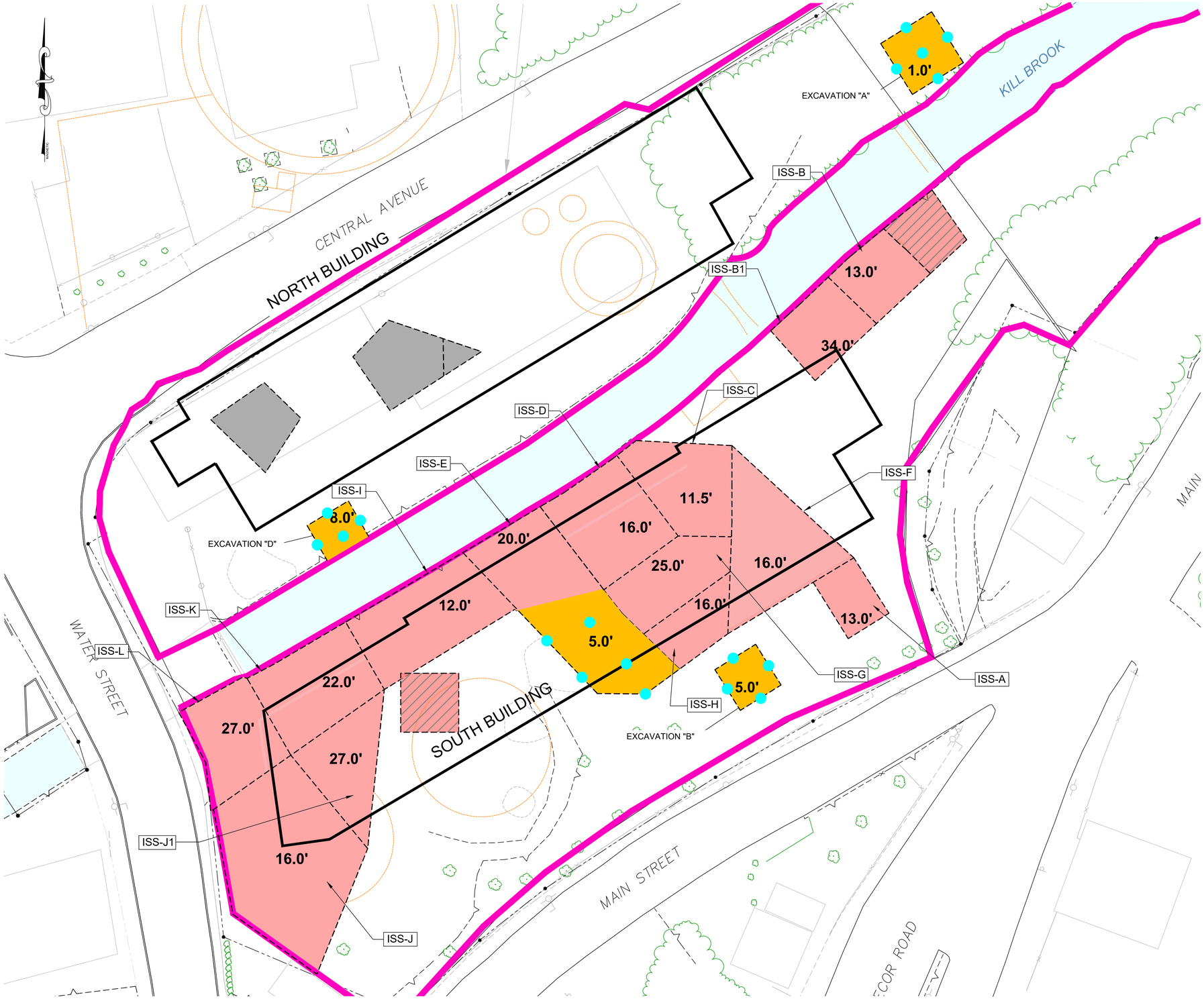
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

PROPOSED RESIDENTIAL DEVELOPMENT
OSSINING DPW SITE
OSSINING, NY

title: PROPOSED REMEDIAL DESIGN SAMPLE LOCATIONS

job no. 11498
drawing no. FIG 2.1

N:\ACAD\11498\CAD\ENVIRONMENTAL BASE\DWG\11498-DWG-EXCAVATION PLAN – PILOT STUDY – V2.DWG 09/24/25 05:58:36PM kim.vonderlieth, LAYOUT:POST EX SAMPS



LEGEND:

- OPERABLE UNIT OUTLINE
- EXISTING STRUCTURE
- WATER
- TREE
- HISTORICAL MGP STRUCTURE
- 5.0' — EXCAVATION AREA AND DEPTH FROM EXISTING GRADE (FT)
- 16' — ISS TREATMENT AREA WITH INITIAL 5' EXCAVATION FROM EXISTING GRADE (FT)
- ISS TREATMENT AREA (DEPTH TO BE DETERMINED)
- TREATMENT AREA WITH PRODUCT RECOVERY WELLS
- BCP BOUNDARY
- PROPOSED DELINEATION SAMPLING LOCATIONS

SITE PLAN

Scale: 1"= 20'

0 10 20 40 60 80

REFERENCE:

1. FOUNDATION INFORMATION WAS TAKEN FROM STRUCTURAL PLANS PROVIDED BY CHRISTIE ENGINEERING, DATED 11/29/2023. CIVIL INFORMATION WAS TAKEN FROM CIVIL/SITE PLANS PROVIDED BY INSITE ENGINEERING DATED 12/22/23.

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.

© SESI CONSULTING ENGINEERS 2025
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

rev	date	description	by
			JMR

dwg by: KBV
chk by: CCM
scale: AS NOTED
date: 06/24/2025

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

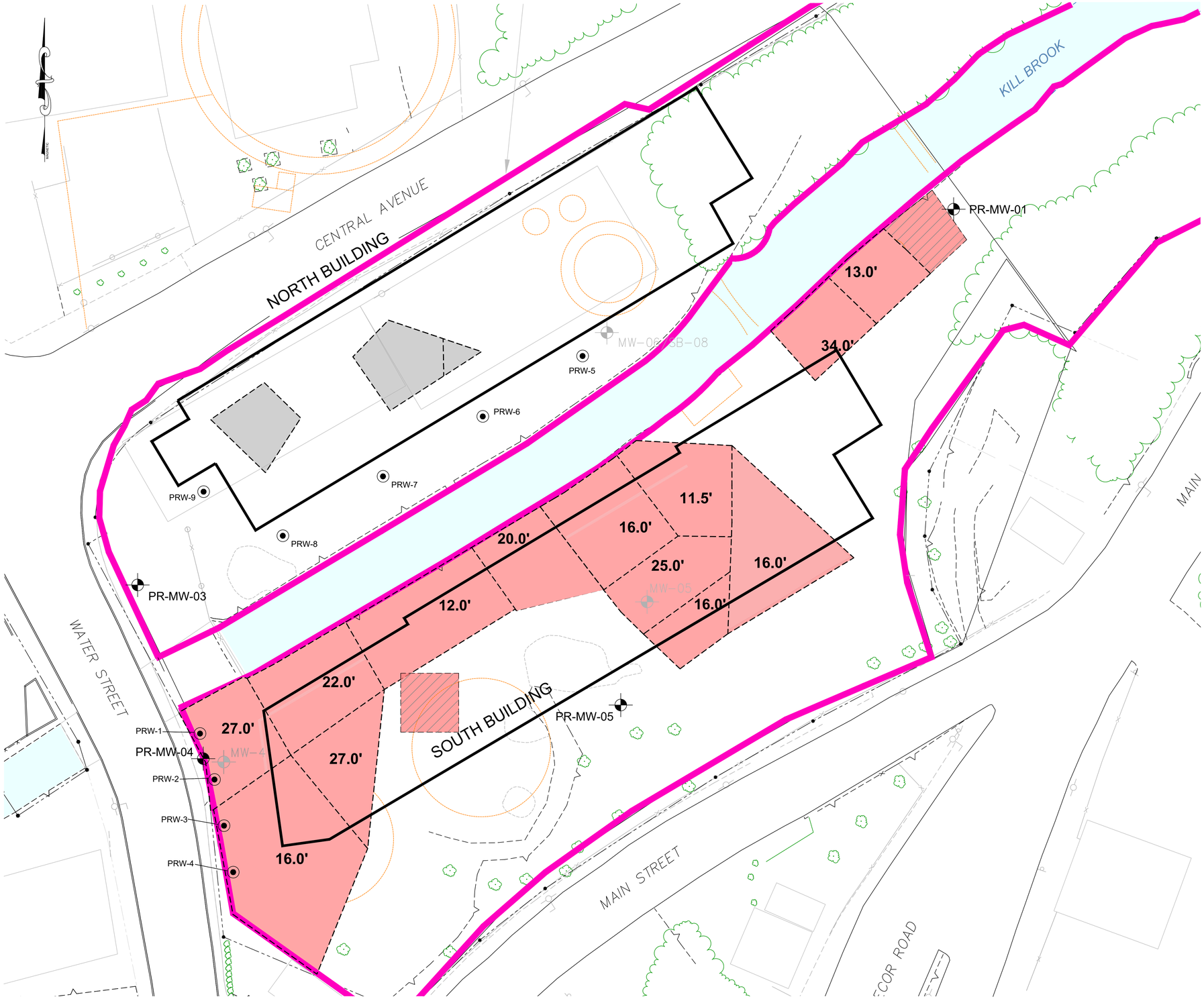
PROPOSED RESIDENTIAL DEVELOPMENT
OSSINING DPW SITE
OSSINING, NY

title: PROPOSED POST-EXCAVATION SAMPLE LOCATIONS

job no. 11498
drawing no.

FIG 3.2

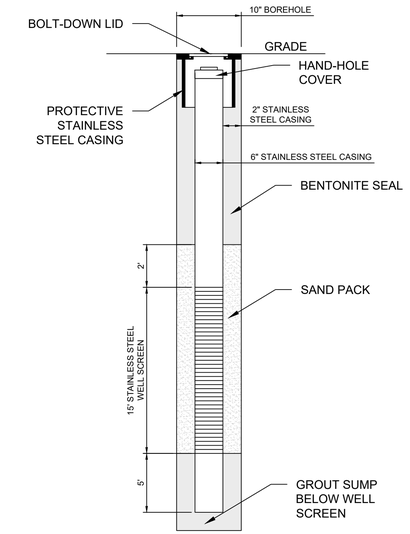
N:\CAD\11498\CAD\ENVIRONMENTAL BASE\VIEWS\11498-DWG EXCAVATION PLAN – PILOT STUDY – V2.DWG 09/24/25 05:55:16PM, kim.vonderlieth, LAYOUT: PROP. BORING LOC



LEGEND:

- OPERABLE UNIT OUTLINE
- EXISTING STRUCTURE
- WATER
- TREE
- HISTORICAL MGP STRUCTURE
- 16' — ISS TREATMENT AREA AND DEPTH FROM EXISTING GRADE (FT)
- ISS TREATMENT AREA (DEPTH TO BE DETERMINED)
- BCP BOUNDARY
- PR-MW-03 — POST REMEDIATION MONITORING WELLS - PROPOSED LOCATION
- PRW-6 — NAPL RECOVERY WELL - PROPOSED LOCATION
- TREATMENT AREA WITH PRODUCT RECOVERY WELLS

NOTES:
1. RECOVERY WELLS CURRENTLY WITHIN ANY ISS MONOLITH WILL BE RELOCATED TO THE WEST SHOULD THE ISS MONOLITH EXTEND TO BEDROCK FOR TREATMENT. NO RECOVERY WELLS SHALL BE ADVANCED WITHIN BEDROCK



RECOVERY WELL DETAIL
N.T.S.

SITE PLAN

Scale: 1"= 20'

0 10 20 40 60 80

REFERENCE:

1. FOUNDATION INFORMATION WAS TAKEN FROM STRUCTURAL PLANS PROVIDED BY CHRISTIE ENGINEERING, DATED 11/29/2023. CIVIL INFORMATION WAS TAKEN FROM CIVIL/SITE PLANS PROVIDED BY INSITE ENGINEERING DATED 12/22/23.

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.

© SESI CONSULTING ENGINEERS 2025
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

rev	date	description	by
			JMR

dwg by: AW
chk by: CCM
scale: AS NOTED
date: 05/23/2025

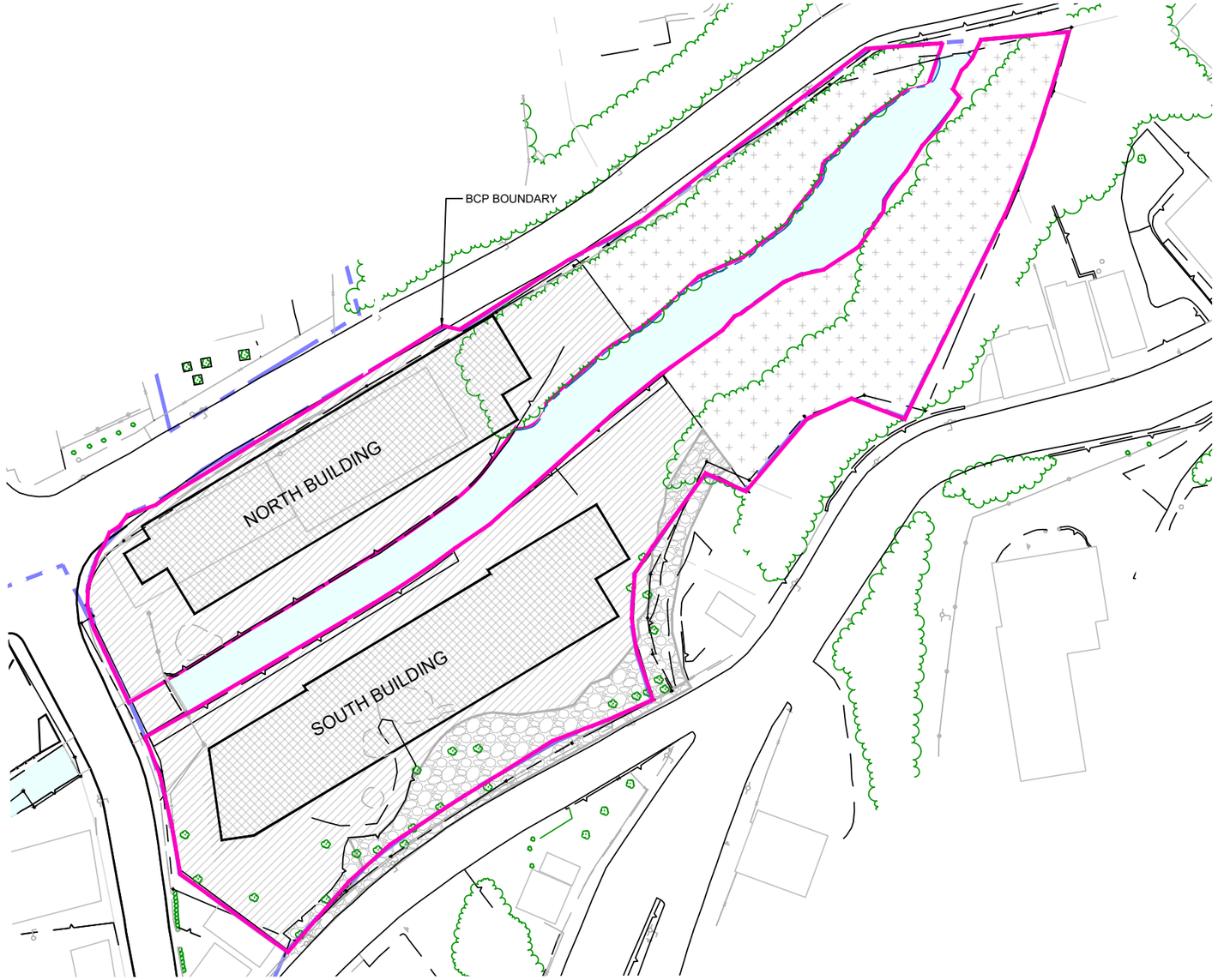
APG
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

PROPOSED RESIDENTIAL DEVELOPMENT
OSSINING DPW SITE
OSSINING, NY

title: PROPOSED WELL LOCATIONS

job no. 11498
drawing no. FIG 3.3

N:\ACAD\11498\CAD\ENVIRONMENTAL_BASE\DWG\11498_ENVBASE_NAPL_RECOVERY_REMEDIAL.DWG 05/23/25 05:45:18PM kim.vandeelen LAYOUT:ED-1



LEGEND:

- RETAINING WALL
- WATER
- BCP BOUNDARY
- EXISTING LANDSCAPE
- EXISTING ROCK
- BUILDING
- HARD SURFACE
- STREAM

SCALE: 1"=80'

0 80 160

© SESI CONSULTING ENGINEERS 2025
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS.

REFERENCE
SITE AND PROPOSED BUILDING LAYOUT TAKEN FROM "ALTERNATIVE ANALYSIS REPORT" PREPARED BY ARCADIC DESIGN AND CONSULTANCY.

dwg by: AW
chk by: FD
scale: AS NOTED
date: 06/20/2025

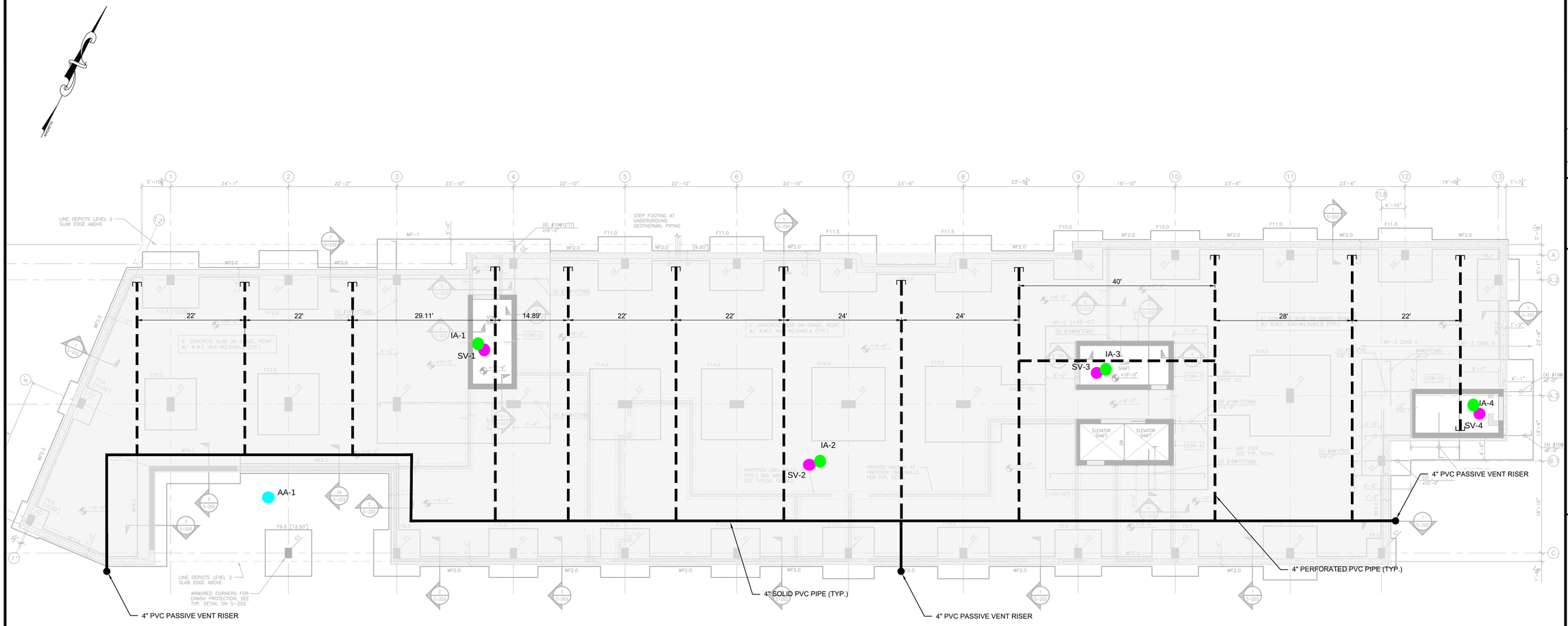
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

project: PROPOSED RESIDENTIAL DEVELOPMENT
OSSINING DPW SITE
OSSINING, NY

title: CAPPING PLAN

job no: 11498
drawing no: FIG-3.4

N:\ACAD\11498\CAD\ENVIRONMENTAL BASE\RDWP\11498.DWG_CAP_COVER.DWG 06/20/25 12:35:45PM, kim.vanderklein, LAYOUT:CAP PLAN



LEGEND:

- 4" PERFORATED PVC CONDUIT
- 4" SOLID PVC HEADER
- CAP
- 4" SOLID PVC PASSIVE VENT RISER
- VAPOR BARRIER AREA

- PROPOSED AMBIENT AIR SAMPLING LOCATION
- PROPOSED SUB-SLAB SOIL VAPOR SAMPLING LOCATION
- PROPOSED INDOOR AIR SAMPLING LOCATION

BUILDING AREA : 17,087 SQ. FT.

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.

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

REFERENCE:
1. STRUCTURAL DRAWINGS PROVIDED BY BEYER BLINDER BELLE, "FOUNDATION PLAN", DATED AUGUST 3, 2024.

Scale: 1"= 10'
0 5 10 20 30 40

rev	date	description	by

dwg by: APG
chk by: FD
scale: AS NOTED
date: 09/18/2024

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

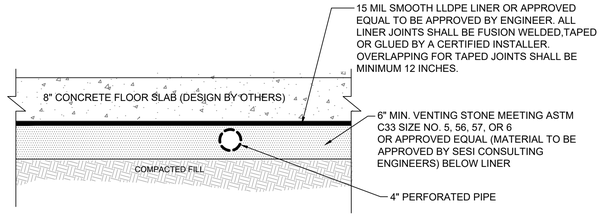
DRAFT

PROPOSED DEVELOPMENT
30 WATER STREET
OSSINING, NY 10562

title: DRAFT SSDS DESIGN

job no. 11498
drawing no. FIG 6.1

N:\CAD\11498\CAD\GEOTECHNICAL\VAPOR\11498.DWG VAPOR PLANS.DWG 10/1/24 02:15:36PM dstevens LAYOUT1 v=1

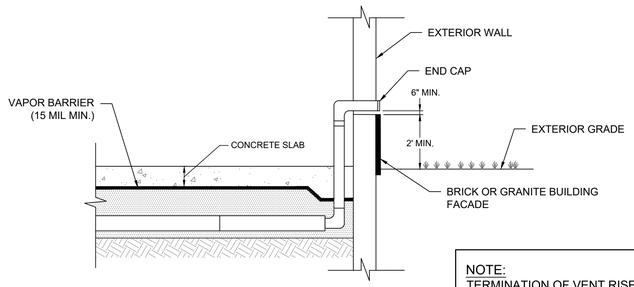


TYPICAL SUBSLAB VENTING SECTION

N.T.S.

NOTES:

1. VENTING STONE SHALL MEET ASTM C33 AGGREGATE SIZE NO. 5, 56, 57, 6, OR ALTERNATE GRADIATION APPROVED BY SESI CONSULTING ENGINEERS. MATERIAL SHOULD BE EVALUATED AND APPROVED BY SESI PRIOR TO INSTALLATION.
2. SESI SHALL INSPECT THE LINER PRIOR TO PLACEMENT OF CONCRETE. SMOKE TESTING SHALL BE PERFORMED ON A REGULAR BASIS DURING INSTALLATION. TRUCKS TRAFFIC OVER LINER SHALL BE KEPT TO A MINIMUM AND/ OR LINER SHALL BE INSTALLED IN SECTIONS TO MINIMIZE HEAVY TRAFFIC.



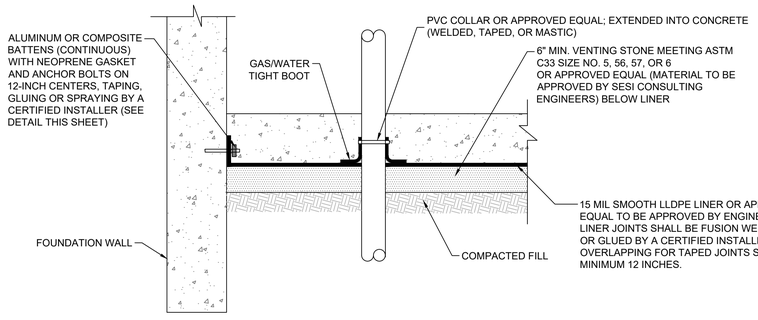
RISER VENT DETAIL

N.T.S.

NOTE:
TERMINATION OF VENT RISER SHALL BE 10' MIN. FROM ANY OPENABLE WINDOW OR DOOR AND 15' MIN. FROM ANY VENT SHAFT OF AIR INTAKE.

RISER NOTES:

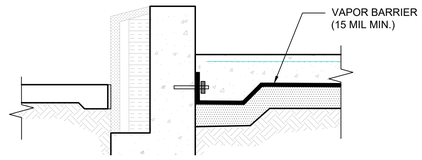
1. MAINTAIN WATER TIGHTNESS FOR THE THROUGH WALL AND FOUNDATION PENETRATION AS SHOWN IN THE "TYPICAL LINER CONNECTION @ PIPING PENETRATIONS DETAIL.
2. ELEVATION OF VENT RISER TERMINATION TO BE COORDINATED WITH ARCHITECTURAL DETAILS AND ELEVATIONS. MUST OCCUR ABOVE A MINIMUM 6" ABOVE TOP OF GRANITE AND/OR BRICK. REFER TO DETAIL 6/A-420 AND 1/A-421, SE-101 AND ALL BUILDING ELEVATIONS.



TYPICAL LINER CONNECTION
@ PIPING PENETRATIONS DETAIL

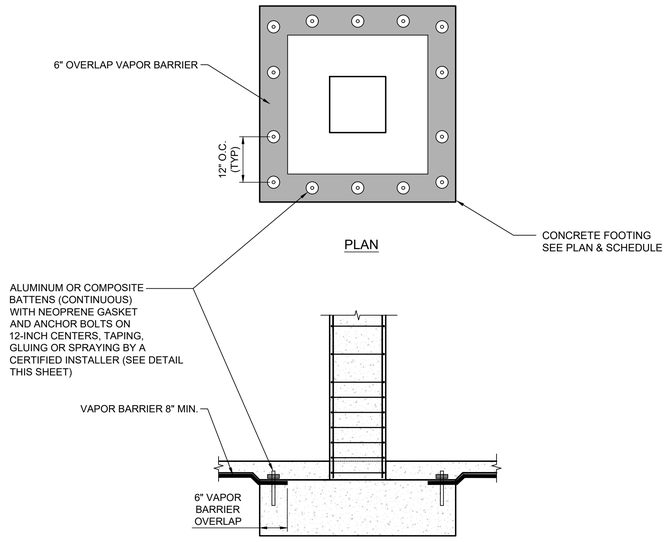
SCALE: N.T.S.

NOTE: REFER TO MECHANICAL DRAWINGS FOR LOCATIONS OF PIPE PENETRATIONS



TYPICAL SLAB -WALL VAPOR BARRIER
TERMINATION DETAIL

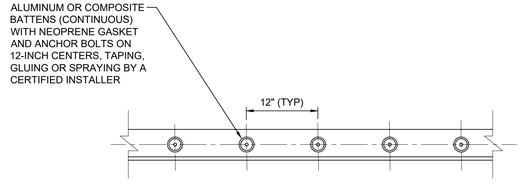
N.T.S.



PLAN

TYPICAL INSIDE FOUNDATION VAPOR BARRIER
TERMINATION DETAIL

N.T.S.



TYPICAL BATTEN DETAIL

SCALE: N.T.S.

GENERAL NOTES

1. THE PLANNED SUB-SLAB VAPOR INTRUSION (VI) MITIGATION SYSTEM WILL BE PLACED BENEATH THE CONCRETE SLAB. THE VI MITIGATION SYSTEM INCLUDES THE FOLLOWING ELEMENTS:
   a) VAPOR BARRIER - A 15 MIL LLDPE LINER OR APPROVED EQUAL WILL BE PLACED ABOVE THE PROPOSED VENTING LAYER.
   b) VENTING LAYER- A MINIMUM, 6-INCH VENTING STONE MEETING ASTM C33 SIZE NO. 5, 56, 57, 6 OR APPROVED EQUAL (MATERIAL TO BE APPROVED BY SESI CONSULTING ENGINEERS) SHALL BE PLACED BELOW THE VAPOR BARRIER.
   c) SUB-SLAB COLLECTION PIPING - A NETWORK OF VENTING PIPES (4" PVC pipe or J-DRAIN OR HDPE PIPE) WILL BE PLACED WITHIN THE VENTING LAYER. THE VENTING PIPES WILL BE MANIFOLDED AS SHOWN IN THE DRAWING.
   d) RISERS - CONVEYANCE RISER PIPES WILL BE INSTALLED FROM THE SUB-SLAB HEADER PIPES TO OUTSIDE THE BUILDING AS SHOWN IN THE DRAWING
   e) OPTIONAL BLOWER(S) - A BLOWER(S) CAN BE CONNECTED TO ANY OF THE RISERS IN THE FUTURE, IF NECESSARY, TO CONVERT THE PASSIVE-VENTED SYSTEM TO AN ACTIVE SYSTEM.
2. ALL CONDUITS AND/OR PIPE PENETRATIONS INTO THE SLAB SHOULD BE GAS TIGHT - REFER TO PIPE OR CONDUIT PENETRATION DETAIL ON THIS DRAWING
3. 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. IF NECESSARY, ADJUSTMENT OF THE VENT VALVES SHALL BE PERFORMED BY A COMPETENT AND RESPONSIBLE AGENT TO ENSURE ADEQUATE VENTING OF THE SUB-SLAB SPACE.
4. 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.
5. THE CONTRACTOR SHALL COORDINATE INSTALLATION OF VI MITIGATION SYSTEM WITH OTHER TRADES.
7. THESE PLANS AND DETAILS SHALL BE PROVIDED TO THE STRUCTURAL ENGINEER FOR REVIEW TO DETERMINE IF THE VAPOR MITIGATION SYSTEM WILL CONFLICT WITH THE INTEGRITY OF PROPOSED BUILDING SLAB AND/OR THE ACTIVIATION OF ANY PROPOSED CONTROL JOINTS.

VAPOR BARRIER INSTALLATION SPECIFICATIONS

1. UNROLL VAPOR BARRIER WITH THE LONGEST DIMENSION PARALLEL WITH THE DIRECTION OF THE POUR. VISUALLY INSPECT THE MATERIAL DURING INSTALLATION FOR IMPERFECTIONS AND MARK FAULTY OR SUSPECT AREAS.
   a. UNROLL VAPOR BARRIER USING METHODS THAT WILL NOT DAMAGE MATERIAL AND WILL PROTECT UNDERLYING SURFACE FROM DAMAGE.
   b. PERSONNEL WALKING ON VAPOR BARRIER SHALL NOT ENGAGE IN ACTIVITIES OR WEAR SHOES THAT COULD DAMAGE IT. SMOKING SHALL NOT BE PERMITTED ON THE BARRIER.
   c. DO NOT ALLOW VEHICULAR TRAFFIC DIRECTLY ON THE VAPOR BARRIER.
2. OVERLAP JOINTS IN MATERIAL SHALL BE THE MINIMUM OVERLAP REQUIRED BY THE MANUFACTURER OR 12" MINIMUM IN ORDER TO FUSION WELD OR TAPE THE MATERIALS. INSTALLATION AND FUSION WELDING OR TAPING OF THE LINER SHALL BE COMPLETED BY A CERTIFIED CONTRACTOR.
3. THE CONTRACTOR SHALL REPAIR DAMAGED AREAS BY CUTTING PATCHES OF VAPOR BARRIER, OVERLAPPING THEM ON THE DAMAGED AREA, AND FUSION WELDING OR TAPING THE PATCHES TO THE LINER.
4. SESI AND THE CONTRACTOR SHALL INSPECT ALL SEAMS, JOINTS, AND PENETRATIONS IN THE VAPOR BARRIER AND DOCUMENT INSPECTION REPORT. THE CONTRACTOR SHALL REPAIR OR REPLACE ALL DEFECTIVE SEAMS, JOINTS, AND PENETRATIONS PRIOR TO COVERING VAPOR BARRIER.
5. QA/QC TESTING SHALL BE COMPLETED DURING FUSION WELDING BY THE CERTIFIED CONTRACTOR TO DOCUMENT THAT ALL WELDS AND TAPE JOINTS ARE BEING COMPLETED CORRECTLY. THE QA/QC PACKAGE SHALL BE PROVIDED TO SESI FOLLOWING COMPLETION OF THE SYSTEM

TESTING AND INSPECTION DURING INSTALLATION

1. THE VAPOR BARRIER SHALL BE SMOKE TESTED FOR QUALITY ASSURANCE. SMOKE TESTING SHALL BE CONDUCTED BY SESI OR AN APPROVED VAPOR BARRIER APPLICATOR.
   a. THE VAPOR BARRIER SHALL BE VISUALLY INSPECTED. ANY APPARENT DEFICIENCIES AND/OR INSTALLATION PROBLEMS SHALL BE CORRECTED PRIOR TO SMOKE TESTING.
   b. THE DATE, TIME, AND TESTING REFERENCE AREA 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.)
   c. 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.
   d. 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.
   e. 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.
   f. 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.
   g. 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.
   h. 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
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.

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

rev	date	description	by

dwg by: APG
chk by: FD
scale: AS NOTED
date: 09/18/2024

DRAFT

PROPOSED DEVELOPMENT
30 WATER STREET
OSSINING, NY 10562

title: DRAFT SSDS DESIGN

job no. 11498
drawing no. FIG 6.1

2 of 2

A:\ACAD\11498\CAD\GEOTECHNICAL\VAPOR\11498 SHEETS.DWG 10/31/24 09:15:04PM dale.ward LAYOUT:V-2

Tables

Table 3.2 - Target Survey Depth

Column A	Column B	Column C	Column D	Column E	Column F	Column G		Column H
Mixing Cell	Existing Ground Elevation NAVD88 Per the February 2025 Survey	Target Mix Depth (RAWP +1 ft)	Target Mix Bottom Elevation Calculated Column B - Column C	Ground Elevation Post 5-ft Excavation NAVD88 Measured by Licensed Surveyor	Treatment Depth* Column E - Column D	Ground elevation Prior to Coring NAVD88 Measured by Licensed Surveyor		Target Coring Depth Calculated Column G - Column D
	ft - amsl	ft-bgs	ft-amsl	ft-amsl	ft - bgs	ft-amsl	Date	ft bgs
A	22.6	14	8.6					
B	16.5	14	2.5					
B1-1	16.5	35	-18.5					
B1-2	16.4	35	-18.6					
C	14.5	12.5	2					
C1	14.5	12.5	2					
D	14.5	17	-2.5					
E-1	13.8	21	-7.2					
E-2	13.8	21	-7.2					
F-1	16.1	17	-0.9					
F-2	17.1	17	0.1					
G-1	16.6	26	-9.4					
G-2	16.7	26	-9.3					
I	13.8	13	0.8					
I1-1	13.8	13	0.8					
I1-2	14.1	13	1.1					
J-1	13.1	17	-3.9					
J-2	16.5	17	-0.5					
J-3	16.5	17	-0.5					
J-4	18.2	17	1.2					
J1-1	14.1	28	-13.9					
J1-2	16.8	28	-11.2					
K-1	12.3	23	-10.7					
K-2	14.1	23	-8.9					
K-3	14.1	23	-8.9					
K-4	14.1	23	-8.9					
L-1	11.9	28	-16.1					
L-2	12.2	28	-15.8					

Table 3.4. ISS Pilot Coring Observations

Date	Location	Existing Ground Elevation NAVD88 Per the February 2025 Survey (ft-amsl)	Proposed Depth of Treatment Depth (ft-bgs)	Proposed Elevation of Treatment (ft-amsl)*	Core Run / Spoon	Existing Ground Elevation Before Coring (ft-amsl)	Core Depth (ft-bgs)	Core Depth Elevation** (ft-amsl)	Recovery	Treatment Recovery	Description	Core Photos
3/10/2025	Pilot-H	17.50	16	1.50	R1	17.13	4.5-6.5	12.63-10.63	72.5%		0-0.8.4": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor 8.4:-13.2": Same as above; however loose, (possible mechanical break) 13.2-14.4": Schist 14.4-17.4": Brick	
3/11/2025	Pilot-H	17.50	16	1.50	R2	17.13	6.5-11.5	10.63-5.63	91.8%		0-3": Brick 3-55": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor	
3/11/2025	Pilot-H	17.50	16	1.50	R3	17.13	11.5-16.5	5.63-0.63	47.5%	86.1% Calculated for the first 33.12 inches of the core	0-28.5": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor	
3/11/2025	Pilot-H	17.50	16	1.50	Spoon	17.13	16.5-18.5	0.63 to -1.37	75.0%		Brown Coarse to fine Sand and Clayey Silt, little medium to fine Gravel, no NAPL, staining, or sheen observed	
3/11/2025	Pilot-D (SE)	14.5	16	-1.50	R1	15.01	4.5-6.5	10.51-8.51	86.5%		0-20.75": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor	
3/11/2025	Pilot-D (SE)	14.5	16	-1.50	R2	15.01	6.5-11.5	8.51-3.51	90.0%		0-54": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor	
3/11/2025	Pilot-D (SE)	14.5	16	-1.50	R3	15.01	11.5-16.5	3.51 to -1.49	70.0%	88% recover based on 3.96' of the core in the treatment zone	0-24": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor 24-42": Dark gray/gray stained coarse to fine GRAVEL, trace coarse to fine Sand, trace Silt with cobbles	
3/11/2025	Pilot-D (SE)	14.5	16	-1.50	R4	15.01	16.5-17.5	-1.49 to - 2.49	0.0%		No recovery	
3/11/2025	Pilot-D (SE)	14.5	16	-1.50	Spoon 1	15.01	17.5-19.5	-2.49 to - 4.49	0.0%		No recovery	
3/11/2025	Pilot-D (SE)	14.5	16	-1.50	Spoon 2	15.01	19.5-21.5	-4.49 to - 6.49	54.2%		0-13": Dark gray/gray stained coarse to fine Gravel, some coarse to fine Sand, some Silt, with sheen, blebs, light odor	

Table 3.4. ISS Pilot Coring Observations

Date	Location	Existing Ground Elevation NAVD88 Per the February 2025 Survey (ft-amsl)	Proposed Depth of Treatment Depth (ft-bgs)	Proposed Elevation of Treatment (ft-amsl)*	Core Run / Spoon	Existing Ground Elevation Before Coring (ft-amsl)	Core Depth (ft-bgs)	Core Depth Elevation** (ft-amsl)	Recovery	Treatment Recovery	Description	Core Photos
3/12/2025	Pilot-D (NW)	14.5	16	-1.50	R1	14.61	4.5-6.5	10.11-8.11	66.7%		0-16": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with brick and coal fragments	
3/12/2025	Pilot-D (NW)	14.5	16	-1.50	R2	14.61	6.5-11.5	8.11-3.11	71.3%		0-42.75": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with brick and wood fragments	
3/12/2025	Pilot-D (NW)	14.5	16	-1.50	R3	14.61	11.5-16.5	3.11 to -1.89	54.6%	60.1% (Calculated for top 54.12 inches of the core in the treated area)	0-8": Gneiss 8-27.5": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with brick and wood fragments 27.5-32.75": Gneiss	
3/12/2025	Pilot-D (NW)	14.5	16	-1.50	Spoon	14.61	16.5-18.5	-1.89 to -3.89	52.1%		0-3": Coarse to fine Gravel, little sand, trace Silt with sheen 3-9.5": Dark brown/ dark gray stained coarse to fine SAND, some coarse to fine Gravel, little Silt 9.5-12.5": Coarse to fine Gravel, little sand, trace Silt with sheen	
3/13/2025	Pilot-D (NE)	14.5	16	-1.50	R1	14.758	11.5-16.5	3.258 to -1.742	70.0%		"0-11": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with brick and metal fragments" 11-33": Granite 35-42": Dark brown coated coarse to fine Sand, and Clayey Silt, little coarse to fine Gravel, with light odor	
3/13/2025	Pilot-J(A) (West)	16.8	16	0.80	R1	16.388	4-6	12.388-10.388	85.4%		0-20.5: Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with wood at top of sample	

Table 3.4. ISS Pilot Coring Observations

Date	Location	Existing Ground Elevation NAVD88 Per the February 2025 Survey (ft-amsl)	Proposed Depth of Treatment Depth (ft-bgs)	Proposed Elevation of Treatment (ft-amsl)*	Core Run / Spoon	Existing Ground Elevation Before Coring (ft-amsl)	Core Depth (ft-bgs)	Core Depth Elevation** (ft-amsl)	Recovery	Treatment Recovery	Description	Core Photos
3/13/2025	Pilot-J(A) (West)	16.8	16	0.80	R2	16.388	6-11	10.388-5.388	99.2%		0-2": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor 2-5": Dark gray loose homogeneous ISS Mix, no NAPL observed, light odor (possible mechanical/grinding break) 5-16": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with metal, brick, and concrete 16-19": Dark gray stained loose homogeneous ISS Mix, no NAPL observed, light odor 19-28": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with brick 28-59.9": Fragmented gneiss, concrete, brick with portions of dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor	 
3/13/2025	Pilot-J(A) (West)	16.8	16	0.80	R3	16.388	11-16	5.388-0.388	38.3%	44.7% Calculated for the top 51.456 inches of the core in the treated area	0-23": Fragmented brick and rock Loose homogenous ISS Mix, no NAPL, light odor observed from 4 to 6"	
3/17/2025	Pilot-J(A) (East)	16.8	16	0.80	R1	16.344	4-6.5	12.344-9.844	54.2%		0-13": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor with wood fragments	
3/17/2025	Pilot-J(A) (East)	16.8	16	0.80	R2	16.344	6.5-11.5	9.844-4.844	97.5%		0-36": Dark gray solidified homogeneous ISS Mix, no NAPL observed, light odor 36-55": Fragmented Granite, schist, with fragmented homogeneous ISS Mix, no NAPL observed, light odor with metal	 
3/17/2025	Pilot-J(A) (East)	16.8	16	0.80	R3	16.344	11.5-16.5	4.844 to -0.156	23.3%	28.8% Calculated for the top 48.528 inches of the core in the treated area	0-8": Fragmented homogeneous ISS Mix, NAPL coating observed at 6", with odor, with metal 8-14": Dark gray coated coarse to fine GRAVEL, some coarse to fine Sand, little Silt with brick, metal debris	
5/12/2025	Pilot-C	16.1	11.5	4.60	R1	15.74	2.5-5.5	13.24 to 10.24	48.6%		0-17.5" Dark gray homogeneous solid ISS mix with brick fragments, light odor, and light sheen No free product observed	

Table 3.4. ISS Pilot Coring Observations

Date	Location	Existing Ground Elevation NAVD88 Per the February 2025 Survey (ft-amsl)	Proposed Depth of Treatment Depth (ft-bgs)	Proposed Elevation of Treatment (ft-amsl)*	Core Run / Spoon	Existing Ground Elevation Before Coring (ft-amsl)	Core Depth (ft-bgs)	Core Depth Elevation** (ft-amsl)	Recovery	Treatment Recovery	Description	Core Photos
5/12/2025	Pilot-C	16.1	11.5	4.60	R2	15.74	5.5-10.0	10.24 to 5.74	81.5%		0-44" Dark gray homogeneous solid ISS mix with brick fragments, light odor, and light sheen No free product observed	
5/13/2025	Pilot-C	16.1	11.5	4.60	R3	15.74	10.0-13.5	5.74 to 2.24	61.9%		0-26" Dark gray homogeneous solid ISS mix with brick fragments, light odor, and light sheen No free product observed	
5/13/2025	Pilot-C	16.1	11.5	4.60	Spoon	15.74	13.5-15.5	2.24 to 0.24	45.8%		0-11" Dark gray stained coarse to fine Sand, some medium to fine Gravel, some Silt with light sheen and light odor. No free product observed	

* Calculated as follows: [Pre-Cut Elevation (ft - amsl)] - [Proposed Depth of Treatment (ft bgs)]

** Calculated as follows: [Existing Ground Elevation Before coring(ft-amsl)] - [Core Depth (ft bgs)]

Appendix A:

Site Permits and Facility Approvals

P.O. Box 996 • Pleasantville, NJ, 08232-0996
street address: 6700 Delilah Road, Egg Harbor Twp., NJ, 08234-5623
609.272.6950 • vvww.acua.com • info@acua.com

March 14, 2025

Aqua-Tex Transport
PO Box 1204
Hammonton, NJ 08037
Attn: Betty Jo Torrissi

Re: ACUA Landfill Amendment Acceptance ID-27 Soil; 30 Water Street, Ossining, NY – 3000 ton

Dear Mrs. Torrissi:

The Atlantic County Utilities Authority (ACUA) is willing to accept an estimated 3,000 tons of non-hazardous soil that will be generated at the project site:30 Water Street, 30 Water Street, Ossining, NY

This acceptance is based upon review of an emailed landfill amendment acceptance request that was submitted by Aqua-Tex Transport to the ACUA on March 12, 2025, which included material characterization attachments that provided soil laboratory data and a certification that the material is not hazardous based upon characterization.

The material to be delivered from the subject site will be used as alternative daily cover at the ACUA landfill and must conform to the non-hazardous characterization that was provided. All deliveries are to be scheduled Monday through Friday only. When ready to deliver the material please arrange scheduling by contacting me by email at snutile@acua.com or by phone at 609-272-6947. If you have any other questions or need additional information, please contact me.

Sincerely,

Sam Nutile
ACUA Solid Waste Manager

c: Greg Seher, ACUA, Director of Solid Waste
Gary Conover, ACUA, Vice President of Solid Waste

The Atlantic County Utilities Authority is responsible for enhancing the quality of life through the protection of waters and lands from pollution by providing responsible waste management services. The Authority is an environmental leader and will continue to use new technologies, innovations and employee ideas to provide the highest quality and most cost effective environmental services.

Docusign Envelope ID: 99C8C846-F0AD-4DDA-A981-2A529C86F365

Non-Hazardous WAM Approval

Requested Management Facility: Fairless Landfill

Profile Number: 493917PAE

Waste Acceptance Expiration Date: 02/19/2026

Common Name: Contaminated Soil

WM Regulatory Volume Limit: 6000 Tons ☐ NA

APPROVAL DETAILS

Approval Decision: ☑ Approved ☐ Not Approved

Profile Renewal: ☐ Yes ☑ No

Management Method: Direct Landfill

Generator Name: WB 30 Water Street, LLC

Profile Expiration Date: 02/19/2026

Periodic Testing Due Date: _____ ☑ NA

Other Due Date: _____ ☑ NA (Specify) _____

Management Facility Precautions, Special Handling Procedures or Limitation on approval:

Generator Conditions

- Shall not contain free liquids.
- Waste manifest or applicable shipping document must accompany load.
- The waste profile number must appear on the shipping papers.

WM Authorization Name: Valerie David

Signed by: Valerie David 3149E3A534564DE...

Title: Waste Approval Manager

WM Authorization Signature: _____ Date: 02/20/2025

Agency Authorization (if Required): _____ Date: _____

©2018 Waste Management

Docusign Envelope ID: 2C931282-7669-48C0-9D2F-04DDDCC300E1

WASTE MANAGEMENT

Hazardous WAM Approval

Requested Management Facility: CWM Emelle (Hazardous Waste Facility)

Profile Number: 412694AL Waste Approval Expiration Date: 03/06/2027

APPROVAL DETAILS

Hazardous Classification: Nonhazardous Profile Renewal: ☐ Yes ☑ No

Management Method: Direct Landfill

Generator Name: WBP 30 Water St

Material Name: Rail MGP Contaminated Soil

Management Facility Precautions, Special Handling Procedures or Limitation on approval:

Generator Conditions

- Absorbent materials for landfill must be made of non-biodegradable material, as defined by EPA and applicable State regulations
- No free liquids
- Must meet applicable OSHA, DOT packaging, labeling, shipping and manifesting requirements per 49 CFR.
- Chemical Waste Management, Inc has all the necessary permits and licenses for the waste that has been characterized and identified by this approved profile.
- The WM decision is based on specific parameters defined within this waste profile. Waste received that is non-conforming in any way will need to be re-evaluated and managed in accordance with all RCRA and State regulations. If alternative treatment is not available and the waste cannot be managed it will be rejected back to the generator.
- AL - Modifications to existing profiles due to discrepancies and/or process changes will be subject to the ADEM modification fee.
- AL - Once approved by the Waste Management laboratory this wastestream was submitted to the Alabama Department of Environmental Management for issuance of an ADEM number. This process can take up to 5 days and is required prior to scheduling this profile for disposal

Approved in bulk only.

Reviewed/approved analysis -

ALPHA: TOTAL VOC, SVOC, METALS, HERB, PEST, PCBS

RCI, TPH 6.14.24 (L2432093: WC-MGP-4A-VOC (4.5-5),

WC-MGP-4-COMP (0-5))

WM Authorization Name: Lisa Acker Title: Waste Approval Manager

WM Authorization Signature: Signed by: Lisa Acker 0237D101F002428 Date: 03/06/2025

Agency Authorization (if Required): Date:

Last Revised April 11, 2014
©2014 Waste Management

VILLAGE OF OSSINING
BUILDING DEPARTMENT
John Paul Rodrigues Ossining Operations Center
101 Route 9A PO BOX 1166
Ossining, NY 10562
(914) 941-3199

BUILDING PERMIT

THIS PERMIT SHALL BE VISIBLY DISPLAYED AT THE WORK SITE AND WILL REMAIN VISIBLE UNTIL THE PROJECT HAS BEEN COMPLETED.

Date Issued: **10/11/2024** Expires: **04/11/2026** Permit Number: **B-24-3556**
Location: **Water St** Status: **OPEN**
SBL: **89.19-6-26** Est.Cost: **$39275258**
Permission is hereby granted to Occu Class: **COMMERCIAL**
Owner: **WB 30 Water Street LLC**
Address: **480 Bedford Rd**
Chappaqua, NY 10514
Scope of Work: **Construction of an 8-story mixed use building including 109 residential units and a 4 story parking garage along with site improvements.**
89.19-6-26, 89.19-6-27, 89.19-6-28, 89.19-6-29.

Current Use: **COMMERCIAL**
Intended Use: **COMMERCIAL**

The above, is subject to compliance with all laws, ordinances, rules and regulations relating to such work, and to the requirements and directions of the Building Inspector with reference thereto.
This permit is not transferable and may be revoked for any default with respect to its conditions.
This permit and stamped plans must be present at site of work whenever the same is in progress and must be exhibited to any person on demand.
This permit is issued subject to field inspections, approved plans, and notations.

ENGINEER **JHW Plan Review Services LLC**
ADDRESS: **832 Park Rd #40 , Pleasant Grove, AL 35127**

ARCHITECT **Beyer Blinder Belle Architects & Planners LLP**
ADDRESS: **120 Broadway, 20th Floor , New York, NY 10271**

ENGINEER **Insite Engineering, Surveying & Landscape Architecture, PC**
ADDRESS: **3 Garrett Place , Carmel, NY 10512**

ENGINEER **Richard Christie**
ADDRESS: **66 York St 2nd Fl , Jersey City, NJ 07302**

ENGINEER **Dmitriy Morozov**
ADDRESS: **1460 Broadway , New York, NY 10036**

COMPANY **Griffon Construction LLC**
ADDRESS: **480 Bedford Rd , Chappaqua, NY 10514**

NOTES:
Fee Paid: **$**

CORPORATION OF OSSINING OSSINING BUILDING DEPT. CERTIFIED NEW YORK

Joseph Agostinelli- Building Inspector

VILLAGE OF OSSINING
BUILDING DEPARTMENT
John Paul Rodrigues Ossining Operations Center
101 Route 9A PO BOX 1166
Ossining, NY 10562
(914) 941-3199

BUILDING PERMIT

THIS PERMIT SHALL BE VISIBLY DISPLAYED AT THE WORK SITE AND WILL REMAIN VISIBLE UNTIL THE PROJECT HAS BEEN COMPLETED.

Date Issued: **10/11/2024** Expires: **04/11/2026** Permit Number: **B-24-3553**
Location: **Central Ave** Status: **OPEN**
SBL: **89.19-6-27** Est.Cost: **$39275258**
Permission is hereby granted to Occu Class: **COMMERCIAL**
Owner: **WB 30 Water Street LLC**
Address: **480 Bedford Rd**

Chappaqua, NY 10514
Scope of Work: **Construction of an 8-story mixed use building including 109 residential units and a 4 story parking garage along with site improvements.**
89.19-6-26, 89.19-6-27, 89.19-6-28, 89.19-6-29

Current Use: **COMMERCIAL**
Intended Use: **COMMERCIAL**

The above, is subject to compliance with all laws, ordinances, rules and regulations relating to such work, and to the requirements and directions of the Building Inspector with reference thereto.
This permit is not transferable and may be revoked for any default with respect to its conditions.
This permit and stamped plans must be present at site of work whenever the same is in progress and must be exhibited to any person on demand.
This permit is issued subject to field inspections, approved plans, and notations.

ARCHITECT **Beyer Blinder Belle Architects & Planners LLP**
ADDRESS: **120 Broadway, 20th Floor , New York, NY 10271**

ENGINEER **Insite Engineering, Surveying & Landscape Architecture, PC**
ADDRESS: **3 Garrett Place , Carmel, NY 10512**

ENGINEER **Richard Christie**
ADDRESS: **66 York St 2nd Fl , Jersey City, NJ 07302**

ENGINEER **Dmitriy Morozov**
ADDRESS: **1460 Broadway , New York, NY 10036**

COMPANY **Griffon Construction LLC**
ADDRESS: **480 Bedford Rd , Chappaqua, NY 10514**

NOTES:
Fee Paid: **$**

CORPORATION OF OSSINING NEW YORK
OSSINING
BUILDING DEPT.
CERTIFIED

Joseph Agostinelli- Building Inspector

VILLAGE OF OSSINING
BUILDING DEPARTMENT
John Paul Rodrigues Ossining Operations Center
101 Route 9A PO BOX 1166
Ossining, NY 10562
(914) 941-3199

BUILDING PERMIT

THIS PERMIT SHALL BE VISIBLY DISPLAYED AT THE WORK SITE AND WILL REMAIN VISIBLE UNTIL THE PROJECT HAS BEEN COMPLETED.

Date Issued: **10/11/2024** Expires: **04/11/2026** Permit Number: **B-24-3554**
Location: **Water St** Status: **OPEN**
SBL: **89.19-6-28** Est.Cost: **$39275258**
Permission is hereby granted to Occu Class: **COMMERCIAL**
Owner: **WB 30 Water Street LLC**
Address: **480 Bedford Rd**
Chappaqua, NY 10514
Scope of Work: **Construction of an 8-story mixed use building including 109 residential units and a 4 story parking garage along with site improvements.**
89.19-6-26, 89.19-6-27, 89.19-6-28, 89.19-6-29

Current Use: **COMMERCIAL**
Intended Use: **COMMERCIAL**

The above, is subject to compliance with all laws, ordinances, rules and regulations relating to such work, and to the requirements and directions of the Building Inspector with reference thereto.
This permit is not transferable and may be revoked for any default with respect to its conditions.
This permit and stamped plans must be present at site of work whenever the same is in progress and must be exhibited to any person on demand.
This permit is issued subject to field inspections, approved plans, and notations.

ENGINEER **Beyer Blinder Belle Architects & Planners LLP**
ADDRESS: **120 Broadway, 20th Floor , New York, NY 10271**

ENGINEER **Insite Engineering, Surveying & Landscape Architecture, PC**
ADDRESS: **3 Garrett Place , Carmel, NY 10512**

ENGINEER **Richard Christie**
ADDRESS: **66 York St 2nd Fl , Jersey City, NJ 07302**

ENGINEER **Dmitriy Morozov**
ADDRESS: **1460 Broadway , New York, NY 10036**

COMPANY **Griffon Construction LLC**
ADDRESS: **480 Bedford Rd , Chappaqua, NY 10514**

NOTES:
Fee Paid: **$**

CORPORATION OF OSSINING OSSINING BUILDING DEPT. CERTIFIED NEW YORK

Joseph Agostinelli- Building Inspector

VILLAGE OF OSSINING
BUILDING DEPARTMENT
John Paul Rodrigues Ossining Operations Center
101 Route 9A PO BOX 1166
Ossining, NY 10562
(914) 941-3199

BUILDING PERMIT

THIS PERMIT SHALL BE VISIBLY DISPLAYED AT THE WORK SITE AND WILL REMAIN VISIBLE UNTIL THE PROJECT HAS BEEN COMPLETED.

Date Issued: **10/11/2024** Expires: **04/11/2026** Permit Number: **B-24-3555**
Location: **Central Ave** Status: **OPEN**
SBL: **89.19-6-29** Est.Cost: **$39275258**
Permission is hereby granted to Occu Class: **COMMERCIAL**
Owner: **WB 30 Water Street LLC**
Address: **480 Bedford Rd**

Chappaqua, NY 10514
Scope of Work: **Construction of an 8-story mixed use building including 109 residential units and a 4 story parking garage along with site improvements.**
89.19-6-26, 89.19-6-27, 89.19-6-28, 89.19-6-29

Current Use: **COMMERCIAL**
Intended Use: **COMMERCIAL**

The above, is subject to compliance with all laws, ordinances, rules and regulations relating to such work, and to the requirements and directions of the Building Inspector with reference thereto.
This permit is not transferable and may be revoked for any default with respect to its conditions.
This permit and stamped plans must be present at site of work whenever the same is in progress and must be exhibited to any person on demand.
This permit is issued subject to field inspections, approved plans, and notations.

ARCHITECT **Beyer Blinder Belle Architects & Planners LLP**
ADDRESS: **120 Broadway, 20th Floor , New York, NY 10271**

ENGINEER **Insite Engineering, Surveying & Landscape Architecture, PC**
ADDRESS: **3 Garrett Place , Carmel, NY 10512**

ENGINEER **Richard Christie**
ADDRESS: **66 York St 2nd Fl , Jersey City, NJ 07302**

ENGINEER **Dmitriy Morozov**
ADDRESS: **1460 Broadway , New York, NY 10036**

COMPANY **Griffon Construction LLC**
ADDRESS: **480 Bedford Rd , Chappaqua, NY 10514**

NOTES:
Fee Paid: **$**

CORPORATION OF OSSINING NEW YORK
OSSINING
BUILDING DEPT.
CERTIFIED

Joseph Agostinelli

Joseph Agostinelli- Building Inspector

VILLAGE OF OSSINING
BUILDING DEPARTMENT
John Paul Rodrigues Ossining Operations Center
101 Route 9A PO BOX 1166
Ossining, NY 10562
(914) 941-3199
Website: www.villageofossining.org

12/26/2024

INSPECTION RESULT

INSPECTION STATUS: PASSED

WB 30 Water Street LLC
480 Bedford Rd

Chappaqua, NY, 10514

Inspection Date: 12/26/2024
Permit#: D-24-0026

Re: Inspection at:

Record Owner of Title: WB 30 Water Street LLC
RE: Central Ave
SBL: 89.19-6-27

TO WHOM IT MAY CONCERN

Please be advised that an Inspection was conducted at the above location on the date specified.

As a Result of the most recent Inspection, I have the following comments:

Inspection Type: Demo
Results: Passed demolition inspection for the complete demolition of the former DPW building. All debris have been removed off the premises.

Andrew Torres
Assistant Building Inspector

If you have any questions, do not hesitate to contact me.

Please be advised of the following Village of Ossining Building Department Policy:

Except in the instance of a legalization, a Certified Letter will not be accepted in lieu of performing required inspections.

If there is any deviation from the current approved plans from the Building Department, it will lead to an automatic failure of scheduled inspection and/or possible Stop Work Order.

Permitted Hours of Construction: Monday through Friday 7:30 am to 8:00 pm Except Holidays; Saturday 9:00 am to 5:00 pm Except Holidays; Sunday: No Construction Permitted

VILLAGE OF OSSINING
BUILDING DEPARTMENT
John Paul Rodrigues Ossining Operations Center
101 Route 9A PO BOX 1166
Ossining, NY 10562
(914) 941-3199
Website: www.villageofossining.org

12/26/2024

Please be advised of the following Village of Ossining Building Department Policy:

Except in the instance of a legalization, a Certified Letter will not be accepted in lieu of performing required inspections.

If there is any deviation from the current approved plans from the Building Department, it will lead to an automatic failure of scheduled inspection and/or possible Stop Work Order.

Permitted Hours of Construction: Monday through Friday 7:30 am to 8:00 pm Except Holidays; Saturday 9:00 am to 5:00 pm Except Holidays; Sunday: No Construction Permitted

STATE OF NEW YORK
DEPARTMENT OF STATE
ONE COMMERCE PLAZA
99 WASHINGTON AVENUE
ALBANY, NY 12231-0001
HTTPS://DOS.NY.GOV

KATHY HOCHUL
GOVERNOR

WALTER T. MOSLEY
SECRETARY OF STATE

May 12, 2025

Steve Marino
Tim Miller Associates, Inc.
10 North Street
Cold Spring, NY 10516
Smarino@timmillerassociates.com

Re: **F-2025-0147**
U.S. Army Corps of Engineers/New York District Permit Application **NAN-2024-00765-WCC** – WBP Development, LLC: Discharge of fill material into waters of the United States in association with the construction of a mixed-use residential apartment complex and extension of an existing greenway trailway. The work involves the remediation of contaminated sediments and soils at the former Consolidated Edison Co. of New York, Inc. facility, through the removal and replacement of approximately 2,500 cubic yards of material. The remediation will also involve the reconstruction of approximately 400 linear feet of existing retaining walls along the stream, with a discharge of roughly 90 cubic yards of material, which will require temporary stream diversion. The project also includes the construction of the extension to an existing elevated trailway system, requiring placement of fill in approximately 295 square feet of streambed for the support structures.
30 Water Street, Sing Sing Kill
Village of Ossining, Westchester County
Concurrence with Consistency Certification

Dear Steve Marino:

The Department of State received your Federal Consistency Assessment Form and consistency certification and supporting information for this proposed activity on March 4, 2025, and began its review of it pursuant to 15 CFR § 930.60 on that date.

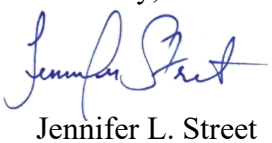
The Department of State has completed its review of the consistency certification regarding the above proposed activity with the New York State Coastal Management Program.

Pursuant to 15 CFR § 930.62, and based upon the project information submitted, the Department of State concurs with your consistency certification for this activity. This concurrence is without prejudice to and does not obviate the need to obtain all other applicable licenses, permits, or other forms of authorization or approval that may be required pursuant to existing State statutes.

NEW YORK STATE | Department of State

When communicating with us regarding this matter, please contact Joseph Sgueglia at (518) 474-1737 (e-mail: Joseph.Sgueglia@dos.ny.gov) and refer to our file #F-2025-0147.

Sincerely,



Jennifer L. Street
Chief, Consistency Review Unit
Office of Planning, Development and
Community Infrastructure

JS/js

ecc: COE/ New York District – Carolyn Courtien
DEC Region 3 – Victoria A. Lawrence (3-5542-00082/00003)
The Village of Ossining LWRP – Karen D'Attore
WBP Development, LLC – James Wendling
Insite Engineering, Surveying & Landscape Architecture, P.C. – Richard D. Williams, Jr.
Insite Engineering, Surveying & Landscape Architecture, P.C. – Dawn McKenzie

Westchester gov.com

George S. Latimer
County Executive

Department of Environmental Facilities

Vincent F. Kopicki, P.E.
Commissioner

October 11, 2024

SESI Consulting Engineers
959 Route 46E
Floor 3, Suite 300
Parsippany, NJ 07054

Mr. Steve Gustems,

RE: Ground Water Remediation

Permit # 513-24
Site: 30 Water Street
Ossining, NY

The wastewater discharge from the above-mentioned site may be discharged to the County Sewer System. The permit holder shall comply with all conditions as outlined in County Sewer Act, Chapter 824 of Laws of Westchester County. The limitations and requirements are as follows:

1) Effective dates of permit – **10/11/2024** to **04/10/2025** inclusive.
2) Maximum discharge to the sewer in Gallons per Day is **15 gpm** – based on monthly average. Flow shall be recorded each week using non-resettable flow meter.
3) Treatment – Sewer Use Ordinance (SUO) limitations (enclosed).
4) **Any PFAS present must be removed prior to discharge**.
5) Analyses of treated wastewater for VOC limitations stated in SUO sent to this office within 30 days of permit date.
6) Additional set of analyses every 30 days.
7) Notification, in writing, to this office when site is no longer active for 90 days and/or remediation work is complete.

If you have any further questions or concerns, please contact our office at (914)813-5431 or by e-mail mew3@westchestercountyny.gov

Monika Wieleba
Industrial Pretreatment Program

Westchester gov.com

George S. Latimer
County Executive

Department of Environmental Facilities

Vincent F. Kopicki, P.E.
Commissioner

LOCAL SEWER LIMITATIONS

REGULATED POLLUTANT	AVERAGE DAILY CONCENTRATION (mg/L)
pH – Low	5.5
pH – High	9.5
Arsenic	0.2
Barium	2.0
Cadmium	0.7
Chromium (Total)	3.0
Chromium (Hex)	2.0
Copper	2.8
Cyanide (Total)	0.8
Lead	0.4
Mercury	0.2
Nickel	2.8
Oil & Grease	100.0
Phenols	4.0
Selenium	0.2
Silver	0.8
Total Toxic Organics	2.1
Zinc	1.8

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

CONTACT NAME:	DANILO L. CARVALHO E SILVA	EFFECTIVE DATE:	01/23/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**01/08/2026**
TELEPHONE NO:	(862)588-1035	US EPA ID NUMBER:	NJR986659282

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY:

The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
110 Sand Company Clean Fill Disposal Site	Melville , NY	Non-Hazardous Industrial/Commercial	
380 DEVELOPMENT LLC (Various BUDs)	STATEN ISLAND , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ACUA HANEMAN "FRITZ" ENVIRONMENTAL PARK	EGG HARBOR TOWNSHIP , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Allocco Recycling Ltd (Kingsland Ave)	Brooklyn , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BAYSHORE SOIL MANAGEMENT, LLC	KEASBEY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BELLMAWR WATERFRONT DEVELOPMENT	BELLMAWR , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BETHLEHEM EARTH, LP	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BETHLEHEM LANDFILL	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BLANCHARD FACILITY	NEWARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BREEZY POINT COOP	QUEENS , NY	Non-Hazardous Industrial/Commercial	
BROOK BROTHERS ENTERPRISES/FRATTERELLI BROS	CARSTADT , NJ	Non-Hazardous Industrial/Commercial	
BTL BARTELL	POCONO SUMMIT , PA	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NOTE: By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the Environmental Conservation Law, all applicable regulations, and the General Conditions printed on the back of this page.

ADDRESS:

New York State Department of Environmental Conservation
Division of Materials Management - Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

AUTHORIZED SIGNATURE: Patricia A. Leonardo Digitally signed by Patricia A. Leonardo Date: 2025.01.21 14:04:41 -05'00' Date:____/____/____

WASTE TRANSPORTER PERMIT

GENERAL CONDITIONS

The permittee must:

1. Carry a copy of this waste transporter permit in each vehicle used to transport waste. Failure to produce a copy of the permit upon request is a violation of the permit.

2. Display the full name of the transporter on both sides of each vehicle and display the waste transporter permit number on both sides and rear of each vehicle containing waste. The displayed name and permit number must be in characters at least three inches high and of a color that contrasts sharply with the background.

3. Transport waste only in authorized vehicles. An authorized vehicle is one that is listed on this permit.

4. Submit to the Department a modification application for additions/deletions to the authorized fleet of vehicles. The permittee must wait for a modified permit before operating the vehicles identified in the modification application.

5. Submit to the Department a modification application to add a new waste category or a new destination facility, or to change the current waste or destination facility category. The permittee must wait for a modified permit before transporting new waste types or transporting to new destination facilities.

6. Submit to the Department a modification application for any change to the permit.

7. Comply with requirements for placarding and packaging as set forth in New York State Transportation Law as well as any applicable federal rules and regulations.

8. Contain all wastes in the vehicle so there is no leaking, blowing, or other discharge of waste.

9. Use vehicles to transport only materials not intended for human or animal consumption unless the vehicle is properly cleaned.

10. Comply with requirements for manifesting hazardous waste, regulated medical waste, or low-level radioactive waste as set forth in the New York State Environmental Conservation Law and the implementing regulations. Transporters who provide a pre-printed manifest to a generator/shipper/ offeror of regulated waste shall ensure that all information is correct and clearly legible on all copies of the manifest.

11. Deliver waste only to transfer, storage, treatment and disposal facilities authorized to accept such waste. Permittee must demonstrate that facilities are so authorized if requested to do so.

12. Maintain liability insurance as required by New York State Environmental Conservation Law.

13. Maintain records of the amount of each waste type transported to each destination facility on a calendar-year basis. The transporter is obligated to provide a report of this information to the Department by March 1 of each year.

14. Pay regulatory fees on an annual basis. Non-payment may be cause for revocation or suspension of permit.

15. This permit is not transferrable. A change of ownership will invalidate this permit.

16. This permit does not relieve the permittee from the obligation to obtain any other approvals or permits, or from complying with any other applicable federal, state, or local requirement.

17. Renewal applications must be submitted no less than 30 days prior to the expiration date of the permit to:

New York State Department of Environmental Conservation
Division of Materials Management, Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

CONTACT NAME: DANILO L. CARVALHO E SILVA
COUNTY: OUT OF STATE
TELEPHONE NO: (862)588-1035

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 01/23/2025
EXPIRATION DATE: **01/08/2026**
US EPA ID NUMBER: NJR986659282

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
BTL BARTELL	POCONO SUMMIT , PA	Petroleum Contaminated Soil	
CAPITAL DEVELOPMENT	E. BANGOR , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF CARTERET	CARTERET , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF MARYLAND	HAGERSTOWN , MD	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF NEW CASTLE, INC.	NEW CASTLE , DE	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF NORTH JERSEY	KEARNY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil Hazardous Industrial/Commercial	
CLEAN EARTH OF PHILADELPHIA	PHILADELPHIA , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF SOUTHEAST PENNSYLVANIA	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLINTON QUARRY LLC	UNION TOWNSHIP , NJ	Non-Hazardous Industrial/Commercial	
COMMONWEALTH ENVIRONMENTAL SYSTEMS, LP	HEGINS , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CONESTOGA LANDFILL	MORGANTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COPLAY AGGREGATES	WHITEHALL , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CUMBERLAND COUNTY IMPROVEMENT AUTHORITY	MILLVILLE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CYCLE CHEM (NJ)	ELIZABETH , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil Hazardous Industrial/Commercial	
CYCLE CHEM (PA)	LEWISBERRY , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil Hazardous Industrial/Commercial	
DOREMUS AVE SITE PREP & EARTHWORK	NEWARK , NJ	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

CONTACT NAME: DANILO L. CARVALHO E SILVA
COUNTY: OUT OF STATE
TELEPHONE NO: (862)588-1035

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 01/23/2025
EXPIRATION DATE: **01/08/2026**
US EPA ID NUMBER: NJR986659282

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
DOREMUS AVE SITE PREP & EARTHWORK	NEWARK , NJ	Petroleum Contaminated Soil	
DOREMUS AVENUE REDEVELOPMENT PROJECT	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
DURABLE RECYCLING	BAYONNE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EARTH EFFICIENT BTL	POCONO SUMMIT , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EARTH EFFICIENT HARMONY (PLANT #1 BELVIDERE RD)	PHILLIPSBURG , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT HARMONY (PLANT #2 FOUL RIFT)	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT MSM LLC	EAST STROUDSBURG , PA	Non-Hazardous Industrial/Commercial	
ENVIRITE OF PENNSYLVANIA	YORK , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil Hazardous Industrial/Commercial	
ENVIRONMENTAL & RECYCLING SERVICES, INC.	TAYLOR , PA	Non-Hazardous Industrial/Commercial	
ESMI OF NEW JERSEY	KEASBEY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Evergreen Recycling of Corona (Willets Point Blvd)	Corona , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
FAIRLESS LANDFILL (PA DEP 101699)	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Faztec Industries	Staten Island , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
FREEMANSBURG RESTORATION FACILITY	FREEMANSBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GERDAU AMERISTEEL PERTH AMBOY MILL/ANACONDA COOPER SITE	PERTH AMBOY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GRAND CENTRAL SANITARY LANDFILL	PEN ARGYL , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GRAND CENTRAL SANITATION	PEN ARGYLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GREEN ROCK RECYCLING	CLINTON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GREENVIEW	STROUDSBURG , PA	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

CONTACT NAME:	DANILO L. CARVALHO E SILVA	EFFECTIVE DATE:	01/23/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**01/08/2026**
TELEPHONE NO:	(862)588-1035	US EPA ID NUMBER:	NJR986659282

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
GREENVIEW	STROUDSBURG , PA	Petroleum Contaminated Soil	
GRIFFIN PIPE PRODUCTION CO.	FLORENCE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GRINNELL RECYCLING INC	SPARTA , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GROWS LANDFILL NORTH (PA DEP 101680)	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
HAZLETON CREEK PROPERTIES, LLC	HAZLETON , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
HENRY HARRIS SLF (ALHERN, INC.)	MULLICA HILL , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
High Acres Western Expansion Landfill	Fairport , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
HOFFMAN GRIFFETT MINE RECLAMATION FACILITY	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
Hunters Point Recycling Inc	Long Island City , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
IMPACT RECOVERY AND REUSE CENTER	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEARNY POINT INDUSTRIAL PARK (KPIP)	SOUTH KEARNY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEEGAN LANDFILL (HMDC) CLOSED DO NOT ADD	KEARNEY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEYSTONE SANITARY LANDFILL	DUNMORE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KINGSLAND LANDFILL CLOSURE PROJECT	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial	
KINGSLEY LANDFILL	SEWELL , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KSR CORP. DEVELOPMENT PROJECT	KEARNY , NJ	Non-Hazardous Industrial/Commercial	
LIBERTY AGGREGATES	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
MALANKA (MALL) LANDFILL	SECAUCUS , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

CONTACT NAME:	DANILO L. CARVALHO E SILVA	EFFECTIVE DATE:	01/23/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**01/08/2026**
TELEPHONE NO:	(862)588-1035	US EPA ID NUMBER:	NJR986659282

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
MFH SERVICES	WEXFORD , PA	Hazardous Industrial/Commercial	
MIDDLESEX COUNTY UA - EDGEBORO LANDFILL	EAST BRUNSWICK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
MIDDLESEX INDUSTRIAL CENTER	MIDDLESEX , NJ	Non-Hazardous Industrial/Commercial	
NATURES CHOICE	NORTH ARLINGTON , NJ	Non-Hazardous Industrial/Commercial	
New York Recycling LLC	Bronx , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
OVERPECK PARK LANDFILL AREA IV	PALISADES PARK , NJ	Non-Hazardous Industrial/Commercial	
P PARK NORTH LLC	PROSPECT PARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Patriot Recycling Inc.	Oceanside , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Pebble Lane Associates LLC	Maspeth , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PHASE III ENVIRONMENTAL	PALMERTON , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PHILLIPSBURG COMMERCE PK URBAN RENEWAL ENTITY	PHILLIPSBURG , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PITT CONSOL SITE	NEWARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Posillico Materials	Farmingdale , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PURE SOIL @ PERTH AMBOY	PERTH AMBOY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PURE SOIL TECHNOLOGIES	JACKSON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
RESOURCE MANAGEMENT TECHNOLOGIES	NORTH BERGEN , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Richmond Recycling LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ROCKRETE RECYCLING CORP	ELIZABETH , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

CONTACT NAME: DANILO L. CARVALHO E SILVA
COUNTY: OUT OF STATE
TELEPHONE NO: (862)588-1035

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 01/23/2025
EXPIRATION DATE: **01/08/2026**
US EPA ID NUMBER: NJR986659282

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
ROCKTECH	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
RODOTA FILL SITE	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
SILVA CONSTRUCTION & DEMOLITION	NEWARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
SOIL SAFE, INC.	LOGAN TOWNSHIP , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
SOIL SAFE-METRO 12	CARTERET , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Staten Island C&D LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
STERICYCLE - HATFIELD	HATFIELD , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil Hazardous Industrial/Commercial	
SUSQUEHANNA BULK SYSTEM	NORTH BERGEN , NJ	Hazardous Industrial/Commercial	
TAYLORS LANE REMEDIATION PROJECT	CINNAMINSON , NJ	Non-Hazardous Industrial/Commercial	
TILCON - KEARNY RECYCLING	KEARNY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TILCON NEW YORK, INC.	WHARTON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TM Maintenance Inc	Staten Island , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TOTAL RECYCLING CORPORATION/FULLERTON SLAG BANK	ALLENTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TREMLEY POINT FLY ASH DISPOSAL SITE	LINDEN , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TULLYTOWN RESOURCE RECOVERY FACILITY (PA DEP 101494)	TULLYTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
US STEEL KEYSTONE	FALLS TOWNSHIP , PA	Non-Hazardous Industrial/Commercial	
VALLEY INDUSTRIAL PROPERTIES	EAST BANGOR , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
WAYNE DISPOSAL, INC	BELLEVILLE , MI	Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

CONTACT NAME: DANILO L. CARVALHO E SILVA
COUNTY: OUT OF STATE
TELEPHONE NO: (862)588-1035

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 01/23/2025
EXPIRATION DATE: **01/08/2026**
US EPA ID NUMBER: NJR986659282

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
WESTSIDE TRANSLOAD LLC	NORTH BERGEN , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
WMNY Varick 1 Transfer Station	Brooklyn , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
XRDS RECYCLING LLC	WAYNE , NJ	Non-Hazardous Industrial/Commercial	
YANNUZZI & SONS	HILLSBOROUGH , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
YANNUZZI GROUP - MIDDLESEX COUNTY	EDISON , NJ	Non-Hazardous Industrial/Commercial	

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-928

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

DI TRUCKING LLC
625 CLINTON AVENUE
KENILWORTH, NJ 07033

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

CONTACT NAME:	DANILO L. CARVALHO E SILVA	EFFECTIVE DATE:	01/23/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**01/08/2026**
TELEPHONE NO:	(862)588-1035	US EPA ID NUMBER:	NJR986659282

AUTHORIZED VEHICLES:
The Permittee is Authorized to Operate the Following Vehicles to Transport Waste:

(Vehicles enclosed in <>'s are authorized to haul Residential Raw Sewage and/or Septage only)

57 (Fifty Seven) Permitted Vehicle(s)

NJ AR713H
NJ AW270H
NJ AW271H
NJ AW398D
NJ AW408E
NJ AW532H
NJ AW659X
NJ AW660X
NJ AW661X
NJ AW906K
NJ AW907K
NJ AX117P
NJ AX118P
NJ AX119P
NJ AX120P
NJ AX121P
NJ AX122P
NJ AX401W
NJ AX402W
NJ AX540W
NJ AY284A
NJ AY320F
NJ AY325F
NJ AY326F
NJ AY509R
NJ AY510R
NJ AY511R
NJ AY585R
NJ AY590M
NJ AY591M
NJ AY592M
NJ AY713E
NJ AY816Z
NJ AY817Z
NJ AY861M
NJ AY862M
NJ AY863M
NJ AY969R
NJ AY970R
NJ AY973B
NJ AY988C
NJ AZ202C
NJ AZ283B
NJ AZ284B
NJ AZ285B
NJ AZ286B
NJ AZ287B
NJ AZ583M
NJ AZ584M
NJ AZ585M
NJ AZ586M
NJ AZ587M
NJ AZ608A
NJ AZ609A
NJ AZ876H
NJ AZ877H
NJ AZ878H
End of List

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-978

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

JID TRANSPORTATION, LLC
418 13TH STREET
CARLSTADT, NJ 07072

CONTACT NAME: JAILE L. LUIS DIAZ-NAPOLEZ
COUNTY: OUT OF STATE
TELEPHONE NO: (201)494-7301

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

EFFECTIVE DATE: 05/19/2025
EXPIRATION DATE: **05/18/2026**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY:

The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
ALLIANCE SANITARY LANDFILL	TAYLOR , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ATLANTIC COUNTY UTILITIES AUTHORITY	EGG HARBOR , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BAYSHORE SOIL MANAGEMENT, LLC	KEASBEY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BETHLEHEM EARTH, LP	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BLYTHE RECYCLING AND DEMOLITION	NEW PHILADELPHIA , PA	Non-Hazardous Industrial/Commercial	
BROOK BROTHERS ENTERPRISES/ FRATTERELLI BROS	CARSTADT , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BURLINGTON COUNTY RESOURCE RECOVERY COMPLEX	FLORENCE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CAPITAL DEVELOPMENT	E. BANGOR , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH DREDGING TECHNOLOGIES	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF CARTERET	CARTERET , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF NEW CASTLE, INC.	NEW CASTLE , DE	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NOTE: By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the Environmental Conservation Law, all applicable regulations, and the General Conditions printed on the back of this page.

ADDRESS:

New York State Department of Environmental Conservation
Division of Materials Management - Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

AUTHORIZED SIGNATURE: Laura Stevens Digitally signed by Laura Stevens Date: 2025.05.07 14:35:16 -04'00' Date:_____/_____/_____

WASTE TRANSPORTER PERMIT

GENERAL CONDITIONS

The permittee must:

1. Carry a copy of this waste transporter permit in each vehicle to transport waste. Failure to produce a copy of the permit upon request is a violation of the permit.

2. Display the full name of the transporter on both sides of each vehicle and display the waste transporter permit number on both sides and rear of each vehicle containing waste. The displayed name and permit number must be in characters at least three inches high and of a color that contrasts sharply with the background.

3. Transport waste only in authorized vehicles. An authorized vehicle is one that is listed on this permit.

4. Submit to the Department a modification application for additions/deletions to the authorized fleet of vehicles. The permittee must wait for a modified permit before operating the vehicles identified in the modification application.

5. Submit to the Department a modification application to add a new waste category or a new destination facility, or to change the current waste or destination facility category. The permittee must wait for a modified permit before transporting new waste types or transporting to new destination facilities.

6. Submit to the Department a modification application for change of address or company name.

7. Comply with requirements for placarding and packaging as set forth in New York State Transportation Law as well as any applicable federal rules and regulations.

8. Contain all wastes in the vehicle so there is no leaking, blowing, or other discharge of waste.

9. Use vehicles to transport only materials not intended for human or animal consumption unless the vehicle is properly cleaned.

10. Comply with requirements for manifesting hazardous waste, regulated medical waste, or low-level radioactive waste as set forth in the New York State Environmental Conservation Law and the implementing regulations. Transporters who provide a pre-printed manifest to a generator/shipper/ offeror of regulated waste shall ensure that all information is correct and clearly legible on all copies of the manifest.

11. Deliver waste only to transfer, storage .. treatment and disposal facilities authorized to accept such waste. Permittee must demonstrate that facilities are so authorized if requested to do so.

12. Maintain liability insurance as required by New York State Environmental Conservation Law.

13. Maintain records of the amount of each waste type transported to each destination facility on a calendar-year basis. The transporter is obligated to provide a report of this information to the Department at the time of permit renewal, or to any law enforcement officer, if requested to do so.

14. Pay regulatory fees on an annual basis. Non-payment may be cause for revocation or suspension of permit.

15. This permit is not transferrable. A change of ownership will invalidate this permit.

16. This permit does not relieve the permittee from the obligation to obtain any other approvals or permits, or from complying with any other applicable federal, state, or local requirement.

17. Renewal applications must be submitted no less than 30 days prior to the expiration date of the permit to:

New York State Department of Environmental Conservation
Division of Materials Management, Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-978

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

JID TRANSPORTATION, LLC
418 13TH STREET
CARLSTADT, NJ 07072

CONTACT NAME: JAILE L. LUIS DIAZ-NAPOLEZ
COUNTY: OUT OF STATE
TELEPHONE NO: (201)494-7301

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

EFFECTIVE DATE: 05/19/2025
EXPIRATION DATE: **05/18/2026**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
CLEAN EARTH OF NEW CASTLE, INC.	NEW CASTLE , DE	Petroleum Contaminated Soil	
CLEAN EARTH OF NORTH JERSEY	KEARNY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF PHILADELPHIA	PHILADELPHIA , PA	Petroleum Contaminated Soil	
CLEAN EARTH OF SOUTHEAST PENNSYLVANIA	MORRISVILLE , PA	Petroleum Contaminated Soil	
CLINTON QUARRY	CLINTON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COMMONWEALTH ENVIRONMENTAL SYSTEMS, LP	HEGINS , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CONESTOGA LANDFILL	MORGANTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COPLAY AGGREGATES	WHITEHALL , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COUNTY CONSERVATION COMPANY/ WINZINGER RECYCLING	SEWELL, , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
DELAWARE COUNTY SWA - ROLLING HILLS LF	BOYERTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EARTH EFFICIENT BTL	POCONO SUMMIT , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EVERGREEN RECYCLING OF CORONA	QUEENS , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
FAIRLESS LANDFILL (PA DEP 101699)	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial	
Faztec Industries	Staten Island , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
FREEMANSBURG RESTORATION FACILITY	FREEMANSBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GRAND CENTRAL SANITARY LANDFILL	PEN ARGYL , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GREENVIEW	STROUDSBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
HARLEYSVILLE MATERIALS QUARRY	HARLEYSVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-978

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

JID TRANSPORTATION, LLC
418 13TH STREET
CARLSTADT, NJ 07072

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME:	JAILE L. LUIS DIAZ-NAPOLEZ	EFFECTIVE DATE:	05/19/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**05/18/2026**
TELEPHONE NO:	(201)494-7301	US EPA ID NUMBER:	

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
HAZLETON CREEK PROPERTIES, LLC	HAZLETON , PA	Non-Hazardous Industrial/Commercial	
HOFFMAN GRIFFETT MINE RECLAMATION FACILITY	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
Hunters Point Recycling Inc	Long Island City , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
IMPACT RECOVERY AND REUSE CENTER	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEYSTONE SANITARY LANDFILL	DUNMORE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KINSLEY LANDFILL	SEWELL , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
LIBERTY AGGREGATES	DUNMORE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
MIDDLESEX COUNTY UTILITIES AUTHORITY-EDGEBORO LANDFILL	EAST BRUNSWICK , NJ	Non-Hazardous Industrial/Commercial	
P PARK NORTH LLC	PROSPECT PARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Pebble Lane Associates LLC	Maspeth , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PHASE III ENVIRONMENTAL	PALMERTON , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PIONEER CROSSING LANDFILL	BIRDSBORO , PA	Non-Hazardous Industrial/Commercial Asbestos Petroleum Contaminated Soil	
Posillico Materials	Farmingdale , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Richmond Recycling LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
RIVER FRONT RECYCLING & AGGREGATE, LLC	CAMDEN , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ROCKRETE RECYCLING	ELIZABETH , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ROCKTECH	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-978

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

JID TRANSPORTATION, LLC
418 13TH STREET
CARLSTADT, NJ 07072

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME:	JAILE L. LUIS DIAZ-NAPOLEZ	EFFECTIVE DATE:	05/19/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**05/18/2026**
TELEPHONE NO:	(201)494-7301	US EPA ID NUMBER:	

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
RODOTA FILL SITE	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
SOIL SAFE, INC.	LOGAN TOWNSHIP , NJ	Petroleum Contaminated Soil	
SOIL SAFE-METRO 12	CARTERET , NJ	Petroleum Contaminated Soil	
TILCON - KEARNY RECYCLING	KEARNY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TILCON - MOUNT HOPE QUARRY	WHARTON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
VALLEY INDUSTRIAL PROPERTIES	EAST BANGOR , PA	Petroleum Contaminated Soil	

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-978

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

JID TRANSPORTATION, LLC
418 13TH STREET
CARLSTADT, NJ 07072

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME:	JAILE L. LUIS DIAZ-NAPOLEZ	EFFECTIVE DATE:	05/19/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**05/18/2026**
TELEPHONE NO:	(201)494-7301	US EPA ID NUMBER:	

AUTHORIZED VEHICLES:
The Permittee is Authorized to Operate the Following Vehicles to Transport Waste:

(Vehicles enclosed in <>'s are authorized to haul Residential Raw Sewage and/or Septage only)

23 (Twenty Three) Permitted Vehicle(s)

NJ AW249J
NJ AY144M
NJ AY145M
NJ AY217K
NJ AY295N
NJ AY400Z
NJ AY434G
NJ AY464N
NJ AY634F
NJ AY679J
NJ AZ183A
NJ AZ206C
NJ AZ207C
NJ AZ208C
NJ AZ462C
NJ AZ490H
NJ AZ583D
NJ AZ584D
NJ AZ618P
NJ AZ849J
NJ AZ930J
NJ AZ932A
NJ AZ933A
End of List

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-990

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MANOLOS TRUCKING, LLC
58 MOORE PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MANUEL PASTUISACA
COUNTY: OUT OF STATE
TELEPHONE NO: (201)852-7771

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 02/28/2025
EXPIRATION DATE: **10/05/2025**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY:
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
110 Sand Company Clean Fill Disposal Site	Melville , NY	Non-Hazardous Industrial/Commercial	
Allocco Recycling Ltd (Kingsland Ave)	Brooklyn , NY	Non-Hazardous Industrial/Commercial	
ATLANTIC COUNTY UTILITIES AUTHORITY	EGG HARBOR , NJ	Non-Hazardous Industrial/Commercial	
BAYONNE LOGISTICS CENTER/BAYONNE MILITARY OCEAN TERMINAL	BAYONNE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BAYSHORE SOIL MANAGEMENT, LLC	KEASBEY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BELLMAWR WATERFRONT DEVELOPMENT	BELLMAWR , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BETHLEHEM EARTH, LP	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial	
BETHLEHEM LANDFILL	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BREEZY POINT COOP	QUEENS , NY	Non-Hazardous Industrial/Commercial	
BROOK BROTHERS ENTERPRISES/FRATTERELLI BROS	CARSTADT , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BTL BARTELL	POCONO SUMMIT , PA	Non-Hazardous Industrial/Commercial	
CAPE MAY CO. MUA	WOODBINE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CAPITAL DEVELOPMENT	E. BANGOR , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NOTE: By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the Environmental Conservation Law, all applicable regulations, and the General Conditions printed on the back of this page.

ADDRESS:

New York State Department of Environmental Conservation
Division of Materials Management - Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

AUTHORIZED SIGNATURE: Patricia A. Leonardo Digitally signed by Patricia A. Leonardo Date: 2025.02.26 12:20:15 -05'00' Date:_____/_____/_____

WASTE TRANSPORTER PERMIT

GENERAL CONDITIONS

The permittee must:

1. Carry a copy of this waste transporter permit in each vehicle to transport waste. Failure to produce a copy of the permit upon request is a violation of the permit.

2. Display the full name of the transporter on both sides of each vehicle and display the waste transporter permit number on both sides and rear of each vehicle containing waste. The displayed name and permit number must be in characters at least three inches high and of a color that contrasts sharply with the background.

3. Transport waste only in authorized vehicles. An authorized vehicle is one that is listed on this permit.

4. Submit to the Department a modification application for additions/deletions to the authorized fleet of vehicles. The permittee must wait for a modified permit before operating the vehicles identified in the modification application.

5. Submit to the Department a modification application to add a new waste category or a new destination facility, or to change the current waste or destination facility category. The permittee must wait for a modified permit before transporting new waste types or transporting to new destination facilities.

6. Submit to the Department a modification application for change of address or company name.

7. Comply with requirements for placarding and packaging as set forth in New York State Transportation Law as well as any applicable federal rules and regulations.

8. Contain all wastes in the vehicle so there is no leaking, blowing, or other discharge of waste.

9. Use vehicles to transport only materials not intended for human or animal consumption unless the vehicle is properly cleaned.

10. Comply with requirements for manifesting hazardous waste, regulated medical waste, or low-level radioactive waste as set forth in the New York State Environmental Conservation Law and the implementing regulations. Transporters who provide a pre-printed manifest to a generator/shipper/ offeror of regulated waste shall ensure that all information is correct and clearly legible on all copies of the manifest.

11. Deliver waste only to transfer, storage .. treatment and disposal facilities authorized to accept such waste. Permittee must demonstrate that facilities are so authorized if requested to do so.

12. Maintain liability insurance as required by New York State Environmental Conservation Law.

13. Maintain records of the amount of each waste type transported to each destination facility on a calendar-year basis. The transporter is obligated to provide a report of this information to the Department at the time of permit renewal, or to any law enforcement officer, if requested to do so.

14. Pay regulatory fees on an annual basis. Non-payment may be cause for revocation or suspension of permit.

15. This permit is not transferrable. A change of ownership will invalidate this permit.

16. This permit does not relieve the permittee from the obligation to obtain any other approvals or permits, or from complying with any other applicable federal, state, or local requirement.

17. Renewal applications must be submitted no less than 30 days prior to the expiration date of the permit to:

New York State Department of Environmental Conservation
Division of Materials Management, Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-990

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MANOLOS TRUCKING, LLC
58 MOORE PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MANUEL PASTUISACA
COUNTY: OUT OF STATE
TELEPHONE NO: (201)852-7771

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 02/28/2025
EXPIRATION DATE: **10/05/2025**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
CLEAN EARTH - BETHLEHEM	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF CARTERET	CARTERET , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF MARYLAND	HAGERSTOWN , MD	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF NORTH JERSEY	KEARNY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF PHILADELPHIA	PHILADELPHIA , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF SOUTHEAST PENNSYLVANIA	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLINTON QUARRY	CLINTON , NJ	Non-Hazardous Industrial/Commercial	
COMMONWEALTH ENVIRONMENTAL SYSTEMS, LP	HEGINS , PA	Non-Hazardous Industrial/Commercial	
CONESTOGA LANDFILL	MORGANTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COPLAY AGGREGATES	WHITEHALL , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CUMBERLAND COUNTY LF-NEWBURG	NEWBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Cycle Chem Inc dba ACV Enviro	New Windsor , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CYTEC INDUSTRIES, INC. - WARNERS	LINDEN , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
DOREMUS AVE SITE PREP & EARTHWORK	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
DOREMUS AVENUE REDEVELOPMENT PROJECT	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT HARMONY (PLANT #1 BELVIDERE RD)	PHILLIPSBURG , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT HARMONY (PLANT #2 FOUL RIFT)	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT MSM LLC	EAST STROUDSBURG , PA	Non-Hazardous Industrial/Commercial	

ENVIRONMENTAL & RECYCLING SERVICES, INC.	TAYLOR , PA	Non-Hazardous Industrial/Commercial
ESMI OF NEW JERSEY	KEASBEY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-990

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MANOLOS TRUCKING, LLC
58 MOORE PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MANUEL PASTUISACA
COUNTY: OUT OF STATE
TELEPHONE NO: (201)852-7771

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 02/28/2025
EXPIRATION DATE: **10/05/2025**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
Evergreen Recycling of Corona (Willets Point Blvd)	Corona , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
FAIRLESS LANDFILL (PA DEP 101699)	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Faztec Industries	Staten Island , NY	Non-Hazardous Industrial/Commercial	
FREEMANSBURG RESTORATION FACILITY	FREEMANSBURG , PA	Non-Hazardous Industrial/Commercial	
GERDAU AMERISTEEL PERTH AMBOY MILL/ANACONDA COOPER SITE	PERTH AMBOY , NJ	Non-Hazardous Industrial/Commercial	
GREEN ROCK RECYCLING	CLINTON , NJ	Non-Hazardous Industrial/Commercial	
GREENVIEW	STROUDSBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GRIFFIN PIPE PRODUCTION CO.	FLORENCE , NJ	Non-Hazardous Industrial/Commercial	
GRINNELL RECYCLING INC	SPARTA , NJ	Non-Hazardous Industrial/Commercial	
GROWS LANDFILL NORTH (PA DEP 101680)	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
HAZLETON CREEK PROPERTIES, LLC	HAZLETON , PA	Non-Hazardous Industrial/Commercial	
HENRY HARRIS SLF (ALHERN, INC.)	MULLICA HILL , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
HOFFMAN GRIFFETT MINE RECLAMATION FACILITY	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Hunters Point Recycling Inc	Long Island City , NY	Non-Hazardous Industrial/Commercial	
IMPACT RECOVERY AND REUSE CENTER	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
JERC PARTNERS VII/LLC	EDISON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEEGAN LANDFILL (HMDC) CLOSED DO NOT ADD	KEARNEY , NJ	Non-Hazardous Industrial/Commercial	
KEYSTONE INDUSTRIAL/KIPC	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEYSTONE SANITARY LANDFILL	DUNMORE , PA	Non-Hazardous Industrial/Commercial	
KINGSLAND LANDFILL CLOSURE PROJECT	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-990

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MANOLOS TRUCKING, LLC
58 MOORE PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MANUEL PASTUISACA
COUNTY: OUT OF STATE
TELEPHONE NO: (201)852-7771

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 02/28/2025
EXPIRATION DATE: **10/05/2025**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
KSR CORP. DEVELOPMENT PROJECT	KEARNY , NJ	Non-Hazardous Industrial/Commercial	
Lawton Adams Construction Corp	Somers , NY	Non-Hazardous Industrial/Commercial	
LIBERTY AGGREGATES	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial	
MALANKA (MALL) LANDFILL	SECAUCUS , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
MIDDLESEX COUNTY UTILITY AUTHORITY	SAYREVILLE , NJ	Non-Hazardous Industrial/Commercial	
NATURES CHOICE	NORTH ARLINGTON , NJ	Non-Hazardous Industrial/Commercial	
New York Recycling LLC	Bronx , NY	Non-Hazardous Industrial/Commercial	
NORTHPOINT REDEVELOPMENT OF US STEEL KEYSTONE IND PORT	FAIRLESS HILLS , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
OVERPECK PARK LANDFILL AREA IV	PALISADES PARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
P PARK NORTH LLC	PROSPECT PARK , NJ	Non-Hazardous Industrial/Commercial	
Patriot Recycling Inc.	Oceanside , NY	Non-Hazardous Industrial/Commercial	
PHASE III ENVIRONMENTAL	PALMERTON , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PHILLIPSBURG COMMERCE PK URBAN RENEWAL ENTITY	PHILLIPSBURG , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Posillico Materials	Farmingdale , NY	Non-Hazardous Industrial/Commercial	
PURE EARTH RECYCLING	VINELAND , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PURE SOIL @ PERTH AMBOY	PERTH AMBOY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PURE SOIL TECHNOLOGIES	JACKSON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
RESOURCE MANAGEMENT TECHNOLOGIES	NORTH BERGEN , NJ	Non-Hazardous Industrial/Commercial	
Richmond Recycling LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ROCKRETE RECYCLING	ELIZABETH , NJ	Non-Hazardous Industrial/Commercial	
ROCKTECH	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial	
RODOTA FILL SITE	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-990

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MANOLOS TRUCKING, LLC
58 MOORE PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MANUEL PASTUISACA
COUNTY: OUT OF STATE
TELEPHONE NO: (201)852-7771

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

EFFECTIVE DATE: 02/28/2025
EXPIRATION DATE: **10/05/2025**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
SILVA CONSTRUCTION & DEMOLITION	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
SOIL SAFE, INC.	LOGAN TOWNSHIP , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
SOIL SAFE-METRO 12	CARTERET , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
South Shore Recycling LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial	
STERICYCLE - HATFIELD	HATFIELD , PA	Non-Hazardous Industrial/Commercial	
STRAVOLA BBQ	BOUND BROOK , NJ	Non-Hazardous Industrial/Commercial	
TAYLORS LANE REMEDIATION PROJECT	CINNAMINSON , NJ	Non-Hazardous Industrial/Commercial	
TETERBORO LANDING	TETERBORO , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TILCON - KEARNY RECYCLING	KEARNY , NJ	Non-Hazardous Industrial/Commercial	
TILCON NEW YORK, INC.	WHARTON , NJ	Non-Hazardous Industrial/Commercial	
TOTAL RECYCLING CORPORATION/FULLERTON SLAG BANK	ALLENTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TREMLEY POINT FLY ASH DISPOSAL SITE	LINDEN , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TULLYTOWN RESOURCE RECOVERY FACILITY (PA DEP 101494)	TULLYTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
VANBRO (C&D ONLY)	STATEN ISLAND , NY	Non-Hazardous Industrial/Commercial	
WALTER R. EARLE RECYCLING CORP.	JACKSON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
XRDS RECYCLING LLC	WAYNE , NJ	Non-Hazardous Industrial/Commercial	
YANNUZZI & SONS	HILLSBOROUGH , NJ	Non-Hazardous Industrial/Commercial	
YANNUZZI GROUP - MIDDLESEX COUNTY	EDISON , NJ	Non-Hazardous Industrial/Commercial	

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-990

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MANOLOS TRUCKING, LLC
58 MOORE PLACE
BELLEVILLE, NJ 07109

PERMIT TYPE:

☐ NEW
☐ RENEWAL
■ MODIFICATION

CONTACT NAME:	MANUEL PASTUISACA	EFFECTIVE DATE:	02/28/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**10/05/2025**
TELEPHONE NO:	(201)852-7771	US EPA ID NUMBER:	

AUTHORIZED VEHICLES:
The Permittee is Authorized to Operate the Following Vehicles to Transport Waste:

(Vehicles enclosed in <>'s are authorized to haul Residential Raw Sewage and/or Septage only)

14 (Fourteen) Permitted Vehicle(s)

NJ AT184B
NJ AT380H
NJ AU148N
NJ AU205L
NJ AW395K
NJ AW754A
NJ AW755A
NJ AW795L
NJ AX232Z
NJ AX630Z
NJ AY687J
NJ AZ284P
NJ AZ285P
NJ AZ322G
End of List

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-1190

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MCB TRUCKING LLC
65 VAN REYPER PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MARCO BERMEO
COUNTY: OUT OF STATE
TELEPHONE NO: (973)592-2724

PERMIT TYPE:

- ☐ NEW
- ■ RENEWAL
- ☐ MODIFICATION

EFFECTIVE DATE: 05/10/2025
EXPIRATION DATE: 05/09/2026
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY:
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
110 Sand Company Clean Fill Disposal Site	Melville , NY	Non-Hazardous Industrial/Commercial	
ATLANTIC COUNTY UTILITIES AUTHORITY	EGG HARBOR , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BAYSHORE SOIL MANAGEMENT, LLC	KEASBEY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BETHLEHEM CLEAN EARTH, L.P.	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BETHLEHEM LANDFILL	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BREEZY POINT COOP	QUEENS , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
BROOK BROTHERS ENTERPRISES/ FRATTERELLI BROS	CARSTADT , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF CARTERET	CARTERET , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF NEW CASTLE, INC.	NEW CASTLE , DE	Non-Hazardous Industrial/Commercial	
CLINTON QUARRY	CLINTON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COMMONWEALTH ENVIRONMENTAL SYSTEMS, LP	HEGINS , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NOTE: By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the Environmental Conservation Law, all applicable regulations, and the General Conditions printed on the back of this page.

ADDRESS:

New York State Department of Environmental Conservation
Division of Materials Management - Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

AUTHORIZED SIGNATURE: Laura Stevens Digitally signed by Laura Stevens Date: 2025.05.07 14:39:52 -04'00' Date:____/____/____

Scanned with CamScanner

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-1190

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MCB TRUCKING LLC
65 VAN REYPER PLACE
BELLEVILLE, NJ 07109

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME: MARCO BERMEO
COUNTY: OUT OF STATE
TELEPHONE NO: (973)592-2724

EFFECTIVE DATE: 05/10/2025
EXPIRATION DATE: 05/09/2026
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
CONESTOGA LANDFILL	MORGANTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COPLAY AGGREGATES	WHITEHALL , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COPLAY AGGREGATES	WHITEHALL , PA	Gas Well Drill Cuttings	
CYCLE CHEM (NJ)	ELIZABETH , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
DOREMUS AVE SITE PREP & EARTHWORK	NEWARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EARTH EFFICIENT BTL	POCONO SUMMIT , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EARTH EFFICIENT HARMONY (PLANT #1 BELVIDERE RD)	PHILLIPSBURG , NJ.	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EARTH EFFICIENT HARMONY (PLANT #2 FOUL RIFT)	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
EARTH EFFICIENT MSM LLC	EAST STROUDSBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ENVIRONMENTAL & RECYCLING SERVICES, INC.	TAYLOR , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Evergreen Recycling of Corona (Willets Point Blvd)	Corona , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Faztec Industries	Staten Island , NY	Non-Hazardous Industrial/Commercial	
FREEMANSBURG RESTORATION FACILITY	FREEMANSBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GERDAU AMERISTEEL PERTH AMBOY MILL/ANACONDA COOPER SITE	PERTH AMBOY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GREENVIEW	STROUDSBURG , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
GRINNELL RECYCLING INC	SPARTA , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
HAZLETON CREEK PROPERTIES, LLC	HAZLETON , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

Scanned with CamScanner

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-1190

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MACB TRUCKING LLC
65 VAN REYPER PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MARCO BERMEO
COUNTY: OUT OF STATE
TELEPHONE NO: (973)592-2724

PERMIT TYPE:

- ☐ NEW
- ■ RENEWAL
- ☐ MODIFICATION

EFFECTIVE DATE: 05/10/2025
EXPIRATION DATE: 05/09/2026
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
HOFFMAN GRIFFETT MINE RECLAMATION FACILITY	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
IMPACT RECOVERY AND REUSE CENTER	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEYSTONE SANITARY LANDFILL	DUNMORE , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KINGSLAND LANDFILL CLOSURE PROJECT	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial	
NATURES CHOICE	NORTH ARLINGTON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
NJ ZINC FACILITY - PHASE 3	PALMERTON , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
P PARK NORTH LLC	PROSPECT PARK , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Patriot Recycling Inc.	Oceanside , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PURE SOIL TECHNOLOGIES	JACKSON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
RAHWAY ARCH PROPERTIES, LLC	CARTERET , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
ROCKTECH	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial	
Russo Recycling Company/Whip Realty Corp	Rosedale , NY	Non-Hazardous Industrial/Commercial	
SAXTON FALLS SAND AND GRAVEL CO.	STANHOPE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
SBI MATEIRALS	WAYNE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
SOIL SAFE, INC.	LOGAN TOWNSHIP , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
STERICYCLE - HATFIELD	HATFIELD , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
TULLYTOWN RESOURCE RECOVERY FACILITY (PA DEP 101494)	TULLYTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
VALLEY INDUSTRIAL PROPERTIES	EAST BANGOR , PA	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

Scanned with CamScanner

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-1190

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MCB TRUCKING LLC
65 VAN REYPER PLACE
BELLEVILLE, NJ 07109

CONTACT NAME: MARCO BERMEO
COUNTY: OUT OF STATE
TELEPHONE NO: (973)592-2724

PERMIT TYPE:

- ☐ NEW
- ■ RENEWAL
- ☐ MODIFICATION

EFFECTIVE DATE: 05/10/2025
EXPIRATION DATE: 05/09/2026
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
VALLEY INDUSTRIAL PROPERTIES	EAST BANGOR , PA	Petroleum Contaminated Soil	



Scanned with CamScanner

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-1190

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MCB TRUCKING LLC
65 VAN REYPER PLACE
BELLEVILLE, NJ 07109

PERMIT TYPE:

- ☐ NEW
- ■ RENEWAL
- ☐ MODIFICATION

CONTACT NAME: MARCO BERMEO
COUNTY: OUT OF STATE
TELEPHONE NO: (973)592-2724

EFFECTIVE DATE: 05/10/2025
EXPIRATION DATE: 05/09/2026
US EPA ID NUMBER:

AUTHORIZED VEHICLES:
The Permittee is Authorized to Operate the Following Vehicles to Transport Waste:
(Vehicles enclosed in <>'s are authorized to haul Residential Raw Sewage and/or Septage only)

5 (Five) Permitted Vehicle(s)

NJ AU450S
NJ AU452S
NJ AW536F
NJ AY609A
NJ AZ669T
End of List

Scanned with CamScanner

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-816

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MENDEZ TRUCKING INC
74 ACADEMY STREET
BELLEVILLE, NJ 07109

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME: JUAN O. MUNOZ
COUNTY: OUT OF STATE
TELEPHONE NO: (973)979-0100

EFFECTIVE DATE: 02/08/2025
EXPIRATION DATE: **02/07/2026**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY:

The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
110 Sand Company Clean Fill Disposal Site	Melville , NY	Non-Hazardous Industrial/Commercial	
380 DEVELOPMENT LLC (Various BUDs)	STATEN ISLAND , NY	Non-Hazardous Industrial/Commercial	
Allocco Recycling Ltd (Kingsland Ave)	Brooklyn , NY	Non-Hazardous Industrial/Commercial	
ATLANTIC COUNTY UTILITIES AUTHORITY	EGG HARBOR , NJ	Non-Hazardous Industrial/Commercial	
BAYONNE LOGISTICS CENTER/BAYONNE MILITARY OCEAN TERMINAL	BAYONNE , NJ	Non-Hazardous Industrial/Commercial	
BAYSHORE SOIL MANAGEMENT, LLC	KEASBEY , NJ	Non-Hazardous Industrial/Commercial	
BELLMAWR WATERFRONT DEVELOPMENT	BELLMAWR , NJ	Non-Hazardous Industrial/Commercial	
BETHLEHEM EARTH, LP	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial	
BETHLEHEM LANDFILL	BETHLEHEM , PA	Non-Hazardous Industrial/Commercial	
BREEZY POINT COOP	QUEENS , NY	Non-Hazardous Industrial/Commercial	
BRIDGE CRANBURY LLC	CRANBURY , NJ	Non-Hazardous Industrial/Commercial	
BROOK BROTHERS ENTERPRISES/ FRATTERELLI BROS	CARSTADT , NJ	Non-Hazardous Industrial/Commercial	
BTL BARTELL	POCONO SUMMIT , PA	Non-Hazardous Industrial/Commercial	
BURLINGTON COUNTY RESOURCE RECOVERY FACILITY	COLUMBUS , NJ	Non-Hazardous Industrial/Commercial	
CAPE MAY CO. MUA	WOODBINE , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF CARTERET	CARTERET , NJ	Non-Hazardous Industrial/Commercial	
CLEAN EARTH OF MARYLAND	HAGERSTOWN , MD	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
CLEAN EARTH OF NEW CASTLE, INC.	NEW CASTLE , DE	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NOTE: By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the Environmental Conservation Law, all applicable regulations, and the General Conditions printed on the back of this page.

ADDRESS:

New York State Department of Environmental Conservation
Division of Materials Management - Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

AUTHORIZED SIGNATURE: Laura Stevens Digitally signed by Laura Stevens Date: 2025.01.07 12:56:57 -05'00' Date:____/____/____

WASTE TRANSPORTER PERMIT

GENERAL CONDITIONS

The permittee must:

1. Carry a copy of this waste transporter permit in each vehicle to transport waste. Failure to produce a copy of the permit upon request is a violation of the permit.

2. Display the full name of the transporter on both sides of each vehicle and display the waste transporter permit number on both sides and rear of each vehicle containing waste. The displayed name and permit number must be in characters at least three inches high and of a color that contrasts sharply with the background.

3. Transport waste only in authorized vehicles. An authorized vehicle is one that is listed on this permit.

4. Submit to the Department a modification application for additions/deletions to the authorized fleet of vehicles. The permittee must wait for a modified permit before operating the vehicles identified in the modification application.

5. Submit to the Department a modification application to add a new waste category or a new destination facility, or to change the current waste or destination facility category. The permittee must wait for a modified permit before transporting new waste types or transporting to new destination facilities.

6. Submit to the Department a modification application for change of address or company name.

7. Comply with requirements for placarding and packaging as set forth in New York State Transportation Law as well as any applicable federal rules and regulations.

8. Contain all wastes in the vehicle so there is no leaking, blowing, or other discharge of waste.

9. Use vehicles to transport only materials not intended for human or animal consumption unless the vehicle is properly cleaned.

10. Comply with requirements for manifesting hazardous waste, regulated medical waste, or low-level radioactive waste as set forth in the New York State Environmental Conservation Law and the implementing regulations. Transporters who provide a pre-printed manifest to a generator/shipper/ offeror of regulated waste shall ensure that all information is correct and clearly legible on all copies of the manifest.

11. Deliver waste only to transfer, storage .. treatment and disposal facilities authorized to accept such waste. Permittee must demonstrate that facilities are so authorized if requested to do so.

12. Maintain liability insurance as required by New York State Environmental Conservation Law.

13. Maintain records of the amount of each waste type transported to each destination facility on a calendar-year basis. The transporter is obligated to provide a report of this information to the Department at the time of permit renewal, or to any law enforcement officer, if requested to do so.

14. Pay regulatory fees on an annual basis. Non-payment may be cause for revocation or suspension of permit.

15. This permit is not transferrable. A change of ownership will invalidate this permit.

16. This permit does not relieve the permittee from the obligation to obtain any other approvals or permits, or from complying with any other applicable federal, state, or local requirement.

17. Renewal applications must be submitted no less than 30 days prior to the expiration date of the permit to:

New York State Department of Environmental Conservation
Division of Materials Management, Waste Transporter Program
625 Broadway, 9th Floor
Albany, NY 12233-7251

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-816

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MENDEZ TRUCKING INC
74 ACADEMY STREET
BELLEVILLE, NJ 07109

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME: JUAN O. MUNOZ
COUNTY: OUT OF STATE
TELEPHONE NO: (973)979-0100

EFFECTIVE DATE: 02/08/2025
EXPIRATION DATE: **02/07/2026**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
CLEAN EARTH OF NORTH JERSEY	KEARNY , NJ	Non-Hazardous Industrial/Commercial	
CLEAN EARTH OF PHILADELPHIA	PHILADELPHIA , PA	Non-Hazardous Industrial/Commercial	
CLEAN EARTH OF SOUTHEAST PENNSYLVANIA	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial	
CLINTON QUARRY	CLINTON , NJ	Non-Hazardous Industrial/Commercial	
COMMONWEALTH ENVIRONMENTAL SYSTEMS, LP	HEGINS , PA	Non-Hazardous Industrial/Commercial	
CONESTOGA LANDFILL	MORGANTOWN , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
COPLAY AGGREGATES	WHITEHALL , PA	Non-Hazardous Industrial/Commercial	
CUMBERLAND COUNTY IMPROVEMENT AUTHORITY	MILLVILLE , NJ	Non-Hazardous Industrial/Commercial	
CUMBERLAND COUNTY LF-NEWBURG	NEWBURG , PA	Non-Hazardous Industrial/Commercial	
CYCLE CHEM (NJ)	ELIZABETH , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
Dakota Supply Corp	Montrose , NY	Non-Hazardous Industrial/Commercial	
DOREMUS AVE SITE PREP & EARTHWORK	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT HARMONY (PLANT #1 BELVIDERE RD)	PHILLIPSBURG , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT HARMONY (PLANT #2 FOUL RIFT)	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
EARTH EFFICIENT MSM LLC	EAST STROUDSBURG , PA	Non-Hazardous Industrial/Commercial	
ENVIRONMENTAL & RECYCLING SERVICES, INC.	TAYLOR , PA	Non-Hazardous Industrial/Commercial	
Evergreen Recycling of Corona (Willets Point Blvd)	Corona , NY	Non-Hazardous Industrial/Commercial	
FAIRLESS LANDFILL (PA DEP 101699)	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial	
Faztec Industries	Staten Island , NY	Non-Hazardous Industrial/Commercial	
FORMER GM MOTORS ASSEMBLY PLANT	LINDEN , NJ	Non-Hazardous Industrial/Commercial	
FREEMANSBURG RESTORATION FACILITY	FREEMANSBURG , PA	Non-Hazardous Industrial/Commercial	
GERDAU AMERISTEEL PERTH AMBOY MILL/ANACONDA COOPER SITE	PERTH AMBOY , NJ	Non-Hazardous Industrial/Commercial	
GRAND CENTRAL SANITARY LANDFILL	PEN ARGYL , PA	Non-Hazardous Industrial/Commercial	
Great Gardens LLC	Yaphank , NY	Non-Hazardous Industrial/Commercial	
GREEN ROCK RECYCLING	CLINTON , NJ	Non-Hazardous Industrial/Commercial	
GREENVIEW	STROUDSBURG , PA	Non-Hazardous Industrial/Commercial	
GRIFFIN PIPE PRODUCTION CO.	FLORENCE , NJ	Non-Hazardous Industrial/Commercial	
GRINNELL RECYCLING INC	SPARTA , NJ	Non-Hazardous Industrial/Commercial	
GROWS LANDFILL NORTH (PA DEP 101680)	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial Asbestos	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-816

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MENDEZ TRUCKING INC
74 ACADEMY STREET
BELLEVILLE, NJ 07109

CONTACT NAME: JUAN O. MUNOZ
COUNTY: OUT OF STATE
TELEPHONE NO: (973)979-0100

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

EFFECTIVE DATE: 02/08/2025
EXPIRATION DATE: **02/07/2026**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
HAZLETON CREEK PROPERTIES, LLC	HAZLETON , PA	Non-Hazardous Industrial/Commercial	
HENRY HARRIS SLF (ALHERN, INC.)	MULLICA HILL , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
High Acres Western Expansion Landfill	Fairport , NY	Non-Hazardous Industrial/Commercial	
HOFFMAN GRIFFETT MINE RECLAMATION FACILITY	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
Hunters Point Recycling Inc	Long Island City , NY	Non-Hazardous Industrial/Commercial	
IMPACT ENVIRONMENT CAVEN POINT YARD	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial	
IMPACT ENVIRONMENTAL	AMBOY , NJ	Non-Hazardous Industrial/Commercial	
IMPACT RECOVERY AND REUSE CENTER	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial	
JERC PARTNERS VII/LLC	EDISON , NJ	Non-Hazardous Industrial/Commercial	
KEARNY POINT INDUSTRIAL PARK (KPIP)	SOUTH KEARNY , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
KEEGAN LANDFILL (HMDC) CLOSED DO NOT ADD	KEARNEY , NJ	Non-Hazardous Industrial/Commercial	
KEYSTONE SANITARY LANDFILL	DUNMORE , PA	Non-Hazardous Industrial/Commercial	
KEYSTONE TRADE CENTER	MORRISVILLE , PA	Non-Hazardous Industrial/Commercial	
KINGSLAND LANDFILL CLOSURE PROJECT	LYNDHURST , NJ	Non-Hazardous Industrial/Commercial	
KINSLEY LANDFILL	SEWELL , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
LIBERTY AGGREGATES	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial	
LINCOLN PARK WEST LANDFILL	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial	
MALANKA (MALL) LANDFILL	SECAUCUS , NJ	Non-Hazardous Industrial/Commercial	
MIDDLESEX COUNTY UA - EDGEBORO LANDFILL	EAST BRUNSWICK , NJ	Non-Hazardous Industrial/Commercial	
MIDDLESEX INDUSTRIAL CENTER	MIDDLESEX , NJ	Non-Hazardous Industrial/Commercial	
MONMOUTH COUNTY RECLAMATION CENTER	TINTON FALLS , NJ	Non-Hazardous Industrial/Commercial	
MORRIS BLANCHARD REDEVELOPMENT	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
NATURES CHOICE	NORTH ARLINGTON , NJ	Non-Hazardous Industrial/Commercial	
New York Recycling LLC	Bronx , NY	Non-Hazardous Industrial/Commercial	
OVERPECK PARK LANDFILL AREA IV	PALISADES PARK , NJ	Non-Hazardous Industrial/Commercial	
P PARK NORTH LLC	PROSPECT PARK , NJ	Non-Hazardous Industrial/Commercial	
Patriot Recycling Inc.	Oceanside , NY	Non-Hazardous Industrial/Commercial	
Pebble Lane Associates LLC	Maspeth , NY	Non-Hazardous Industrial/Commercial	
PHASE III ENVIRONMENTAL	PALMERTON , PA	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-816

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MENDEZ TRUCKING INC
74 ACADEMY STREET
BELLEVILLE, NJ 07109

CONTACT NAME: JUAN O. MUNOZ
COUNTY: OUT OF STATE
TELEPHONE NO: (973)979-0100

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

EFFECTIVE DATE: 02/08/2025
EXPIRATION DATE: **02/07/2026**
US EPA ID NUMBER:

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
PHASE III ENVIRONMENTAL	PALMERTON , PA	Petroleum Contaminated Soil	
PHILLIPSBURG COMMERCE PK URBAN RENEWAL ENTITY	PHILLIPSBURG , NJ	Non-Hazardous Industrial/Commercial	
PITT CONSOL SITE	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
Posillico Materials	Farmingdale , NY	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
PURE SOIL @ PERTH AMBOY	PERTH AMBOY , NJ	Non-Hazardous Industrial/Commercial	
PURE SOIL TECHNOLOGIES	JACKSON , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
REPUBLIC SERVICES MODERN LANDFILL	YORK , PA	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
RESOURCE MANAGEMENT TECHNOLOGIES	NORTH BERGEN , NJ	Non-Hazardous Industrial/Commercial	
Richmond Recycling LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial	
ROCKRETE RECYCLING	ELIZABETH , NJ	Non-Hazardous Industrial/Commercial	
ROCKTECH	JERSEY CITY , NJ	Non-Hazardous Industrial/Commercial	
RODOTA FILL SITE	BELVIDERE , NJ	Non-Hazardous Industrial/Commercial	
SILVA CONSTRUCTION & DEMOLITION	NEWARK , NJ	Non-Hazardous Industrial/Commercial	
SOIL SAFE, INC.	LOGAN TOWNSHIP , NJ	Non-Hazardous Industrial/Commercial Petroleum Contaminated Soil	
SOIL SAFE-METRO 12	CARTERET , NJ	Non-Hazardous Industrial/Commercial	
South Shore Recycling LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial	
Staten Island C&D LLC	Staten Island , NY	Non-Hazardous Industrial/Commercial	
STERICYCLE - HATFIELD	HATFIELD , PA	Non-Hazardous Industrial/Commercial	
TAYLORS LANE REMEDIATION PROJECT	CINNAMINSON , NJ	Non-Hazardous Industrial/Commercial	
TETERBORO LANDING	TETERBORO , NJ	Non-Hazardous Industrial/Commercial	
TILCON - KEARNY RECYCLING	KEARNY , NJ	Non-Hazardous Industrial/Commercial	
TILCON NEW YORK, INC.	WHARTON , NJ	Non-Hazardous Industrial/Commercial	
TM Maintenance Inc	Staten Island , NY	Non-Hazardous Industrial/Commercial	
TOTAL RECYCLING CORPORATION/ FULLERTON SLAG BANK	ALLENTOWN , PA	Non-Hazardous Industrial/Commercial	
TREMLEY POINT FLY ASH DISPOSAL SITE	LINDEN , NJ	Non-Hazardous Industrial/Commercial	
TULLYTOWN RESOURCE RECOVERY FACILITY (PA DEP 101494)	TULLYTOWN , PA	Non-Hazardous Industrial/Commercial Asbestos	
US STEEL KEYSTONE	FALLS TOWNSHIP , PA	Non-Hazardous Industrial/Commercial	

*** AUTHORIZED WASTE TYPES BY DESTINATION FACILITY LISTING (continued on next page) ***

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-816

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MENDEZ TRUCKING INC
74 ACADEMY STREET
BELLEVILLE, NJ 07109

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME:	JUAN O. MUNOZ	EFFECTIVE DATE:	02/08/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**02/07/2026**
TELEPHONE NO:	(973)979-0100	US EPA ID NUMBER:	

AUTHORIZED WASTE TYPES BY DESTINATION FACILITY: (Continued)
The Permittee is Authorized to Transport the Following Waste Type(s) to the Destination Facility listed :

Destination Facility	Location	Waste Type(s)	Note
VALLEY INDUSTRIAL PROPERTIES	EAST BANGOR , PA	Non-Hazardous Industrial/Commercial	
WESTSIDE TRANSLOAD LLC	NORTH BERGEN , NJ	Non-Hazardous Industrial/Commercial	
WMNY Varick 1 Transfer Station	Brooklyn , NY	Non-Hazardous Industrial/Commercial	
XRDS RECYCLING LLC	WAYNE , NJ	Non-Hazardous Industrial/Commercial	
YANNUZZI & SONS	HILLSBOROUGH , NJ	Non-Hazardous Industrial/Commercial	

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MATERIALS MANAGEMENT

PART 364
WASTE TRANSPORTER PERMIT NO. NJ-816

Pursuant to Article 27 ,Titles 3 and 15 of the Environmental Conservation Law and 6 NYCRR 364

PERMIT ISSUED TO:

MENDEZ TRUCKING INC
74 ACADEMY STREET
BELLEVILLE, NJ 07109

PERMIT TYPE:

☐ NEW
■ RENEWAL
☐ MODIFICATION

CONTACT NAME:	JUAN O. MUNOZ	EFFECTIVE DATE:	02/08/2025
COUNTY:	OUT OF STATE	EXPIRATION DATE:	**02/07/2026**
TELEPHONE NO:	(973)979-0100	US EPA ID NUMBER:	

AUTHORIZED VEHICLES:
The Permittee is Authorized to Operate the Following Vehicles to Transport Waste:

(Vehicles enclosed in <>'s are authorized to haul Residential Raw Sewage and/or Septage only)

33 (Thirty Three) Permitted Vehicle(s)

NJ AS353M
NJ AS354M
NJ AS520B
NJ AS521B
NJ AS530D
NJ AS531D
NJ AS757P
NJ AT558B
NJ AU550Z
NJ AU937Z
NJ AW525V
NJ AW526V
NJ AW549H
NJ AW582M
NJ AW583M
NJ AW652G
NJ AW653G
NJ AW654G
NJ AW833L
NJ AW834L
NJ AW837F
NJ AW838F
NJ AX792T
NJ AX956X
NJ AX957X
NJ AY608Y
NJ AZ128J
NJ AZ129J
NJ AZ130J
NJ AZ165H
NJ AZ166H
NJ AZ834G
NJ AZ835G
End of List

Appendix B:

NYSDEC Email and Workplan Approvals

Outlook

Re: Site No C360172 - Pipe investigation and removal

From Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Date Fri 4/18/2025 9:17 AM
To Fuad Dahan, PE, LSRP <fd@sesi.org>
Cc Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>

CAUTION !! This E-Mail originated from outside the organization. Confirm it is from a legitimate E-Mail address. If uncertain - do not click links or open attachments unless you contact the sender and know the content is safe.

Thank you, Fuad.

I have no further questions and the plan is acceptable.

- Caroline

Get Outlook for iOS

From: Fuad Dahan, PE, LSRP <fd@sesi.org>
Sent: Thursday, April 17, 2025 6:08:54 PM
To: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Cc: Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Pipe investigation and removal

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

My answers in green below.

Regards,

SESI CONSULTING ENGINEERS
GEOTECHNICAL ENVIRONMENTAL SITE CIVIL

Fuad Dahan, PE, LSRP
Principal
fd@sesi.org
862-702-5719
973-747-9567
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

sesi.org

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

From: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Sent: Thursday, April 17, 2025 4:02 PM
To: Fuad Dahan, PE, LSRP <fd@sesi.org>
Cc: Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Pipe investigation and removal

CAUTION !! This E-Mail originated from outside the organization. Confirm it is from a legitimate E-Mail address. If uncertain - do not click links or open attachments unless you contact the sender and know the content is safe.

Fuad,

See my clarifying questions below in red.

- Remove product via high CFM Vacuum truck (Vactor, Guzzler etc.). This may need to be done through a vacuum box or drum.
- The vacuumed material from the pipe will be stored in a lined roll
  - Lined rolloff container? Yes
- Once the pipe is vacuumed, a push or crawler camera will be inserted to investigate the pipe length and location to develop a plan for removal.
  - How will the location of the camera be tracked? Will there be live GPS coordinates to track the camera? It will be tracked by measuring the distance and the angles. No GPS unit.
  - How will the pipe location be marked out above ground? Stakes, spray paint, etc.? It will be painted and or staked
- Excavate around the pipe after the pipe has been evacuated of material to determine the path and remove accordingly. Piping path investigation may necessitate excavation into adjacent structural and environmental grids. Material that is excavated from adjacent grids will be stockpile accordingly based on disposal facility. All the material from MGP-4 will be stockpiled for disposal to Waste Management Emelle. All other grids will be stockpiled for disposal to Waste Management Fairless.
  - If the pipe extends beneath the current truck pads how will this be addressed? The pad will be removed temporary or moved to another location if needed.
- The sludge will be stabilized by mixing with a drying agent with an excavator bucket inside the roll-off container until the free liquids and absorbed.

- Once the material is stabilized with no free liquids, it will be mixed with the existing approved material for offsite disposal into Waste Mgt Emelle.
- The vac truck will be decontaminated on site and the liquid waste dumped into the rolloff.
    - A fractank would be more appropriate to contain liquid waste. How will this material be treated and/or transported? Based on conversation with the soil broker and receiving facilities it is better to dispose of the wash liquids in the roll-off; we do not expect much volume. It will be stabilized in the roll off with Portland Cement or Power Pellets (SDS and specs attached) and then loaded in trucks for disposal.
- The pipe will be removed in pieces
    - How will segmented pieces be determined? By predetermined cells, remedial areas v structural areas? Once the pipe is delineated the plan is to remove it all before the ISS in any area structural or remediation.
- If any spill occurs during the pipe removal, it will be stabilized immediately by blocking the pipe section from which it is coming. The spilled material will removed and placed it either in the roll-off or in a stabilized stockpiled.
    - If placed in the rolloff containing material from vac truck decon, how will the material be treated and prepped for transport to a disposal facility? The liquids in the roll off will be stabilized with Portland cement (PC) or power pellets. This method was recommended by the soil broker and the disposal facility will accept the stabilized product.
- Place the removed pipe pieces in a stabilized stockpile underlain and covered with plastic sheeting and surrounded with haybales.

CAROLINE JALANTI, P.E. *(she/her/hers)*
Professional Engineer 1

New York State Department of Environmental Conservation
Division of Environmental Remediation | Bureau C
625 Broadway, Albany, NY 12233-4500
w: (518) 402-9650 | caroline.jalanti@dec.ny.gov
dec.ny.gov | @NYSDEC on Social Media | Podcast

From: Fuad Dahan, PE, LSRP <fd@sesi.org>
Sent: Thursday, April 17, 2025 3:18 PM
To: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Cc: Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>
Subject: Site No C360172 - Pipe investigation and removal

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Caroline,

Please find below the procedure to investigate and remove the encountered pipes in Ossining.

- Remove product via high CFM Vacuum truck (Vactor, Guzzler etc.). This may need to be done through a vacuum box or drum.
- The vacuumed material from the pipe will be stored in a lined roll
- Once the pipe is vacuumed, a push or crawler camera will be inserted to investigate the pipe length and location to develop a plan for removal.

- Excavate around the pipe after the pipe has been evacuated of material to determine the path and remove accordingly. Piping path investigation may necessitate excavation into adjacent structural and environmental grids. Material that is excavated from adjacent grids will be stockpile accordingly based on disposal facility. All the material from MGP-4 will be stockpiled for disposal to Waste Management Emelle. All other grids will be stockpiled for disposal to Waste Management Fairless.
- The sludge will be stabilized by mixing with a drying agent with an excavator bucket inside the roll-off container until the free liquids and absorbed.
- Once the material is stabilized with no free liquids, it will be mixed with the existing approved material for offsite disposal into Waste Mgt Emelle.
- The vac truck will be decontaminated on site and the liquid waste dumped into the rolloff.
- The pipe will be removed in pieces
- If any spill occurs during the pipe removal, it will be stabilized immediately by blocking the pipe section from which it is coming. The spilled material will removed and placed it either in the roll-off or in a stabilized stockpiled.
- Place the removed pipe pieces in a stabilized stockpile underlain and covered with plastic sheeting and surrounded with haybales.

Please let me know if this approach is acceptable.

Regards,

Fuad Dahan, PE, LSRP
Principal
fd@sesi.org
862-702-5719
973-747-9567
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054
sesi.org

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

SESI
CONSULTING ENGINEERS

Geotechnical
Environmental
Site Civil

959 Route 46E, Fl 3, Ste 300
Parsippany, NJ 07054
973.808.9050
www.sesi.org

Pre Design Investigation Delineation Sampling Work Plan

For

Ossining Gas Works DPW Site
BCP No. C360172
30 Water Street
Ossining, Westchester County, NY

Prepared for:

WB 30 Water Street, LLC

May 2025

SESI Project No:
11498

CERTIFICATIONS

I, Fuad Dahan, certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Pre Design Investigation Delineation Sampling 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	5/14/2025	
NYS Professional Engineer	Date	Signature
(# 090531)		

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education

Table of Contents

LIST OF ACRONYMS i
1.0 INTRODUCTION AND PURPOSE 1
2.0 OBJECTIVES, SCOPE AND RATIONALE 1
3.0 DELINEATION OF PAH-IMPACTED AREAS PRE-REMEDIATION 1
4.0 DELINEATION OF EASTERN EXCAVATION 2
5.0 HEALTH AND SAFETY PROTOCOLS 3
6.0 GOVERNING DOCUMENTS 4
7.0 REPORTING AND SCHEDULE 4
8.0 CONTACT INFORMATION 4
9.0 CITIZEN PARTICIPATION ACTIVITIES 5

FIGURES

Figure 3.1 Proposed Boring Locations
Figure 4.1 Proposed Test Pit Locations

TABLES

Table 3.1 Proposed Soil Boring Sample Summary
Table 4.1 Proposed Test Pit Sample Summary
Table 7.1 Estimated Schedule of Completion
Table 8.1 Contact Information

ATTACHMENTS

Attachment 1 Analytical Results

LIST OF ACRONYMS

Acronym	Definition
BCP	Brownfield Cleanup Program
ft-bgs	Feet below grade surface
ISS	In Situ Solidification
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbon
PDI	Pre Design Investigation
PGW	Protection of Groundwater
RAWP	Remedial Action Work Plan
RDWP	Remedial Design Work Plan
RRSCO	Restricted Residential Soil Cleanup Objectives
SCO	Soil Cleanup Objective

1.0 INTRODUCTION AND PURPOSE

WB 30 Water Street, LLC (the "Volunteer") entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) on April 8, 2024 to investigate and remediate a portion of the Former Ossining Works Site, Operable Unit 1 (OU-1), which is now known as the Former Ossining Gas Works DWP BCP Site No. C360172 (hereinafter referred to as the "Site" or "BCP Site"). The Site, along with the remainder of OU-1 and Operable Units OU-2 and OU-3, has previously been subject to Consent Order No. CO 0-20180516-519 with Consolidated Edison Company of New York, Inc. ("Con Edison"). The Site has been removed from the Consent Order in order for the Site to enter the Brownfield Cleanup Program (BCP) but the remainder of OU-1, OU-2 and OU-3 remain subject to the Con Edison Consent Order.

This is a Pre Design Investigation (PDI) Sampling Work Plan to delineate soils exceeding the Protection of Groundwater (PGW) Soil Cleanup Objectives (SCOs) pre-remediation, which includes excavation or in situ solidification stabilization (ISS) mixing.

2.0 OBJECTIVES, SCOPE AND RATIONALE

The Scope of work of this PDI Delineation Sampling Work Plan is to detail the delineation for pre-remediation areas through the advancement of borings and test pits. The delineation observations and sampling will determine the method of remediation required in each area. The work will be completed in conformance of the Remedial Action Work Plan (RAWP) approved by the NYSDEC on February 14, 2025.

3.0 DELINEATION OF PAH-IMPACTED AREAS PRE-REMEDIATION

The information below details the boring delineation prior to remediating three (3) areas for polycyclic aromatic hydrocarbons (PAH) impacts. Pre-excavation delineation sampling around B-10 (Excavation C), B-11 (Excavation B) and SB-23B (Excavation D) is planned to be completed as outlined in **Table 3.1** below. Samples will be collected for PAHs only.

Table 3.1 Proposed Soil Boring Sample Summary

Location	**Sample ID**	**Depth of Sample (ft-bgs)**	**Analytical Procedures** Sampling Method
Excavation B	B-11-10'N (2.5-3')	2.5-3.0	PAHs (EPA Method 8270) Grab
Excavation B	B-11-10'E (2.5-3')	2.5-3.0	
Excavation B	B-11-10'S (2.5-3')	2.5-3.0	
Excavation B	B-11-10'W (2.5-3')	2.5-3.0	
Excavation C	B-10-10'N (10.5-11')	10.5-11.0	
Excavation C	B-10-10'E (10.5-11')	10.5-11.0	
Excavation C	B-10-10'S (10.5-11')	10.5-11.0	
Excavation C	B-10-10'W (10.5-11')	10.5-11.0	
Excavation D	SB-23B-10'N (5.5-6.2')	5.5-6.2	
Excavation D	SB-23B-10'E (5.5-6.2')	5.5-6.2	
Excavation D	SB-23B-10'S (5.5-6.2')	5.5-6.2	
Excavation D	SB-23B-10'W (5.5-6.2')	5.5-6.2	
QA/QC	Duplicate-1	TBD	
QA/QC	MS/MSD-1	TBD	

- Up to one (1) duplicate sample and one (1) Matrix Spike/Matrix Spike Duplicate (MS/MSD) will be collected for every 20 samples for QA/QC. Therefore, it is anticipated that one (1) duplicate and one (1) MS/MSD will be required for this sampling as noted in Table 3.1 above.
- All borings will be documented for lithology; visual observations including products, staining etc.; odors and PID readings.
- The sample analytical results will be compared to PGWSCO and the results will determine the extent of remediation required by excavation or if the remedy should be modified to include these area(s) for ISS.
- Should bedrock be encountered prior to the sample depth in any area, an additional boring will be advanced adjacent to confirm the bedrock refusal depth. Bedrock will then be documented in lieu of sample collection.
- All spoils will be placed in 55-gallon drums and all reuseable equipment will be properly decontaminated.
- Each boring will be backfilled upon completion.

The proposed boring sample locations are provided as **Figure 3.1**

4.0 DELINEATION OF EASTERN EXCAVATION

The information below details the test pit sampling delineation of the eastern four (4)-foot excavation. The remediation plan for this area included 4 foot excavation per the RAWP and the collection of post excavation samples. The 4-ft excavation was completed on April 8, 2025. The post excavation samples were collected on April 11, 2025 and resulted in PGW exceedances of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. As a result, one (1) additional foot of soil was excavated vertically, two (2) additional feet horizontally to the east and one (1) additional foot of soil to the south. Post excavation samples were then collected on April 18, 2025. The second round of post excavation samples resulted in exceedances of the PGW, specifically for the same PAHs, with the exception of naphthalene which is not considered a PAH contaminant of concern per the RAWP. These results are included as **Attachment 1.**

The excavation is currently below the groundwater table and below the Sing Sing Brook grade. Further vertical excavation is not practical because of the water and the proximity to the Sing Sing. SESI is proposing ISS - mixing this area in lieu of further excavation. Therefore, further investigation is required to determine the vertical depth of the PGW exceedances to determine the ISS mixing depth.

- One (1) test pit will be completed at the center of the existing excavation for vertical delineation and two (2) additional test pits will be completed 5 ft-bgs and 10 ft-bgs east of the eastern sidewall for horizontal delineation.
- Test pits will each be excavated to 10 ft-bgs with samples collected at 2 foot intervals below the existing excavation grade as noted in **Table 4.1** below:

Table 4.1 Proposed Test Pit Sample Summary

Location	**Sample ID**	**Depth of Sample (ft-bgs)**	**Analytical Procedures** Sampling method
TP-1	TP-1 (6-6.5')	6.0-6.5	

Location	Sample ID	Depth of Sample (ft-bgs)	Analytical Procedures Sampling method
TP-1	TP-1 (8-8.5')*	8.0-8.5	PAHs (EPA Method 8270) Grab
TP-1	TP-1 (10-10.5')*	10.0-10.5	
TP-2	TP-2 (6-6.5')	6.0-6.5	
TP-2	TP-2 (8-8.5')*	8.0-8.5	
TP-2	TP-2 (10-10.5')*	10.0-10.5	
TP-3	TP-3 (6-6.5')*	6.0-6.5	
TP-3	TP-3 (8-8.5')*	8.0-8.5	
TP-3	TP-3 (10-10.5')*	10.0-10.5	
QA/QC	Duplicate-2	TBD	
QA/QC	MS/MSD-2	TBD	

**Sample collected and placed on hold; contingent on other sample results*

- Samples at 6-6.5' will be run for PAHs of concern that exceeded the PGW SCOs in the initial post-excavation sampling of this area. This includes benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. Samples will be released from vertical and horizontal intervals based on the results of the initial round.
- Up to one (1) duplicate sample and one (1) MS/MSD will be collected for every 20 samples for QA/QC. Therefore, it is anticipated that one (1) duplicate and one (1) MS/MSD will be required for this sampling as noted in Table 4.1 above.
- Horizontal delineation will be concluded when sample results are below the PGW SCOs or reach the property boundary to the east.
- Vertical delineation will be concluded when sample results are below the PoGW SCOs.
- Sampling is not anticipated to the west due to the remedial ISS-B area. Sampling is not anticipated to the south due to the rock wall and buttress. Sampling is not anticipated to the north due to the retaining wall and the Sing Sing Brook.
- Each test pit will be backfilled immediately upon completion, with the same material to minimize exposure before proceeding to the next location.
- Each test pit will be continuously logged and observation of any free product, PID readings and odors will be reported.

The proposed sample locations are provided as **Figure 4.1.**

5.0 HEALTH AND SAFETY PROTOCOLS

Air monitoring will be performed during the implementation of the pilot study actions to protect the health and safety of Site workers and to confirm that air impacts from Site-related activities are not migrating off-Site. The monitoring program will include monitoring for vapor, odors, and dust.

Vapors will be monitored during the pilot study activities in accordance with the Community Air Monitoring Plan (CAMP) and the Health and Safety Plan (HASP) of the approved RAWP.

6.0 GOVERNING DOCUMENTS

The following appendices are included in the approved RAWP and applicable to this PDI delineation sampling work plan:

- Health and Safety Plan
- Soil Erosion and Sediment Controls Plan (SESCP)
- Community Air Monitoring Plan
- Citizen Participation Plan (CPP)

7.0 REPORTING AND SCHEDULE

Electronic progress reports will be submitted to NYSDEC and New York State Department of Health (NYSDOH) Project Managers daily before the close of business on the following day. Upon completion of the PDI delineation, SESI will provide the results within two (2) weeks.

An estimated schedule of completion is included in **Table 7.1** below.

Table 7.1 Estimated Schedule of Completion

Task	Duration
Boring Delineation	1 day
Test Pit Delineation	1 day
Sample Results and Recommendations	2 weeks

8.0 CONTACT INFORMATION

The following **Table 8.1** includes the contact information of the personnel associated with the pilot study work to be completed:

Table 8.1 Contact Information

Agency/Individual	Contact Number
James Seliga, Vice President of Operations* Renova Environmental Co.	(732) 659-1000
Fuad Dahan, Remedial Engineer SESI Consulting Engineers	(973) 808-9050
Jose Rodriguez, Geotechnical Engineer SESI Consulting Engineers	(973) 808-9050
Christopher Malvicini, Asst Project Manager	(973) 808-9050

Agency/Individual	Contact Number
SESI Consulting Engineers	
Craig Malkin, President Griffon Construction	(845) 278-0301
Michael Burke, Project Manager Griffon Construction	(845) 745-0219
James Wendling, Volunteer Representative WB 30 Water Street LLC	(914) 610-3647
Caroline Jalanti, Project Manager NYSDEC	(518) 402-9650
Anthony Perretta, Project Manager NYSDOH	(518) 402-7860

9.0 CITIZEN PARTICIPATION ACTIVITIES

Citizen Participation during implementation of the remedial program will proceed in accordance with the Citizen Participation Plan included in the approved RAWP. The short-term impacts will be addressed by the CAMP, HASP and other measures such as a truck wash at the points of ingress and egress and other odor and dust controls.

Department of Environmental Conservation

KATHY HOCHUL
Governor

AMANDA LEFTON
Acting Commissioner

Transmitted via Email

May 14, 2025

WB 30 Water Street, LLC
William Balter
480 Bedford Road, 300 Building
First Floor, West Wing
Chappaqua, NY 10514
bbalter@wbpdev.com

Rosemarie Noonan
c/o Housing Action Council
55 South Broadway, 2nd Floor
Tarrytown, New York 10591
rnoonan@affordablehomes.org

Re: Pre-Design Investigation Delineation Sampling Work Plan – May 14, 2025
Ossining Gas Works DPW Site
Ossining, NY
Site No.: C360172

Mr. Balter and Ms. Noonan:

The New York State Department of Environmental Conservation (the Department) has reviewed the Pre-Design Investigation Delineation Sampling Work Plan, dated May 14, 2025, for the Ossining Gas Works DPW Site (Site No. C360172), and determined this work plan to be acceptable.

Place a copy of the approved work plan to the document repository and record of submission by email to, caroline.jalanti@dec.ny.gov. As we have previously discussed this work in relation to the on-going site schedule, the 7-day notice requirement is waived for this sampling plan.

Sincerely,

Caroline Jalanti, P.E.
Project Manager
Remedial Bureau C, Section B
Division of Environmental Remediation

ec:

J. Wendling, WBP (jwendling@wilderbalter.com)
C. Hahn, WBP (chahn@wbpdev.com)
F. Duhan, SESI (fd@sesi.org)
J. Vander Vliet, SESI (james.vandervliet@sesi.org)
L. Shaw, Knauf Shaw LLP (Lshaw@nyenvlaw.com)
M. Doroski, NYSDOH (melissa.doroski@health.ny.gov)
A. Perretta, NYSDOH (anthony.perretta@health.ny.gov)
M. Murphy, NYSDEC OGC (michael.murphy1@dec.ny.gov)
S. McCague, NYSDEC Region 3 (steven.mccague@dec.ny.gov)
S. Pawliczak, NYSDEC (Sarah.Pawliczak@dec.ny.gov)
S. Saucier, NYSDEC (sarah.saucier@dec.ny.gov)
K. Maloney, NYSDEC (kerry.maloney@dec.ny.gov)

DecDocs/File

From:	Jalanti, Caroline B (DEC)
To:	Christopher C. Malvicini
Cc:	William Luposello; Craig Malkin; Chris Hahn; Fuad Dahan, PE, LSRP; Andrei Dirle; Jose M. Rodriguez, PE; Sheng Long, LSRP; James Wendling; Michael Burke; Maloney, Kerry A (DEC); Pratt, Gerald H (DEC); Wharram, Nicolus G (DEC)
Subject:	RE: Site No C360172 - Activities Schedule week of 5/5
Date:	Thursday, May 8, 2025 1:48:56 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png image007.png image008.png image009.png image010.png image011.png

CAUTION !! This E-Mail originated from outside the organization. Confirm it is from a legitimate E-Mail address. If uncertain - do not click links or open attachments unless you contact the sender and know the content is safe.

Thank you for the quick reply.

The scope of work is acceptable. Please document the scope deviation (adding test pits) and findings in the final Pilot Study Report.

CAROLINE JALANTI, P.E. *(she/her/hers)*
Professional Engineer 1
New York State Department of Environmental Conservation
Division of Environmental Remediation | Bureau C
625 Broadway, Albany, NY 12233-4500
w: (518) 402-9650 | caroline.jalanti@dec.ny.gov
dec.ny.gov | @NYSDEC on Social Media | Podcast

From: Christopher C. Malvicini <chris.malvicini@sesi.org>
Sent: Thursday, May 8, 2025 1:37 PM
To: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; fd@sesi.org; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Yes, the points in the J(B) area are each representative of a proposed approximate test pit location.

Christopher C. Malvicini
Asst. Project Manager II
chris.malvicini@sesi.org
973-808-9050 Ext 273
973-518-8042
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

From: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Sent: Thursday, May 8, 2025 1:13 PM
To: Christopher C. Malvicini <chris.malvicini@sesi.org>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; Fuad Dahan, PE, LSRP <fd@sesi.org>; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

CAUTION !! This E-Mail originated from outside the organization. Confirm it is from a legitimate E-Mail address. If uncertain - do not click links or open attachments unless you contact the sender and know the content is safe.

Chris,

My assumption is the blue squares on the attached figure denote the planned test pit locations, is this correct?

CAROLINE JALANTI, P.E. *(she/her/hers)*
Professional Engineer 1

New York State Department of Environmental Conservation
Division of Environmental Remediation | Bureau C
625 Broadway, Albany, NY 12233-4500
w: (518) 402-9650 | caroline.jalanti@dec.ny.gov
dec.ny.gov | @NYSDEC on Social Media | Podcast

From: Christopher C. Malvicini <chris.malvicini@sesi.org>
Sent: Thursday, May 8, 2025 10:32 AM
To: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; fd@sesi.org; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Hi Caroline,

Below please find the details regarding the planned delineation work at Pilot Cell J(B) below:
The proposed plan below is to:

a. Delineate the horizontal and vertical extent of the observed debris in Pilot J(B);
b. Determine if the tank bottom is still present and if so, the extent; and
c. Develop a remediation plan for Pilot J (B) based on the findings of this investigation.

Based on the test pit probing conducted on April 30, 2025, Pilot Cell J(B) was found to predominantly consist of construction debris (e.g. bricks, stones and concrete chunks). We propose to delineate the horizontal extent of the debris using test pits, while actively using odor and dust controls:

- Starting on the northern side of Piot J(B) a line of test pits (20 ft apart from each other) will be conducted approximately

10-ft away from Pilot J(A) as shown in the attached. Test pits will be conducted at centers in the eastern and western directions until significant debris is no longer observed or until reaching the property boundary. The test pits will also be conducted southward to the extent of the Pilot J(B). The test pits will be at minimum 20-ft separation in the south direction or to the extent of the test pit. See the attached plan with planned test pit locations.

- The width of each test pit will be limited to the bucket width to the extent possible.
- Each test pit will be extended to a depth of the tank bottom, if present, to confirm its presence and its extent.
- Dewatering by pumping water directly from the excavation will be conducted as needed to facilitate the observations and the investigative work.
- One of the CAMP stations will be placed downwind adjacent the Pilot J(B) work activities.
- Odor control foam will be applied at each test pit and at any temporary soil stockpiles, as needed.
- Each test pit will be backfilled immediately upon completion, with the same material to minimize exposure before proceeding to the next location.
- Each test pit will be continuously logged and observation of any free product, PID readings and odors will be reported.
- The approximate location and depth of each test pit will be measured to determine the extent of the encountered debris and the tank bottom.
- All work will be conducted under the CAMP and HASP of the approved RAWP

This investigation will be conducted with an excavator and no direct push-drilling methods will be used. Direct-push drilling methods are likely to encounter frequent refusal due to debris. Additionally, previous borings installed by Arcadis (attached) were not conclusive on the nature and extent of the debris or the nature and extent and the presence of the tank bottoms.
Please let us know if you have any questions and if this plan is acceptable to proceed with this investigation.

Thanks,
Chris

Christopher C. Malvicini
Asst. Project Manager II
chris.malvicini@sesi.org
973-808-9050 Ext 273
973-518-8042
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

From: Christopher C. Malvicini
Sent: Wednesday, May 7, 2025 4:18 PM
To: Jalanti, Caroline B (DEC) <caroline.jalanti@dec.ny.gov>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; Fuad Dahan, PE, LSRP <fd@sesi.org>; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>
Subject: Site No C360172 - Activities Schedule week of 5/5

Hi Caroline,

Please see the planned site schedule for this week through Monday next week.

Date		Activities	Disposal Facility	Trucks	Status
Monday	**5/5/2025**	**Stream Diversion Installation**			
Tuesday	**5/6/2025**	**Stream Diversion Installation**			
		Breakup 2-1,2-2,2-3 Slab			
		Breakup concrete from MGP-4 Cell			
		Backfill Pilot Cell C			
Wednesday	**5/7/2025**	**Breakup 2-1,2-2,2-3 Slab**			
		Export MGP-4 Lead Cell Material	**WM-Emelle**		
		Load out North Side Soils			
Thursday	**5/8/2025**	**Stream Diversion Installation**			
		Export MGP-4 Lead Cell Material	**WM-Emelle**		
		Load out North Side Soils			
Friday	**5/9/2025**	**Stream Diversion Installation**			
		Export MGP-4 Lead Cell Material	**WM-Emelle**		
		Mix 2-2 or 2-3			
		Load out North Side Soils			
Monday	**5/12/2025**	**Stream Diversion Installation**			
		Coring Pilot Cell C			
		Investigate Area J Holder Wall			
		Mix 2-2 or 2-3			
		Load out North Side Soils			

Please also note that we have drilling scheduled on Thursday 5/15 to delineate excavations noted in the RDWP. We will provide a workplan for this shortly.

Please let us know if you have any questions.

Thanks,
Chris

Christopher C. Malvicini
Asst. Project Manager II
chris.malvicini@sesi.org
973-808-9050 Ext 273
973-518-8042
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

From:	Jalanti, Caroline B (DEC)
To:	Fuad Dahan, PE, LSRP; Christopher C. Malvicini
Cc:	William Luposello; Craig Malkin; Chris Hahn; Andrei Dirle; Jose M. Rodriguez, PE; Sheng Long, LSRP; James Wendling; Michael Burke; Maloney, Kerry A (DEC); Pratt, Gerald H (DEC); Wharram, Nicolus G (DEC)
Subject:	RE: Site No C360172 - Activities Schedule week of 5/5
Date:	Monday, May 19, 2025 3:32:02 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png image007.png image008.png image009.png image010.png image011.png

---

CAUTION !! This E-Mail originated from outside the organization. Confirm it is from a legitimate E-Mail address. If uncertain - do not click links or open attachments unless you contact the sender and know the content is safe.

Yes, it is acceptable to defer the work related to Pilot Cell J(B).

Based on field reporting and the findings of QA/QC coring in Pilot-C, the goals of the Pilot Study have been achieved.

CAROLINE JALANTI, P.E. *(she/her/hers)*
Professional Engineer 1
New York State Department of Environmental Conservation
Division of Environmental Remediation | Bureau C
625 Broadway, Albany, NY 12233-4500
w: (518) 402-9650 | caroline.jalanti@dec.ny.gov
dec.ny.gov | @NYSDEC on Social Media | Podcast

From: Fuad Dahan, PE, LSRP <fd@sesi.org>
Sent: Monday, May 19, 2025 3:19 PM
To: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>; Christopher C. Malvicini <chris.malvicini@sesi.org>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Hi Caroline,

We are requesting that the scope described below for the pre-clearing/investigation of the Piot-J(B) be completed under the full scale work. If this change is approved, we can submit the pilot study report in which we will mention that the Pilot J (B) will be pre-cleared/investigated and remediated under the full scale work and the RDWP.

Please let me know if this acceptable.

Regards,

Fuad Dahan, PE, LSRP
Principal

fd@sesi.org
862-702-5719
973-747-9567
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

From: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Sent: Thursday, May 8, 2025 1:49 PM
To: Christopher C. Malvicini <chris.malvicini@sesi.org>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; Fuad Dahan, PE, LSRP <fd@sesi.org>; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

CAUTION !! This E-Mail originated from outside the organization. Confirm it is from a legitimate E-Mail address. If uncertain - do not click links or open attachments unless you contact the sender and know the content is safe.

Thank you for the quick reply.

The scope of work is acceptable. Please document the scope deviation (adding test pits) and findings in the final Pilot Study Report.

CAROLINE JALANTI, P.E. *(she/her/hers)*
Professional Engineer 1

New York State Department of Environmental Conservation
Division of Environmental Remediation | Bureau C
625 Broadway, Albany, NY 12233-4500
w: (518) 402-9650 | caroline.jalanti@dec.ny.gov
dec.ny.gov | @NYSDEC on Social Media | Podcast

From: Christopher C. Malvicini <chris.malvicini@sesi.org>
Sent: Thursday, May 8, 2025 1:37 PM
To: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; fd@sesi.org; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Yes, the points in the J(B) area are each representative of a proposed approximate test pit location.

Christopher C. Malvicini
Asst. Project Manager II
chris.malvicini@sesi.org
973-808-9050 Ext 273
973-518-8042
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

From: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Sent: Thursday, May 8, 2025 1:13 PM
To: Christopher C. Malvicini <chris.malvicini@sesi.org>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; Fuad Dahan, PE, LSRP <fd@sesi.org>; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

CAUTION !! This E-Mail originated from outside the organization. Confirm it is from a legitimate E-Mail address. If uncertain - do not click links or open attachments unless you contact the sender and know the content is safe.

Chris,

My assumption is the blue squares on the attached figure denote the planned test pit locations, is this correct?

CAROLINE JALANTI, P.E. *(she/her/hers)*
Professional Engineer 1

New York State Department of Environmental Conservation
Division of Environmental Remediation | Bureau C
625 Broadway, Albany, NY 12233-4500
w: (518) 402-9650 | caroline.jalanti@dec.ny.gov
dec.ny.gov | @NYSDEC on Social Media | Podcast

From: Christopher C. Malvicini <chris.malvicini@sesi.org>
Sent: Thursday, May 8, 2025 10:32 AM
To: Jalanti, Caroline B (DEC) <Caroline.Jalanti@dec.ny.gov>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; fd@sesi.org; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>; Pratt, Gerald H (DEC) <gerald.pratt@dec.ny.gov>; Wharram, Nicolus G (DEC) <nicolus.wharram@dec.ny.gov>
Subject: RE: Site No C360172 - Activities Schedule week of 5/5

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Hi Caroline,

Below please find the details regarding the planned delineation work at Pilot Cell J(B) below:
The proposed plan below is to:

a. Delineate the horizontal and vertical extent of the observed debris in Pilot J(B);
b. Determine if the tank bottom is still present and if so, the extent; and
c. Develop a remediation plan for Pilot J (B) based on the findings of this investigation.

Based on the test pit probing conducted on April 30, 2025, Pilot Cell J(B) was found to predominantly consist of construction debris (e.g. bricks, stones and concrete chunks). We propose to delineate the horizontal extent of the debris using test pits, while actively using odor and dust controls:

- Starting on the northern side of Piot J(B) a line of test pits (20 ft apart from each other) will be conducted approximately 10-ft away from Pilot J(A) as shown in the attached. Test pits will be conducted at centers in the eastern and western directions until significant debris is no longer observed or until reaching the property boundary. The test pits will also be conducted southward to the extent of the Pilot J(B). The test pits will be at minimum 20-ft separation in the south direction or to the extent of the test pit. See the attached plan with planned test pit locations.
- The width of each test pit will be limited to the bucket width to the extent possible.
- Each test pit will be extended to a depth of the tank bottom, if present, to confirm its presence and its extent.
- Dewatering by pumping water directly from the excavation will be conducted as needed to facilitate the observations and the investigative work.
- One of the CAMP stations will be placed downwind adjacent the Pilot J(B) work activities.
- Odor control foam will be applied at each test pit and at any temporary soil stockpiles, as needed.
- Each test pit will be backfilled immediately upon completion, with the same material to minimize exposure before proceeding to the next location.
- Each test pit will be continuously logged and observation of any free product, PID readings and odors will be reported.
- The approximate location and depth of each test pit will be measured to determine the extent of the encountered debris and the tank bottom.
- All work will be conducted under the CAMP and HASP of the approved RAWP

This investigation will be conducted with an excavator and no direct push-drilling methods will be used. Direct-push drilling methods are likely to encounter frequent refusal due to debris. Additionally, previous borings installed by Arcadis (attached) were not conclusive on the nature and extent of the debris or the nature and extent and the presence of the tank bottoms.
Please let us know if you have any questions and if this plan is acceptable to proceed with this investigation.

Thanks,
Chris

Christopher C. Malvicini
Asst. Project Manager II
chris.malvicini@sesi.org
973-808-9050 Ext 273
973-518-8042
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

From: Christopher C. Malvicini
Sent: Wednesday, May 7, 2025 4:18 PM
To: Jalanti, Caroline B (DEC) <caroline.jalanti@dec.ny.gov>
Cc: William Luposello <wluposello@griffonllc.com>; Craig Malkin <cmalkin@griffonllc.com>; Chris Hahn <chahn@wbpdev.com>; Fuad Dahan, PE, LSRP <fd@sesi.org>; Andrei Dirle <andrei.dirle@sesi.org>; Jose M. Rodriguez, PE <jose.rodriguez@sesi.org>; Sheng Long, LSRP <sheng.long@sesi.org>; James Wendling <jwendling@wbpdev.com>; Michael Burke <mburke@griffonllc.com>; Maloney, Kerry A (DEC) <kerry.maloney@dec.ny.gov>
Subject: Site No C360172 - Activities Schedule week of 5/5

Hi Caroline,

Please see the planned site schedule for this week through Monday next week.

Date		Activities	Disposal Facility	Trucks	Status
Monday	**5/5/2025**	**Stream Diversion Installation**			
Tuesday	**5/6/2025**	**Stream Diversion Installation**			
		Breakup 2-1,2-2,2-3 Slab			
		Breakup concrete from MGP-4 Cell			
		Backfill Pilot Cell C			
Wednesday	**5/7/2025**	**Breakup 2-1,2-2,2-3 Slab**			
		Export MGP-4 Lead Cell Material	**WM-Emelle**		
		Load out North Side Soils			
Thursday	**5/8/2025**	**Stream Diversion Installation**			
		Export MGP-4 Lead Cell Material	**WM-Emelle**		
		Load out North Side Soils			
Friday	**5/9/2025**	**Stream Diversion Installation**			
		Export MGP-4 Lead Cell Material	**WM-Emelle**		
		Mix 2-2 or 2-3			
		Load out North Side Soils			
Monday	**5/12/2025**	**Stream Diversion Installation**			
		Coring Pilot Cell C			
		Investigate Area J Holder Wall			
		Mix 2-2 or 2-3			
		Load out North Side Soils			

Please also note that we have drilling scheduled on Thursday 5/15 to delineate excavations noted in the RDWP. We will provide a workplan for this shortly.

Please let us know if you have any questions.

Thanks,
Chris

Christopher C. Malvicini
Asst. Project Manager II
chris.malvicini@sesi.org
973-808-9050 Ext 273
973-518-8042
959 Route 46E Floor 3, Suite 300,
Parsippany, NJ 07054

This electronic mail transmission is privileged and confidential and is intended only for the review of the party to whom it is addressed. If you have received this transmission in error, please immediately return it to the sender. Any use, distribution, or forwarding of this e-mail is strictly prohibited. SESI Consulting Engineers will not be responsible for any loss or damage arising in any way from the use of this email. Although this e-mail and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened it is the responsibility of the recipient to ensure that it is safe for use.

Appendix C:

Quality Assurance Project Plan

SESI
CONSULTING ENGINEERS

QUALITY ASSURANCE PROJECT PLAN

FOR

Portion of Former Ossining Works Site, Operable Unit 1
30 Water Street
Ossining, New York
BCP# C360172

Prepared For:

WB 30 Water Street, LLC
480 Bedford Road
Chappaqua, New 10514

Prepared By:

SESI CONSULTING ENGINEERS
959 Route 46E, Floor 3, Suite 300
Parsippany, New Jersey 07054

Project No.: 11498

May 2023

Table of Contents

LIST OF ACRONYMS ..... **i**
1.0 PROJECT DESCRIPTION **1**
2.0 PROJECT ORGANIZATION **3**
2.1. PROJECT PRINCIPAL 4
2.2. PRINCIPAL ENGINEER 4
2.3. PROJECT MANAGER 4
2.4. REMEDIAL INVESTIGATION WORK PLAN PROJECT MANAGER 4
2.5. FIELD TEAM LEADER 4
2.6. QUALITY ASSURANCE OFFICER 4
3.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA **5**
3.1. COMPLETENESS 5
3.2. REPRESENTATIVENESS 5
3.3. COMPARABILITY 6
3.4. PRECISION AND ACCURACY 7
4.0 SAMPLING PROCEDURES **8**
4.1. SAMPLING PROGRAM 8
4.1.1 DRILLING/SAMPLING PROCEDURES 9
4.1.2 MONITORING WELL COMPLETION 10
4.1.3 WELL DEVELOPMENT 11
4.1.4 DECONTAMINATION 11
4.1.5 PFAS SAMPLING CONSIDERATIONS 11
4.2. GROUNDWATER SAMPLING PROGRAM 13
4.2.1 WELL EVACUATION 13
4.2.2 SAMPLING PROCEDURE 13
4.3. ISS SAMPLING SPECIFICATIONS 13
4.3.2 EQUIPMENT METHODS 13
4.3.3 EXECUTION 14
4.3.4 PERFORMANCE EVALUATIONS 15
4.3.5 FIELD DOCUMENTATION AND APPROVALS 17
4.4. SOIL VAPOR SAMPLING 18
4.5. SAMPLE PRESERVATION AND SHIPMENT 19
5.0 SAMPLE CUSTODY **20**
5.1. FIELD SAMPLE CUSTODY 20

5.2. LABORATORY SAMPLE CUSTODY....20
5.3. FINAL EVIDENCE FILES....21
6.0 CALIBRATION PROCEDURES....22
7.0 ANALYTICAL PROCEDURES....23
7.1. VOLATILE ORGANICS....23
7.2. SEMI-VOLATILE ORGANIC COMPUNDS....23
7.3. PESTICIDE AND PCB COMPOUNDS....24
7.4. METALS....24
7.5. PER- AND POLYFLUOROALKYL SUBSTANCES....24
7.6. SITE SPECIFICITY OF ANALYSES....25

TABLES

TABLE 2.1 SESI PERSONNEL AND SUBCONTRACTORS
TABLE 4.1 SAMPLING PROCEDURE FOR MONITORING WELLS USING LOW-STESS (LOW-FLOW) METHODS
TABLE 4.2 SAMPLE CONTAINERIZATION
TABLE 7.1 CONTRACT-REQUIRED QUANTITATION LEVELS AND ANALYTICAL METHODS FOR ASP INORGANICS, ASP VOLATILES, ASP SEMI-VOLATILES, ASP PESTICIDES, AND PCBs

ATTACHMENTS

ATTACHMENT A NYSDEC IN-SITU SOLIDIFICATION QA/QC PROCEDURES

LIST OF ACRONYMS

Acronym	Definition
AAS	Absorption Spectroscopy
ASP	Analytical Service Protocol
BCP	Brownfield Cleanup Program
CCS	Combined Cover System
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Accreditation Program
GC/MS	Gas Chromatography/Mass Spectrometry
HAS	Hollow-stem Auger
HDPE	High-Density Polyethylene
ISS	In-Situ Solidification Stabilization
LDPE	Low-density Polyethylene
LFPS	Low Flow Purging Sampling
MDL	Method Detection Limit
NAPL	Non-Aqueous Phase Liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	Polychlorinated Biphenyls
PDI	Pre-design Investigation
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PPE	Personal Protective Equipment
PTFE	Polytetrafluoroethylene
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAWP	Remedial Action Work Plan
SESI	SESI Consulting Engineers, Inc.
SSDS	Sub-slab Depressurization System
TIC	Tentatively Identified Compound
TCL	Target Compound List
VOC	Volatile Organic Compound
USEPA	United States Environmental Protection Agency

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 30 Water Street, Ossining, New York (the "Site"). The Site consists of four (4) parcels totaling 2.815 acres of land identified on the Westchester County Assessors map as tax lot 26, 27, 28 and 29. The Site is improved with a one-story garage building belonging to the Ossining Department of Public Works. A circular concrete pad, between the main building and the garage/shop in the vicinity of one (1) of the former gas holders, is used for storage. The southern portion of the Site is used for storage of mulch and other materials and equipment by the Village DPW operations. The areas around the building are paved and the property is fenced off.

The Site is bound to the south by Main Street, to the west by North Water Street and to the north by Central Avenue. The closest surface water body is the Sing Sing Brook, which bisects the Site and is not included in the Site. The Site topography decreases to the west.

SESI Consulting Engineers (SESI) prepared the RAWP for 30 Water Street, Ossining, New York, dated May 2023, which describes the investigation activities to be conducted at the Site, as part of the Site's planned remedial investigation and remediation.

The remedial actions selected for the Site include the following:

- Demolition of the existing Site structures and removal of any areas of concern such as hydraulic lifts, tanks, etc.
- Excavation of material as required for in-situ solidification stabilization (ISS) treatment, including pre-ISS 5-ft excavation, the estimated volumes of which will be determined after the pre-design investigation (PDI), and as required to remove non-MGP contamination. as preparation for the proposed development:
- Transport and off-site disposal of material as follows, the estimated volumes of which will be determined after the PDI:
    - 120 tons of construction and demolition debris
    - Hazardous waste soils as result of the non-aqueous phase liquid (NAPL) excavation for treatment/disposal via low-temperature

thermal desorption.

  - Non-hazardous waste disposal soil from ISS preparation and jet grout
  - Contaminated non-hazardous MGP contaminated soils pre-ISS excavation as described above.

- Conducting ISS treatment of subsurface soil containing significant quantities of NAPL to depths of up to 34 ft. bgs, the estimated volume of which will be determined after the PDI.
- Backfilling the 5 foot cut ISS areas with appropriate backfill as described in this RAWP in the ISS area outside of the building footprint on the southern portion of the Site.
- Installation of NAPL recovery wells in the downgradient portion of the Site and establishing a long-term monitoring and recovery program to remove NAPL from the wells and limit the potential for future migration of NAPL downgradient of the Site.
- Installation of additional groundwater monitoring wells to establish a new groundwater monitoring well network.
- A Site-wide combined cover system (CCS) consisting of hard surfaces (buildings and paving) resulting from the proposed development. In the areas where no hard surfaces are proposed, twenty-four (24) inches of soil that complies with the Restricted Residential Soil Cleanup Objectives with the top six (6) inches amenable for vegetation will be added. The northeastern area of the Site, which is currently covered with a wooded area and where no development is proposed and may be open to the public, a pre-design surface soil sampling is proposed to determine if a surface soil cover system remediation is required.
- Installation of precautionary sub slab depressurization system (SSDS) piping and a soil vapor barrier in the proposed residential building and performing a soil vapor evaluation after implementation of the main components of the remedy to determine if the SSDS needs to become activated.

- Conducting annual groundwater monitoring to document the extent and concentrations of dissolved and potential trends in contaminant of concern concentrations.
- Preparing an annual report to summarize annual groundwater monitoring activities.
- Establishing institutional controls in the form of an environmental easement to limit the future development and use of the Site to restricted residential or commercial use (i.e. the Site will be redeveloped to house retail and multifamily dwellings), limit the potential future use of Site groundwater as a source of potable or process water without necessary water quality treatment, limit the permissible subsurface activities that could result in potential exposures to subsurface soils and groundwater containing residual impacts and to require maintenance of the CCS and recovery well engineering controls.
- Preparation of a Site Management Plan to document the institutional/engineering controls as well as protocols (including health and safety requirements) for conducting subsurface activities and for management of potentially impacted material encountered during these activities.

2.0 PROJECT ORGANIZATION

The RAWP activities will be conducted by SESI and their qualified subcontractors, on behalf of WB 30 Water Street. The organization of SESI's key project management and field staff, and respective areas of responsibility, is presented on Table 2.1 below.

Table 2.1—SESI Personnel and Subcontractors

Role	Name	Telephone No.
Project Principal	Fuad Dahan, P.E., PhD	973-808-9050 x249
Project Manager (PM)	Steven Gustems, PG	973-808-9050 x247
Principal Engineer	Fuad Dahan, P.E., PhD	973-808-9050 x249
Remedial Investigation Work Plan Project Manager	Steven Gustems, PG	973-808-9050 x247

Role	Name	Telephone No.
Field Team Leader	Jon Stuart	973-808-9050 x301
Quality Assurance Officer	Todd Kelly	973-808-9050 x238
Field Personnel	TBD	
Analytical Laboratory	TBD	
Data Validator	TBD	
Driller	TBD	

2.1. PROJECT PRINCIPAL

Provides 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

Provides technical guidance and review of reports, analytical data. Will have key involvement in screening and development of remedial alternatives.

2.3. PROJECT MANAGER

Responsible for maintaining the day-to-day schedule for completing the fieldwork and deliverables according to Brownfield Cleanup Program (BCP) requirements and client expectations.

2.4. REMEDIAL INVESTIGATION WORK PLAN PROJECT MANAGER

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

Responsible for overseeing field work during the implementation of the RAWP, including observing subcontractors, maintaining field notes, and collecting samples of various environmental media.

2.6. QUALITY ASSURANCE OFFICER

Responsible for 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 laboratory performing analysis in connection with this project will have appropriate New York State Department of Health (NYSDOH) ELAP Certification. Analytical Service Protocol (ASP, June 2000) Category B deliverables are required for all samples. All data will be sent to a third party for validation in accordance with NYSDEC BCP requirements.

Detection limits set by New York State Department of Environmental Conservation (NYSDEC) ASP 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 Applicable or Relevant and Appropriate Requirements [ARARs]), then ASP Special Analytical Services (SAS) or other appropriate methods will be utilized.

The quality assurance/quality control (QA/QC) objectives for all measurement data include completeness, representativeness, comparability, precision, and accuracy.

In addition, the sampling program and ISS implementation as specified in the RAWP will be conducted in accordance with the NYSDEC In-Situ Solidification QA/QC procedures to ensure the effectiveness of the ISS (**Attachment A**).

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 (VOCs) 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 10/2016 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, 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. Matrix spike and matrix spike duplicates will be collected to confirm accuracy and precision at a rate of one (1) per 20 soil and/or groundwater samples taken.

The number of duplicate, spiked and blank samples analyzed will be a minimum of one (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 (1) per every 20 samples (soil). For the aqueous matrix field blanks will be collected at a frequency of one (1) 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). An equipment blank for Per- and polyfluoroalkyl substances (PFAS) will be collected once per day per matrix, regardless of whether equipment being used is disposable, at a frequency of one (1) per 20 samples taken for both soil and groundwater.

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 (5) 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 the following Pre-design investigation (PDI):

- Soil sampling on the far eastern undeveloped wooded portion of the Site and in other areas under the footprints of the buildings to further delineate the contaminant nature of the top five feet of soils being excavated for the foundations and in some cases deeper utilities.
- Additional investigation borings near the two (2) former gas holders in the south-western part of the site and the former gas holder in the northern part of the Site, and near existing soil boring locations SB-21, SB-22, SB-22A and SB-25, consistent with the NYSDEC September 30, 2022 AAR Comment Letter, and near boring B-9, which was installed during SESI BCP Phase II investigation. These additional borings will be conducted to investigate potential subsurface impacts in the areas and/or confirm the appropriate ISS limits. A work plan for this investigation will be developed and submitted to the NYSDEC for approval prior to implementation.
- As part of the remedial design phase for the ISS portion of the remedy, PDI activities will also be conducted to determine all of the areas on the Site that need ISS as described above, including an appropriate ISS mix design and the extent of shallow excavation and ISS areas. PDI activities will generally consist of advancing additional direct push borings and collecting soil sampling across the Site and in the proposed building footprints for implementability. The treatability study discussed below will determine the appropriate ISS mix to be used at the Site. Engineering evaluations will be performed to determine if erosion control is required and if SOE or some other method of stabilization is required to retain the Brook walls or if other mitigation may be needed and to safeguard the Brook in general during the ISS.
- Installation of additional groundwater monitoring wells to establish a new

groundwater monitoring well network.

Soil samples will be collected from split spoon sampling or macrocore devices retrieved from soil borings. Groundwater samples will be collected from groundwater monitoring wells using low flow purging techniques. A description of this method is shown on **Table 4.1**. Soil vapor samples will be collected from vapor points screened in the vadose zone using Summa Canisters. A summary of the sample containers, bottle types, preservatives and holding times is shown on **Table 4.2.**

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. In addition, the sampling program for the ISS design sampling will be conducted in accordance with the NYSDEC In-Situ Solidification QA/QC procedures to ensure the effectiveness of the ISS (**Attachment A**).

Soil samples 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. In accordance with the NYSDEC In-Situ Solidification QA/QC guidelines, the soil cores will be no longer than five (5) feet. If less than 60% of the core material is recovered from any of the core runs, one (1) new core will be drilled adjacent to the previous location. If the recovery from the adjacent core hole continues to be less than 60%, the contractor may abandon the location.

Upon retrieval of the sampling barrel, the collected sample shall be placed in glass jars 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

Prior to sampling, 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 (1) of two (2) methods, pumping or bailing groundwater from the well until it yields relatively sediment-free water.

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.

4.1.4 DECONTAMINATION

All drilling equipment and associated tools including augers, drill rods, sampling equipment, wrenches and any other 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. Any contaminated water generated will be drummed. The contaminated water drums will be disposed of at an appropriate facility after approval and sampling in accordance with the specific facility requirements.

4.1.5 PFAS SAMPLING CONSIDERATIONS

This section contains the materials limitations for Per- and polyfluoroalkyl substances sampling in accordance with the Draft NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoralkyl Substances (June 2022).

The groundwater samples will be analyzed for PFAS using Modified USEPA Method 537. Reporting limits for PFOA and PFOS will not exceed 2 nanograms per liter (ng/L). Category B deliverables and an electronic data deliverable will be completed.

PFAS are very persistent in the environment and in the human body. Due to their presence in a variety of products, persistence in the environment and very low drinking water standards, care must be used when groundwater sampling for PFAS to avoid cross contamination from the sampling equipment and personal protective equipment (PPE).

No fabric softener will be used on clothing to be worn in field. Cosmetics, moisturizers, hand cream, unauthorized sunscreen, insect repellent or other related products will not be used the morning of sampling. The field samplers will wear powder-free nitrile gloves while filling and sealing the sample bottles. The sampling equipment components and sample containers will not come in contact with material that may potentially contain PFAS such as aluminum foil, low density polyethylene (LDPE), glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials will be avoided. Food and drink packaging materials will be avoided, as well.

Sampling will be performed using certified PFAS-free sampling materials such as stainless steel, high density polyethylene (HDPE), PVC, silicone, acetate or polypropylene pump and tubing. Rinse water must be laboratory-provided certified PFAS-free distilled or de-ionized water. Standard two step decontamination using Alconox® detergent and clean certified PFAS-free water rinse will be performed for equipment that does come in contact with PFAS materials.

No waterproof field books, plastic clipboards, binders, or spiral hard cover will be used for PFAS containers. No adhesives (i.e. Post-It® Notes), sharpies, or permanent markers will be used for PFAS containers. The PFAS containers will be labeled with ballpoint pens. PFAS samples will be stored in separate cooler filled with regular ice only with no chemical (blue) ice packs.

Pre-cleaned sample bottles with closures, coolers, sample labels and a chain of custody form will be provided by the laboratory.

4.2. GROUNDWATER SAMPLING PROGRAM

4.2.1 WELL EVACUATION

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 USEPA 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. 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 (5) minutes during low flow purging using a flow through cell. When three (3) 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. Low-flow sampling procedures are summarized on **Table 4.1.**

4.3. ISS SAMPLING SPECIFICATIONS

IN accordance with the NYSDEC In-Situ Solidification QA/QC, the following QA/QC procedures will be considered during the field implementation of the ISS.

4.3.2 EQUIPMENT METHODS

Cores must be no longer than five (5) feet. If less than 60% of the core material is recovered from any of the coring runs, one (1) new core hole must be drilled adjacent to the previous location. If the recovery from the adjacent core hole continues to be less than 60%, the contractor may abandon the location. If trenching is use, a trenching plan will

be submitted to the Department during the remedial design. Samples of the mixed soil will be collected while wet and formed into cylinders in accordance with the approved testing methods (ASTM D5084 for hydraulic conductivity, ASTM D2166 or D1633 for unconfined compressive strength). Samples will be collected every 500 cy. Additional sampling may be appropriate on a site-specific basis in areas of particular concern.

4.3.3 EXECUTION

Coring

- One core borehole shall be completed for every 5,000 square feet of ISS treatment area, but not less than two bore holes per treatment area.
- To allow early coring information to be incorporated in adjusting ISS operations, the first coring location shall be completed when the ISS treatment project area is no more than25 percent complete.
- Core borehole locations shall be biased towards areas with the greatest soil contamination, areas where contamination is in direct contact with the bedrock surface, and/or locations where difficulties in the ISS process were encountered
- Core boreholes shall be placed in locations where individual treatment columns or cells overlap, to the extent possible.
- Core boreholes should be advanced to at least a foot below the monolith design or bedrock, if encountered. If coring reveals previously undocumented areas of
- contamination, delineation (and remediation, as necessary) of that contamination may be required outside the QA/QC program.
- Cores shall be archived following coring activities. Cores may be discarded upon final inspection by the Department. Following initial inspection, the Department may require cores to be retained to compare to future cores or to document issues that will need to be resolved.
- To allow any needed corrective actions to commence before the monolith cures to a point making corrective action difficult or impossible, core inspection by the Department will occur as soon as possible but not later than 48 hours of the core's collection.
- In order to identify potential areas of concern for the coring program, documentation on the volume/shrinkage of grout obtained during ISS installation shall be reviewed. Areas where excessive grout was lost during ISS implementation should be targeted for coring.

Trenching Implementation

- If trenching is used, it will be completed at the perimeter of the ISS treatment area and locations within the ISS treatment area. The minimum depth of excavation should be the design depth of the ISS treatment.
- If the bottom of the ISS treatment cannot be visually inspected, the Department may require cores to be collected.
- To allow inspection information to be incorporated in adjusting ISS operations, trenching shall commence when the ISS treatment project area is no more than 25 percent complete.

Sample Analysis

- Typically, multiple cylinders are collected at each location for testing unconfined compressive strength. This allows testing after 3-5 days to get an initial indication of the strength of the mix, while reserving cylinders for compliance testing after they have achieved full strength (28 days).
- Cylinders tested for hydraulic conductivity in accordance with the approved plans. The maximum permeability should generally be 1x10-6 cm/sec, as measured using ASTM D5084-00.

4.3.4 PERFORMANCE EVALUATIONS

Visual Inspections

Core samples and related equipment will be visually inspected for the following criteria, and the results recorded:

• Visible NAPL

• Non-mechanical induced cracking within the core

• Percent of core sample recovered

In addition, indirect indications of unmixed NAPL should be recorded, such as:

• NAPL coating on drilling tools

• NAPL in drill wash tub, if water-based drilling methods are employed

Performance Concerns

Performance testing must be completed early enough to identify problems. Substandard results cannot be ignored with the intention to “average-out” the results over the course of project. The purpose of this guidance is to detect installation of an inadequate remedy in time to correct the problems and avoid costly retreatment or repairs to ensure effectiveness of the ISS remedy, the following conditions will warrant further attention and will be documented during ISS implementation:

• A continuous layer or seam of NAPL is noted within the core.

• NAPL coating is visible on drilling tools

• Visible NAPL is noted in the drill wash tub

• Unconfined compressive strength below 50 psi

• Hydraulic conductivity greater than 1.0 x 10-6 cm/sec or project specific goal.

• Large sections (> 1 cf) of unmixed material.

If one or more of the above conditions are noted, the Department must be notified to discuss the severity of the problem, the degree of concern, and whether any corrective action will be necessary.

A notification, by itself, does not necessarily mean a corrective action or additional borings or testing are warranted. For instance, small NAPL blebs may be present within properly mixed areas of the ISS monolith, and coring through such a bleb, especially before the monolith has achieved its maximum strength, could result in NAPL coating on drilling tools and/or NAPL in the drill wash water. The first step to determining whether corrective action is required will be to complete additional borings around the area of concern and determine if identified NAPL within the ISS mass is encapsulated, thus eliminating NAPL mobility and impact to the surrounding environment. The results of all the samples taken within a given treatment area cannot be averaged to show compliance. While each sample must satisfy the definition on its own, a single test showing slightly elevated hydraulic conductivity would not necessarily require corrective action for that cell/column, but evaluation to ensure that it is not a systemic problem is required.

If NAPL is detected in the additional borings, particularly on the edges of the ISS monolith, or at the bottom of the ISS monolith, corrective actions may be necessary in order to fully encapsulate the source area.

Corrective Actions

If the ISS installation is deemed unsatisfactory after a collaborative evaluation of the coring program, measures will be put in-place to address the deficiencies and ensure that the remedy is protective of human health and the environment. Such measures may include:

- Repair, re-mixing, or isolation of the concerned area using jet grouting or other suitable method
- Excavation and disposal of the concerned area, where feasible and practicable.

Core Hole/Trench Abandonment

When a core has been drilled from the top to the bottom elevation of the targeted ISS treatment zone, and samples collected, it will be considered complete. Following

completion of each coring location, the borings will be filled with grout using tremie methods.

If trenching is used for QA/QC activities, backfill material should meet the approved ISS specifications.

4.3.5 FIELD DOCUMENTATION AND APPROVALS

Field Documentation

Documentation of the ISS QA/QC activities shall be included with the Final Engineering Report (FER). Documentation will include (but not be limited to):
- Figure depicting boring/trenching locations
- Photographs of each core boring/trench referenced
- Type of drilling method or excavator used
- Field coring/trench logs

Department Approval

The Department should be notified of the ISS QA/QC activities as soon as possible, with a minimum of 72 hours' notice or two business days. Department personnel will attempt to be onsite, unless the remedial party is informed otherwise, to inspect the QA/QC activities and provide informal approval or recommend corrective actions.

Following on-site Department inspection of the ISS QA/QC, email correspondence should be sent to the Department project manager which summarizes observations of the coring results.

The Department project manager will provide an email reply within 48 hours confirming that the ISS QA/QC objectives have been met. If the Department project manager does not feel the ISS QA/QC objectives have been adequately satisfied, the response email will include any additional corrective actions required.

Resolution of Disagreements

In the event there is a disagreement regarding the ISS QA/QC program the remedial party will submit a written request for resolution to the project manager's supervisor. The correspondence shall include the ISS QA/QC activities, relevant documentation, and the nature of the dispute.

The project manager's supervisor will meet with the Project Manager, Construction Inspector (if applicable) and the Bureau Director to discuss the request. If necessary, a

meeting will be arranged which will include the remedial party, Department project manager, supervisor, and the Bureau Director to discuss the matter.
Following the meeting, the supervisor will send correspondence to the remedial party outlining the Department final decision.

4.4. SOIL VAPOR SAMPLING

Soil vapor sampling will be conducted in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in New York State (October 2006 and the subsequent May 2017 updates to the Soil Vapor/Indoor Air Decision Matrices). Soil vapor samples will be collected in the vadose zone from shallow (five [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 six (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 one (1) to two (2) feet of porous coarse sand or glass beads, and at least three (3) 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.

The regulator will be set to collect a soil vapor sample at a flow rate of less than 0.2 liters per minute. 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 $\mu g/m^3$ or less.

The soil vapor sampling effort will include the use of 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 site of the pail. Refer to NYSDOH Guidance for Evaluating Indoor Air Intrusion in New York State (October 2006).

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.

4.5. SAMPLE PRESERVATION AND SHIPMENT

Since all bottles will contain the necessary preservatives as shown in **Table 4.2**, 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 one (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 (2) copies of this record follow the samples to the laboratory. The laboratory maintains one (1) 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 to 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 investigation team leader and the sample will not be analyzed if tampering is apparent.

5.2. LABORATORY SAMPLE CUSTODY

The site investigation 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:

- 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.
- 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.
- Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the site investigation 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:

1. The samples are stored in a secured area at a temperature of approximately 4°C until analyses are to commence.
2. A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
3. 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 2005) 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 a factor of five. 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

For the analysis of water samples for Target Compound List 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 COMPUNDS

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 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 polychlorinated biphenyls (PCBs) 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. PER- AND POLYFLUOROALKYL SUBSTANCES

The NYSDEC has developed a list of 40 PFAS Analytes List on **Table 7.1** for remedial programs.

Currently, ELAP does not offer certification for PFAS compounds in matrices other than finished drinking water. Per the NYSDEC June 2019 memo on emergent contaminant sampling, the analytical procedure for soil and groundwater sampling of PFAS is Modified EPA Method 1633. The reporting limit for PFAS in soil samples is 0.5 ug/kg. Reporting limits for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in groundwater should not exceed 2 ng/L.

The laboratory standard operating procedures are included in **Attachment C**. The laboratory method detection limits (MDLs) for PFAS compounds are included in **Attachment D**.

7.6. SITE SPECIFICITY OF ANALYSES

Work plans prepared for remedial actions for 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 TCL analytes will be performed on all samples.

To ensure that the field sampling and laboratory analytical practices are acceptable, the data associated with 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 data usability summary report (DUSR) to be included in the Report.

TABLES

TABLE 4.1--SAMPLING PROCEDURE FOR MONITORING WELLS USING LOW-STESS (LOW-FLOW) METHODS

Step	Description	Details
1	Record initial static water level.	**Device:** electric contact probe accurate to the nearest 0.1 foot.
2	Lower sampling device 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.
5	Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.	

Step	Description	Details
6	Monitor Indicator Parameters	1. 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
7	The pump must not be removed from the well between purging and sampling.	Dissolved oxygen and turbidity usually require the longest time to achieve stabilization.
8	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.
9	Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate	If pH adjustment is necessary for VOC sample preservation,

Step	Description	Details
	EPA Program Guidance should be consulted to determine whether pH adjustment is necessary.	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.
10	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.
11	Measure and record well depth.	
12	Close and lock the well.	
13	Samples are capped, labeled and placed in laboratory coolers with ice packs or bagged ice.	
14	All equipment is cleaned with successive rinses of pesticide-grade methanol and distilled water.	Dedicated line is disposed of or left at well site.
15	Equipment/wash blanks are collected when non-dedicated sampling equipment is used.	
16	Chain-of-custody forms are completed in triplicate.	The original and one carbon copy are put into a zip-lock bag and placed into the cooler. The

Step	Description	Details
		original will be returned following sample analysis. A second carbon copy is kept on file.
17	Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of sample.	

TABLE 4.2--SAMPLE CONTAINERIZATION

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE[1]	HOLDING TIME
Aqueous Samples				
VOCs – USEPA 8260C	3	40 mL, glass vial with septum cap	Hydrochloric Acid to pH <2 Ice to 4°C	14 days
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270 SIM	2	1-liter amber glass bottle	Ice to 4°C	7 days (until extraction) 40 days (extracted)
Pesticides – USEPA 8081B	2	1-liter amber glass bottle	Ice to 4°C	7 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	2	1-liter amber glass bottle	Ice to 4°C	7 days (until extraction) 40 days (extracted)
Metals[2]	1	1-liter, plastic bottle	Nitric acid to pH <2 NaOH for cyanide Ice to 4°C	180 days Cyanide: 14 days Mercury: 28 days
Cyanide – USEPA 9010C/9012B	1	1-liter, plastic	Sodium Hydroxide to pH >12 Ice to 4°C	14 days
PFAS Compounds – USEPA Modified Method 537	2	500 ml HDPE or Polypropylene with non-Teflon lid	None	14 days
Soil, Sediment, Solid Waste Samples:				
VOCs – USEPA 8260C	3	5-gram EnCore samplers	Chilled to 0 - 6°C	14 days
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270D SIM if RL cannot be reached	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction, 40 days extracted)

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE(1)	HOLDING TIME
Pesticides – USEPA 8081B	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	None
Metals(3)	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	180 days Cyanide: 14 days Mercury: 28 days
PFAS Compounds – USEPA Modified Method 537	2	500 ml HDPE or Polypropylene with non-Teflon lid	None	28 days
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) Metals refers to the 24 metals and cyanide in the Target Compound List (NYSDEC-CLP 11/87). Metals will be analyzed by Method 6020B, 7470A for mercury, and 9010C/9012B for cyanide

(3) Metals refers to the 24 metals and cyanide in the Target Compound List (NYSDEC-CLP 11/87). Metals will be analyzed by Method 6010D, 7471B for mercury, and 9010C/9012B for cyanide

(4) A complete list of compounds is provided on Table 7.1.

Target Analyte List (TAL) and Contract-Required Quantitation Limit

SECTION 1 - ASP INORGANICS Method: NYSDEC-ASP-91-4					
METALS		**CONTRACT-REQUIRED DETECTION LEVEL* (µg/L)**	**METALS**		**CONTRACT-REQUIRED DETECTION LEVEL* (µg/L)**
1.	Aluminum	200	13.	Magnesium	5,000
2.	Antimony	60	14.	Manganese	15
3.	Arsenic	15	15.	Mercury	0.2
4.	Barium	200	16.	Nickel	40
5.	Beryllium	5	17.	Potassium	5,000
6.	Cadmium	5	18.	Selenium	35
7.	Calcium	5,000	19.	Silver	10
8.	Chromium	10	20.	Sodium	5,000
9.	Cobalt	50	21.	Thallium	25
10.	Copper	25	22.	Vanadium	50
11.	Iron	100	23.	Zinc	60
12.	Lead	10	24.	Cyanide	10

Target Compound List (TCL) and Contract-Required Quantitation Limit

SECTION 2 – ASP ORGANICS (VOLATILES) Method: NYSDEC-ASP-91-1					
VOLATILE		**CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)**	**VOLATILE**		**CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)**
1.	Chloromethane	5.0	18.	1,2-Dichloropropane	5.0
2.	Bromomethane	5.0	19.	cis-1,3-Dichloropropene	5.0
3.	Vinyl Chloride	5.0	20.	Trichloroethene	5.0
4.	Chloroethane	5.0	21.	Dibromochloromethane	5.0
5.	Methylene Chloride	5.0	22.	1,1,2-Trichloroethane	5.0
6.	Acetone	10.0	23.	Benzene	5.0
7.	Carbon Disulfide	5.0	24.	Trans-1.3-Dichloropropene	5.0
8.	1,1-Dichloroethylene	5.0	25.	Bromoform	5.0
9.	1,1-Dichloroethane	5.0	26.	2-Hexanone	10.0

SECTION 2 – ASP ORGANICS (VOLATILES) Method: NYSDEC-ASP-91-1					
VOLATILE		CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)	VOLATILE		CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)
10.	1,2-Dichloroethylene (total)	5.0	27.	4-Methyl, 1,2-Pentanone	10.0
11.	Chloroform	5.0	28.	Tetrachloroethylene	5.0
12.	1,2-Dichloroethane	5.0	29.	Toluene	5.0
13.	2-Butanone	10.0	30.	Chlorobenzene	5.0
14.	1,1,1-Trichloroethane	5.0	31.	Ethylbenzene	5.0
15.	Carbon Tetrachloride	5.0	32.	Styrene	5.0
16.	Bromodichloromethane	5.0	33.	Total Xylenes	5.0
17.	1,1,2,2-Tetrachloroethane	5.0			

SECTION 3 - ASP ORGANICS (SEMI-VOLATILES) Method: NYSDEC-ASP-91-2					
SEMI-VOLATILE		CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)	SEMI-VOLATILE		CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)
1.	Phenol	5.0	33.	Acenaphthene	5.0
2.	Bis(2-chloroethyl)ether	5.0	34.	2,4-Dinitrophenol	10.0
3.	2-Chlorophenol	5.0	35.	4-Nitrophenol	10.0
4.	1,3-Dichlorobenzene	5.0	36.	Dibenzofuran	5.0
5.	1,4-Dichlorobenzene	5.0	37.	Dinitrotoluene	5.0
6.	1,2-Dichlorobenzene	5.0	38.	Diethylphthalate	5.0
7.	2-Methylphenol	5.0	39.	4-Chlorophenyl phenyl ether	5.0
8.	2,2'oxybis(1-Chloropropane)	5.0	40.	Fluorene	5.0
9.	4-Methylphenol	5.0	41.	4-Nitroanile	10.0
10.	N-Nitroso-dipropylamine	5.0	42.	4,6-Dinitro-2-methylphenol	10.0
11.	Hexachloroethane	5.0	43.	N-nitrosodiphenyl amine	5.0
12.	Nitrobenzene	5.0	44.	4-Bromophenyl phenyl ether	5.0
13.	Isophorone	5.0	45.	Hexachlorobenzene	5.0
14.	2-Nitrophenol	5.0	46.	Pentachlorophenol	10.0
15.	2,4-Dimethylphenol	5.0	47.	Phenanthrene	5.0
16.	Bis(2-Chloroethoxy) methane	5.0	48.	Anthracene	5.0
17.	2,4-Dichlorophenol	5.0	49.	Carbazole	5.0
18.	1,2,4-Trichlorobenzene	5.0	50.	Di-n-butyl phthalate	5.0
19.	Naphthalene	5.0	51.	Fluoranthene	5.0
20.	4-Chloroaniline	5.0	52.	Pyrene	5.0
21.	Hexachlorobutadiene	5.0	53.	Butyl benzyl phthalate	5.0
22.	4-Chloro-3-methylphenol	5.0	54.	3,3'-Dichloro benzidine	5.0
23.	2-Methylnaphthalene	5.0	55.	Benz(a)anthracene	5.0
24.	Hexachlorocyclopentadiene	5.0	56.	Chrysene	5.0
25.	2,4,6-Trichlorophenol	5.0	57.	Bis(2-ethylhexyl) phthalate	5.0
26.	2,4,5-Trichlorophenol	10.0	58.	Di-n-octyl phthalate	5.0

SECTION 3 - ASP ORGANICS (SEMI-VOLATILES) Method: NYSDEC-ASP-91-2					
	SEMI-VOLATILE	**CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)**		**SEMI-VOLATILE**	**CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)**
27.	2-Chloronapthalene	5.0	59.	Benzo(b)fluoranthene	5.0
28.	2-Nitroananiline	10.0	60.	Benzo(k)fluoranthene	5.0
29.	Dimethyl phthalate	5.0	61.	Benzo(a)pyrene	5.0
30.	Acenaphthylene	5.0	62.	Indeno(1,2,3-cd) pyrene	5.0
31.	2,6-Dinitrotoluene	5.0	63.	Dibenz(a,h) anthracene	5.0
32.	3-Nitroaniline	10.0	64.	Benzo(g,h,i)perylene	5.0

SECTION 3 - ASP ORGANICS (PESTICIDES/PCBS) Method: NYSDEC-ASP-91-3					
PESTICIDE/PCB		CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)	PESTICIDE/PCB		CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)
1.	Alpha-BHC	0.05	15.	4,4'-DDT	0.10
2.	Beta-BHC	0.05	16.	Methoxychlor	0.5
3.	Delta-BHC	0.05	17.	Endrin ketone	0.10
4.	Gamma-BHC (lindane)	0.05	18.	Endrin aldehyde	0.10
5.	Heptachlor	0.05	19.	Alpha-Chlordane	0.05
6.	Aldrin	0.05	20.	Gamma-Chlordane	0.05
7.	Heptachlor epoxide	0.05	21.	Toxaphene	5.0
8.	Endosulfan I	0.05	22.	AROCHLOR-1016	1.0
9.	Dieldrin	0.10	23.	AROCHLOR-1221	1.0
10.	4,4'-DDE	0.10	24.	AROCHLOR-1232	1.0
11.	Endrin	0.10	25.	AROCHLOR-1242	1.0
12.	Endosulfan II	0.10	26.	AROCHLOR-1248	1.0
13.	4,4'-DDD	0.10	27.	AROCHLOR-1254	1.0
14.	Endosulfan sulfate	0.10	28.	AROCHLOR-1260	1.0

*Matrix: groundwater. For soil matrix, multiply CRDL by 100.

**Quantitation limit for medium-level soil is 1,200 µg/kg (wet weight basis).

PFAS Compound List and Reporting and Method Detection Limits for Soil and Groundwater

Method: EPA Modified 1633 Perfluorinated Alkyl Acids by Isotope Dilution			
	PFAS	Reporting Limit— Groundwater (ng/l)	Method Detection Limit— Groundwater (ng/l)
1	Perfluorobutanoic Acid (PFBA)	2.00	0.408
2	Perfluoropentanoic Acid (PFPeA)	2.00	0.396
3	Perfluorobutanesulfonic Acid (PFBS)	2.00	0.238
4	Perfluorohexanoic Acid (PFHxA)	2.00	0.328

Method: EPA Modified 1633 Perfluorinated Alkyl Acids by Isotope Dilution			
5	Perfluoroheptanoic Acid (PFHpA)	2.00	0.225
6	Perfluorohexanesulfonic Acid (PFHxS)	2.00	0.376
7	Perfluorooctanoic Acid (PFOA)	2.00	0.236
8	1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2 FTS)	2.00	1.33
9	Perfluoroheptanesulfonic Acid (PFHpS)	2.00	0.688
10	Perfluorononanoic Acid (PFNA)	2.00	0.312
11	Perfluorooctanesulfonic Acid (PFOS)	2.00	0.504
12	Perfluorodecanoic Acid (PFDA)	2.00	0.304
13	1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	2.00	1.21
14	N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2.00	0.648
15	Perfluoroundecanoic Acid (PFUnA)	2.00	0.260
16	Perfluorodecanesulfonic Acid (PFDS)	2.00	0.980
17	Perfluorooctanesulfonamide (FOSA)	2.00	0.580
18	N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2.00	0.804
19	Perfluorododecanoic Acid (PFDoA)	2.00	0.372
20	Perfluorotridecanoic Acid (PFTrDA)	2.00	0.327
21	Perfluorotetradecanoic Acid (PFTA)	2.00	0.248

Method: EPA Modified 537 Perfluorinated Alkyl Acids by Isotope Dilution			
	PFAS	**Reporting Limit— Soil (ng/g)**	**Method Detection Limit— Soil (ng/g)**
1	Perfluorobutanoic Acid (PFBA)	0.500	0.023
2	Perfluoropentanoic Acid (PFPeA)	0.500	0.046
3	Perfluorobutanesulfonic Acid (PFBS)	0.250	0.039
4	Perfluorohexanoic Acid (PFHxA)	0.500	0.053
5	Perfluoroheptanoic Acid (PFHpA)	0.250	0.045
6	Perfluorohexanesulfonic Acid (PFHxS)	0.250	0.061
7	Perfluorooctanoic Acid (PFOA)	0.250	0.042

Method: EPA Modified 537 Perfluorinated Alkyl Acids by Isotope Dilution			
8	1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2 FTS)	0.500	0.180
9	Perfluoroheptanesulfonic Acid (PFHpS)	0.500	0.137
10	Perfluorononanoic Acid (PFNA)	0.250	0.075
11	Perfluorooctanesulfonic Acid (PFOS)	0.250	0.130
12	Perfluorodecanoic Acid (PFDA)	0.250	0.067
13	1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	0.500	0.287
14	N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	0.500	0.202
15	Perfluoroundecanoic Acid (PFUnA)	0.500	0.047
16	Perfluorodecanesulfonic Acid (PFDS)	0.500	0.153
17	Perfluorooctanesulfonamide (FOSA)	0.500	0.098
18	N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	0.500	0.085
19	Perfluorododecanoic Acid (PFDoA)	0.500	0.070
20	Perfluorotridecanoic Acid (PFTrDA)	0.500	0.205
21	Perfluorotetradecanoic Acid (PFTA)	0.500	0.054

Attachment A:

NYSDEC In-Situ Solidification QA/QC Procedures

NYSDEC In-Situ Solidification QA/QC

1.0 GENERAL

1.1 Introduction

Technology Description

In-situ solidification (ISS) is an established remediation treatment technology which can prevent migration of and exposure to certain contaminants in media including soil, sludge, and sediment. The ISS process is increasingly being used within remedial programs in the New York State Department of Environmental Conservation (Department).

ISS is a process that involves the mixing of reagents with contaminated soil to create a low permeability mass which encapsulates the contamination in the soil in place. Bucket excavators augers, or other technologies are used to mix the contaminated media and one or more reagents, entrapping the contaminated material within a low permeability mass. This reduces or eliminates non-aqueous phase liquid (NAPL) mobility and contaminant migration into exposure pathways, thus eliminating the treated area as a source of future exposure or contamination of groundwater, surface water, or vapor.

Complete mixing of the contaminated soil and the ISS reagents must be achieved for the process to be effective and protective of human health and the environment. Incomplete mixing can result in a non-homogenous mass, untreated areas, or large fractures within the ISS mass, which may allow mobility of NAPL and groundwater within the treated areas.

1.2 Document Purpose

The purpose of this document is to provide a method of Quality Assurance (QA)/Quality Control (QC) to ensure the effectiveness of ISS after field implementation is complete. This includes coring, and testing for hydraulic conductivity and unconfined compressive strength. The use of coring for QA/QC may not be suitable for all ISS projects and other QA/QC methods such as excavation/visual inspection will be considered an option on a case by case basis.

Failure to meet QA/QC goals, particularly incomplete mixing, is of greatest concern when it occurs along the edges of the solidified mass. The Department has noted a tendency for DNAPL to accumulate in permeable soils and sediments immediately above the bedrock surface, creating a potential pathway for DNAPL migration. Such zones can be quite difficult to mix adequately, whether using augers or bucket mixing. Thus, attention is required to ensure that “top of rock” zones are thoroughly solidified, and that this solidification is adequately documented.

To ensure the integrity of the treated material, the Department has identified QA/QC procedures, specifically coring, which are essential to ensure that ISS treatment processes are protective of the environment. This document has been developed to provide guidance on a coring program to be conducted to ensure confidence regarding complete mixing and ISS installation in the remedial area.

2.0 EQUIPMENT

2.1 Coring Drilling Method

To allow early coring information to be used for adjusting ISS operations, it is recommended that coring operations be conducted prior to complete curing of the ISS material. For high-strength material, a rock core is frequently required. Driven split spoons (typically using Direct Push tools but potentially using augers as well) may be used to collect core samples of the ISS material for lower strength materials. Rotosonic and compressed air drilling methods have not been successful in obtaining representative core samples.

Cores must be no longer than five (5) feet. If less than 60% of the core material is recovered from any of the coring runs, one (1) new core hole must be drilled adjacent to the previous location. If the recovery from the adjacent core hole continues to be less than 60%, the contractor may abandon the location. This is not intended to justify an inadequate sampling program. A representative number of successfully completed cores must be provided. Close communication with the Department's project manager (PM) is strongly encouraged to discuss and reach concurrence on the coring program.

2.2 Trenching

While trenching has not been used to date, there could potentially be instances where trenching would be a viable alternative. A trenching plan would have to be submitted to the Department during the remedial design. In the event trenching is proposed after the remedial design phase, but prior to field implementation of the ISS, a minimum of two weeks' notice should be provided to the Department for review of the trenching design.

2.3 Sample Collection for strength and permeability

Samples of the mixed soil will be collected while wet and formed into cylinders in accordance with the approved testing methods (ASTM D5084 for hydraulic conductivity, ASTM D2166 or D1633 for unconfined compressive strength). Samples should be collected every 500 cubic yards. Additional sampling may be appropriate on a site-specific basis in areas of particular concern.

3.0 EXECUTION

3.1.1 Coring Implementation

- One core borehole shall be completed for every 5,000 square feet of ISS treatment area, but not less than two bore holes per treatment area.
- To allow early coring information to be incorporated in adjusting ISS operations, the first coring location shall be completed when the ISS treatment project area is no more than 25 percent complete.
- Core borehole locations shall be biased towards areas with the greatest soil contamination, areas where contamination is in direct contact with the bedrock surface, and/or locations where difficulties in the ISS process were encountered.

- Core boreholes shall be placed in locations where individual treatment columns or cells overlap, to the extent possible.
- Core boreholes should be advanced to at least a foot below the monolith design or bedrock, if encountered. If coring reveals previously undocumented areas of contamination, delineation (and remediation, as necessary) of that contamination may be required outside the QA/QC program.
- Cores shall be archived following coring activities. Cores may be discarded upon final inspection by the Department. Following initial inspection, the Department may require cores to be retained to compare to future cores or to document issues that will need to be resolved.
- To allow any needed corrective actions to commence before the monolith cures to a point making corrective action difficult or impossible, core inspection by the Department will occur as soon as possible but not later than 48 hours of the core's collection.
- In order to identify potential areas of concern for the coring program, documentation on the volume/shrinkage of grout obtained during ISS installation shall be reviewed. Areas where excessive grout was lost during ISS implementation should be targeted for coring.

3.1.2 Trenching Implementation

- If trenching is used, it will be completed at the perimeter of the ISS treatment area and locations within the ISS treatment area. The minimum depth of excavation should be the design depth of the ISS treatment.
- If the bottom of the ISS treatment cannot be visually inspected, the Department may require cores to be collected.
- To allow inspection information to be incorporated in adjusting ISS operations, trenching shall commence when the ISS treatment project area is no more than 25 percent complete.

3.1.3 Sample analysis

- Typically, multiple cylinders are collected at each location for testing unconfined compressive strength. This allows testing after 3-5 days to get an initial indication of the strength of the mix, while reserving cylinders for compliance testing after they have achieved full strength (28 days).
- Cylinders tested for hydraulic conductivity in accordance with the approved plans. The maximum permeability should generally be 1x10-6 cm/sec, as measured using ASTM D 5084-00.

3.2 Performance Evaluations

3.2.1 Visual Inspection

Core samples and related equipment will be visually inspected for the following criteria, and the results recorded:

- Visible NAPL
- Non-mechanical induced cracking within the core
- Percent of core sample recovered

In addition, indirect indications of unmixed NAPL should be recorded, such as:

- NAPL coating on drilling tools
- NAPL in drill wash tub, if water-based drilling methods are employed

3.2.2 Performance Concerns

Performance testing must be completed early enough to identify problems. Substandard results cannot be ignored with the intention to "average-out" the results over the course of project. The purpose of this guidance is to detect installation of an inadequate remedy in time to correct the problems and avoid costly retreatment or repairs to ensure effectiveness of the ISS remedy, the following conditions will warrant further attention and will be documented during ISS implementation:

- A continuous layer or seam of NAPL is noted within the core.
- NAPL coating is visible on drilling tools
- Visible NAPL is noted in the drill wash tub
- Unconfined compressive strength below 50 psi
- Hydraulic conductivity greater than 1.0 x 10-6 cm/sec or project specific goal.
- Large sections (> 1 cf) of unmixed material.

If one or more of the above conditions are noted, the Department must be notified to discuss the severity of the problem, the degree of concern, and whether any corrective action will be necessary.

A notification, by itself, does not necessarily mean a corrective action or additional borings or testing are warranted. For instance, small NAPL blebs may be present within properly mixed areas of the ISS monolith, and coring through such a bleb, especially before the monolith has achieved its maximum strength, could result in NAPL coating on drilling tools and/or NAPL in the drill wash water. The first step to determining whether corrective action is required will be to complete additional borings around the area of concern and determine if identified NAPL within the ISS mass is encapsulated, thus eliminating NAPL mobility and impact to the surrounding environment. The results of all the samples taken within a given treatment area cannot be averaged to show compliance. While each sample must satisfy the definition on its own, a single test showing slightly elevated hydraulic conductivity would not necessarily require corrective action for that cell/column, but evaluation to ensure that it is not a systemic problem is required.

If NAPL is detected in the additional borings, particularly on the edges of the ISS monolith, or at the bottom of the ISS monolith, corrective actions may be necessary in order to fully encapsulate the source area.

3.2.3 Corrective Actions

If the ISS installation is deemed unsatisfactory after a collaborative evaluation of the coring program, measures will be put in-place to address the deficiencies and ensure that the remedy is protective of human health and the environment. Such measures may include:

- Repair, re-mixing, or isolation of the concerned area using jet grouting or other suitable method
- Excavation and disposal of the concerned area, where feasible and practicable.

3.2.4 Core Hole/Trench Abandonment

When a core has been drilled from the top to the bottom elevation of the targeted ISS treatment zone, and samples collected, it will be considered complete. Following completion of each coring location, the borings will be filled with grout using tremie methods.

If trenching is used for QA/QC activities, backfill material should meet the approved ISS specifications.

3.3 Field Documentation and Approvals

3.3.1 Field Documentation

Documentation of the ISS QA/QC activities shall be included with the Final Engineering Report (FER). Documentation will include (but not be limited to):

- Figure depicting boring/trenching locations
- Photographs of each core boring/trench referenced
- Type of drilling method or excavator used
- Field coring/trench logs

3.3.2 Department Approval

The Department should be notified of the ISS QA/QC activities as soon as possible, with a minimum of 72 hours' notice or two business days. Department personnel will attempt to be on-site, unless the remedial party is informed otherwise, to inspect the QA/QC activities and provide informal approval or recommend corrective actions.

Following on-site Department inspection of the ISS QA/QC, email correspondence should be sent to the Department project manager which summarizes observations of the coring results. The Department project manager will provide an email reply within 48 hours confirming that the ISS QA/QC objectives have been met. If the Department project manager does not feel the ISS

QA/QC objectives have been adequately satisfied, the response email will include any additional corrective actions required.

3.3.3. Resolution of Disagreements

In the event there is a disagreement regarding the ISS QA/QC program the remedial party will submit a written request for resolution to the project manager's supervisor. The correspondence shall include the ISS QA/QC activities, relevant documentation, and the nature of the dispute. The project manager's supervisor will meet with the Project Manager, Construction Inspector (if applicable) and the Bureau Director to discuss the request. If necessary, a meeting will be arranged which will include the remedial party, Department project manager, supervisor, and the Bureau Director to discuss the matter.

Following the meeting, the supervisor will send correspondence to the remedial party outlining the Department final decision.

Appendix D:

Health and Safety Plan

SESI
CONSULTING ENGINEERS

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Portion of Former Ossining Works Site, Operable Unit 1
30 Water Street
Ossining, New York
BCP# C360172

Prepared For:

WB 30 Water Street, LLC
480 Bedford Road
Chappaqua, NY 10514

Prepared By:

SESI CONSULTING ENGINEERS
959 Route 46E
Parsippany, NJ 07054

Project No.: 11498

May 2023

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 Wilder Balter Partners, Inc. 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

Portion of Former Ossining Works Site, Operable Unit 1
30 Water Street
Ossining, New York

Prepared by: _____ Date:

_____

Steven Gustems
SESI- Project Manager

Approved by: _____ Date:

_____

Fuad Dahan
SESI-Principal

Table of Contents

LIST OF ACRONYMS ..... **I**

HEALTH AND SAFETY PLAN SUMMARY **1**

1.0 INTRODUCTION **2**

1.1 Objective 2
1.2 Site and Facility Description 2
1.3 Policy Statement 2
1.4 References 3
1.5 Definitions 3

2.0 PROJECT SCOPE OF WORK **4**

3.0 ROLES AND RESPONSIBILITIES **6**

3.1 All Personnel 6
3.2 *Key Safety Personnel* 6
3.2.1 Project Officer (PO) 6
3.2.2 Project Manager (PM) 6
3.2.3 Health and Safety Manager (HSM) 7
3.2.4 Site Safety Officer (SSO) 7
3.2.5 Field Supervisor (FS) 7
3.2.6 Field Personnel (FP) 8
3.3 Subcontractors 8
3.4 Stop Work Authority 8
3.5 All On-Site Personnel 8
3.6 Visitors 9

4.0 PERSONAL PROTECTIVE EQUIPMENT **10**

4.1 Levels of Protection 10
4.1.1 Level D Protection 10
4.1.2 Modified Level D Protection 10
4.1.3 Level C Protection 10
4.2 Selection of PPE 11
4.3 Site Respiratory Protection Program 11
4.4 Using PPE 11
4.4.1 Donning Procedures 12
4.4.2 Doffing Procedures 12
4.5 Selection Matrix 12

5.0 AIR AND NOISE MONITORING **13**

5.1 Air Monitoring 13
5.2 Noise Monitoring 13
5.3 Monitoring Equipment Maintenance and Calibration 13
5.4 Action Levels 14

6.0 WORK ZONES AND DECONTAMINATION **15**

6.1 Work Zones 15
6.1.1 Authorization to Enter 15
6.1.2 Site Orientation and Hazard Briefing 15
6.1.3 Certification Documents 15
6.1.4 Entry Log 15
6.1.5 Entry Requirements 15

6.1.6 Emergency Entry and Exit....15
6.1.7 Contamination Control Zones....16
6.1.8 Exclusion Zone (EZ)....16
6.1.9 Contamination Reduction Zone....16
6.1.10 Support Zone (SZ)....16
6.1.11 Posting....16
6.1.12 Site Inspections....16
6.2 Decontamination....16
6.2.1 Personnel Decontamination....16
6.2.2 Equipment Decontamination....17
6.2.3 Personal Protective Equipment Decontamination....17
7.0 TRAINING AND MEDICAL SURVEILLANCE....17
7.1 Training....17
7.1.1 General....17
7.1.2 Basic 40-Hour Course....17
7.1.3 Supervisor Course....18
7.1.4 Site-Specific Training....18
7.1.5 Daily Safety Meetings....18
7.1.6 First Aid and CPR....18
7.2 Medical Surveillance....18
7.2.1 Medical Examination....18
7.2.2 Pre-placement Medical Examination....18
7.2.3 Other Medical Examinations....19
7.2.4 Periodic Exam....19
7.2.5 Medical Restriction....19
8.0 GENERAL SAFETY PRACTICES....20
8.1 General Safety Rules....20
8.2 Buddy System....21
8.3 Heat Stress....21
8.4 Heat Stress Safety Precautions....23
8.5 Cold Stress....24
8.6 Safety Precautions for Cold Stress Prevention....25
8.7 Safe Work Practices....25
8.8 Biological Hazards....26
8.8.1 Tick Borne Diseases....26
8.8.2 Poisonous Plants....27
8.8.3 Snakes....27
8.8.4 Spiders....27
8.9 Noise....28
8.10 Spill Control....28
8.11 Sanitation....28
8.11.1 Break Area....28
8.11.2 Potable Water....28
8.11.3 Sanitary Facilities....29
8.11.4 Lavatory....29
8.12 Emergency Equipment....29
8.13 Lockout/Tagout Procedures....29
8.14 Electrical Safety....29
8.15 Lifting Safety....30
8.16 Ladder Safety....31

8.17 Traffic Safety....32
9.0 SITE-SPECIFIC HAZARDS AND CONTROL MEASURES....33
9.1 Evaluation of Hazards....33
9.1.1 Hazard Characteristics....33
9.1.2 Potential Health and Safety Hazards....33
9.2 Field Activities, Hazards, and Control Procedures....33
9.2.1 Mobilization/Construction Stakeout....34
9.2.2 Demolition/Site Clearing....34
9.2.3 Excavation and Cut/Fill Operations....35
9.2.3.1 Excavation/Trenching....35
9.2.3.2 Heavy Equipment Operation....37
9.2.3.3 Disturbance/Handling of Contaminated Material....37
9.2.4 Drilling/Subsurface Intrusion Activities....38
9.2.5 Subsurface Chemical Sample Collection/Analysis....42
9.2.6 UST Closure....42
9.2.6.1 Working in Confined Spaces....42
9.2.6.2 Working with Compressed Air....42
9.2.7 Decontamination....43
9.2.8 Demobilization....43
9.3 Chemical Hazards....43
10.0 EMERGENCY PROCEDURES....47
10.1 General....47
10.2 Emergency Response....47
10.2.1 Fire....47
10.2.2 Contaminant Release....47
10.3 Medical Emergency....47
10.3.1 Emergency Care Steps....48
10.4 First Aid - General....48
10.4.1 First Aid - Inhalation....48
10.4.2 First Aid - Ingestion....48
10.4.3 First Aid - Skin Contact....48
10.4.4 First Aid - Eye Contact....49
10.5 Reporting Injuries, Illnesses, and Safety Incidents....49
10.6 Emergency Information....49
10.6.1 Directions to Hospital....49
11.0 LOGS, REPORTS, AND RECORD KEEPING....52
11.1 HASP Field Change Request....52
11.2 Medical and Training Records....52
11.3 Exposure Records....52
11.4 Accident/Incident Report....52
11.5 OSHA Form 200....52
11.6 On-Site Health and Safety Field Logbooks....53
11.7 Material Safety Data Sheets....53

FIGURES

FIGURE 10.1 DIRECTIONS TO PHELPS MEMORIAL HOSPITAL FROM 30 WATER STREET OSSINING, NY

TABLES

TABLE 3.1 KEY SAFETY PERSONNEL
TABLE 4.1 PPE SELECTION MATRIX
TABLE 5.1 AIRBORNE CONTAMINANT ACTION LEVELS
TABLE 8.1 WORK/REST SCHEDULE
TABLE 8.2 WIND CHILL TEMPERATURE CHART
TABLE 9.1 LIST OF PRIMARY CONTAMINANTS
TABLE 10.1 EMERGENCY CONTACTS

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

Acronym	Definition
ACGIH	American Conference of Governmental Industrial Hygienists
COC	Contaminants(s) of Concern
CRZ	Contamination Reduction Zone
EMS	Emergency Medical Services
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
NIOSH	National Institute for Occupational Safety and Health
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PEL	Permissible Exposure Limit
PFD	Personal Flotation Device
PID	Photoionization Detector
PM	Project Manager
PO	Project Officer
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
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
UST	Underground Storage Tank
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 VOCs, SVOCs, metals, and PFOA and PFOS. 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 low. 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	≤ 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

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, In Situ Stabilization Soil Grouting)	Modified Level D/Level C
Earthwork/Grading	Level D
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 remedial action activities. 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

This document presents the health and safety plan (HASP) for the environmental investigation and report for the property located at 30 Water Street, Ossining, New York. The Site is an approximately 2.815 -acre acre area bordered by Central Avenue to the north, Main Street to the south, and North Water Street to the west. This parcel identified on the Town of Ossining NY GIS Viewer as Part 89.19 – Block 6 – Lots No. 26, 27, 28, and 29. The Site is located in the Village of Ossining.

Historically, from circa 1855 to circa 1929, The Site was utilized as a manufactured gas plant (MGP). The MGP operations on-site reportedly produced 9 million to 140 million cubic feet of manufactured gas per year during its operation. The operations were placed on a standby status until 1943 when the units were retired from service. By 1971 the site was mainly used for parking and was eventually left vacant.

Surface elevations on-site rand from 15 to 50 feet above mean sea level along main street in the northern direction. The Kill Brook flows at approximately 5’ below the surrounding topography and run through the site. The majority of the Site is covered in asphalt and/or gravel cover aside from the eastern portion of the property which is mostly wooded.

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 specified in the Remedial Action Work PlaN (RAWP) that are 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.

- Demolition of the existing Site structures and removal of any areas of concern such as hydraulic lifts, tanks, etc.
- Excavation of material as required for in-situ solidification stabilization (ISS) treatment, including pre-ISS 5-ft excavation, the estimated volumes of which will be determined after the pre-design investigation (PDI), and as required to remove non-MGP contamination. as preparation for the proposed development:
- Transport and off-site disposal of material as follows, the estimated volumes of which will be determined after the PDI:
    - 120 tons of construction and demolition debris
    - Hazardous waste soils as result of the non-aqueous phase liquid (NAPL)_ excavation for treatment/disposal via low-temperature thermal desorption.
    - Non-hazardous waste disposal soil from ISS preparation and jet grout
    - Contaminated non-hazardous MGP contaminated soils pre-ISS excavation as described above.
- Conducting ISS treatment of subsurface soil containing significant quantities of NAPL to depths of up to 34 ft. bgs, the estimated volume of which will be determined after the PDI.
- Backfilling the 5 foot cut ISS areas with appropriate backfill as described in this RAWP in the ISS area outside of the building footprint on the southern portion of the Site.

- Installation of NAPL recovery wells in the downgradient portion of the Site and establishing a long-term monitoring and recovery program to remove NAPL from the wells and limit the potential for future migration of NAPL downgradient of the Site.
- Installation of additional groundwater monitoring wells to establish a new groundwater monitoring well network.
- A Site-wide combined cover system (CCS) consisting of hard surfaces (buildings and paving) resulting from the proposed development. In the areas where no hard surfaces are proposed, twenty-four (24) inches of soil that complies with the Restricted Residential Soil Cleanup Objectives with the top six (6) inches amenable for vegetation will be added. The northeastern area of the Site, which is currently covered with a wooded area and where no development is proposed and may be open to the public, a pre-design surface soil sampling is proposed to determine if a surface soil cover system remediation is required.
- Installation of precautionary sub slab depressurization system (SSDS) piping and a soil vapor barrier in the proposed residential building and performing a soil vapor evaluation after implementation of the main components of the remedy to determine if the SSDS needs to become activated.
- Conducting annual groundwater monitoring to document the extent and concentrations of dissolved and potential trends in contaminant of concern concentrations.
- Preparing an annual report to summarize annual groundwater monitoring activities.
- Establishing institutional controls in the form of an environmental easement to limit the future development and use of the Site to restricted residential or commercial use (i.e. the Site will be redeveloped to house retail and multifamily dwellings), limit the potential future use of Site groundwater as a source of potable or process water without necessary water quality treatment, limit the permissible subsurface activities that could result in potential exposures to subsurface soils and groundwater containing residual

impacts and to require maintenance of the CCS and recovery well engineering controls.

- Preparation of a Site Management Plan to document the institutional/engineering controls as well as protocols (including health and safety requirements) for conducting subsurface activities and for management of potentially impacted material encountered during these activities.

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 3.1**.

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 safety meetings;
- Verify that project personnel have received the required physical examinations and medical certifications;
- 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 use 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 3.1 – Key Safety Personnel

SESI Personnel		
Role	**Name**	**Address/Telephone No.**
Project Officer (PO)	Fuad Dahan	Parsippany, NJ/973-808-9050
Project Manager (PM)	Steven Gustems	Parsippany, NJ/973-808-9050
Senior Project Engineer (SPE)	Fuad Dahan	Parsippany, NJ/973-808-9050
Health and Safety Manager (HSM)	Todd Kelly	Parsippany, NJ/973-808-9050
Site Safety Officer (SSO)	Jon Stuart	Parsippany, NJ/973-808-9050
Field Supervisor (FS)	TBD	Parsippany, NJ/973-808-9050
Field Personnel	TBD	Parsippany, NJ/973-808-9050
Field Personnel	TBD	
Subcontractors		
Company/Role	**Name**	**Address/Telephone No.**
General Borings/Driller	TBD	
Coastal/Driller	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 3.2**.

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 4.1** below. This matrix is based on information available at the time this plan was written. The Airborne Contaminant Action Levels in **Table 5.1**, Airborne Contaminant Action Levels, should be used to verify that the PPE prescribed in these matrices is appropriate.

Table 4.1 – 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
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 devices to be used are a PDR1000 particulate monitor (or equivalent) and 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 5.1 below 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 5.1 – 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
	At any reading > 5 ppm	Monitor perimeter per CAMP
Benzene	≥ 1 ppm to 5 ppm	Upgrade to Level C PPE
	> 5 ppm	Stop work; investigate cause of reading
Dust	0 to .05 mg/m3	Normal operations
	0.05 to 0.1 mg/m3	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 0.15 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

Parameter	Reading	Action
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 8.1** below.

Table 8.1– 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 8.2** below.

Table 8.2 – 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 __X__ Tank _____ Pit _____ Debris
_____ Pond _____ Lagoon Other:

Hazardous Material Characteristics:
__X__ Volatile _____ Corrosive _____ Reactive _____ Radioactive
_____ Ignitable __X__ Toxic _____ 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
__X__ Electrical hazards
__X__ 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
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 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 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.

9.2.8 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 VOCs, SVOCs, metals, 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 9.1 – List of Primary Contaminants

Media: Soil		
VOCs	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Benzene	190	PID
Toluene	450	PID
Ethylbenzene	260	PID
Xylenes	570	PID
Naphthalene	1600	PID
1,3,5-Trimethylbenzene	61	PID
1,2,4-Trimethylbenzene	190	PID
SVOCs	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Benzo(a)anthracene	65	PID
Benzo(a)pyrene	42	PID
Benzo(b)fluoranthene	60	PID
Benzo(k)fluoranthene	57	PID
Chrysene	300	PID
Dibenzo(a,h)anthracene	7	PID
Indeno(1,2,3-cd)pyrene	36	PID
Metals	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Mercury	2.3	Not Applicable
Chromium	49.8	Not Applicable
Selenium	54.7	Not Applicable
Pesticides	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
4,4-DDE	0.00465	PID
4,4-DDD	0.0145	PID
4,4-DDT	0.088	PID

Media: Groundwater		
VOC	**Maximum Concentration (ug/L)**	**Applicable Monitoring Instrument**
Benzene	7	PID
Ethylbenzene	100	PID
Isopropylbenzene	7.3	PID
Naphthalene	1200	PID
1,3,5 trimethylbenzene	9.9	PID
1,2,4 trimethylbenzene s	36	PID
SVOCs	**Maximum Concentration (ug/L)**	**Applicable Monitoring Instrument**
Acenaphthene	140	PID
Benzo(a)anthracene	22	PID
Benzo(a)pyrene	16	PID
Benzo(b)fluoranthene	11	PID
Benzo(k)fluoranthene	4.7	PID
Chrysene	18	PID
Fluorene	66	PID
Indeno(1,2,3-cd)pyrene	7.2	PID
Phenanthrene	150	PID
Phenol	4.6	PID
Pyrene	68	PID
Metals	**Maximum Concentration (ug/L)**	**Applicable Monitoring Instrument**
Cyanide	435	Not Applicable
Iron	23800	Not Applicable
Lead	81.58	Not Applicable
Magnesium	105000	Not Applicable
Sodium	487000	Not Applicable

Emerging Contaminants	Maximum Concentration (ng/L)	Applicable Monitoring Instrument
Perfluorooctanoic Acid	104	Not Applicable
Perfluorooctanesulfonic Acid	83.9	Not Applicable

Media: Soil Vapor		
Tetrachloroethene	116	Not Applicable
Trichloroethene	12.7	Not Applicable
Cis-1,2 dichloroethene	99.5	Not Applicable
Vinyl chloride	246	Not Applicable

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** below.

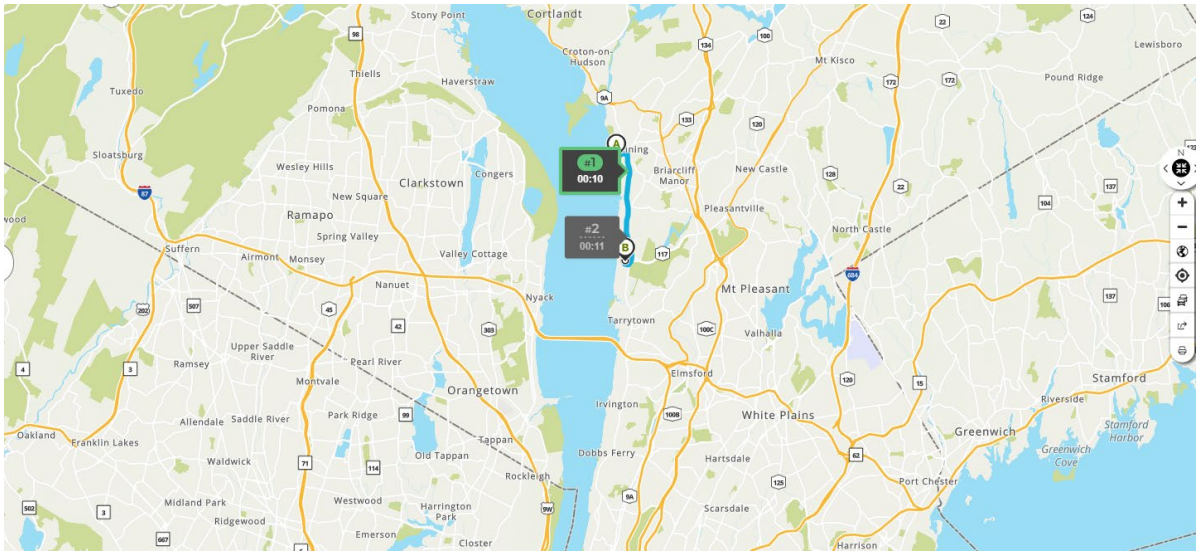
Table 10.1 – Emergency Contacts

Local Emergency Contacts	**Telephone No.**
EMERGENCY	911
Phelps Memorial Hospital	(914) 366-3000
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 Hotline	(800) 424-8802
Center for Disease Control	(800) 311-3435
Utility Mark-Out	(800) 962-7962

10.6.1 Directions to Hospital

Phelps Memorial Hospital Center
701 North Broadway, Sleepy Hollow, NY
(914) 366-3000

Fig-10.1: Direction to Hospital from 30 Water Street



<u>Directions to Hospital from 30 Water Street Ossining, NY :</u>

Head southwest. Go for 141 ft.

Then 0.03 miles

Turn right toward Central Ave. Go for 154 ft.

Then 0.03 miles

Turn slightly right onto Central Ave. Go for 0.3 mi.

Then 0.27 miles

Turn slightly right onto Brandreth St. Go for 56 ft.

Then 0.01 miles

Turn left onto Main St. Go for 190 ft.

Then 0.04 miles

Continue on Church St. Go for 463 ft.

Then 0.09 miles

Turn right onto S Highland Ave (US-9). Go for 3.8 mi.

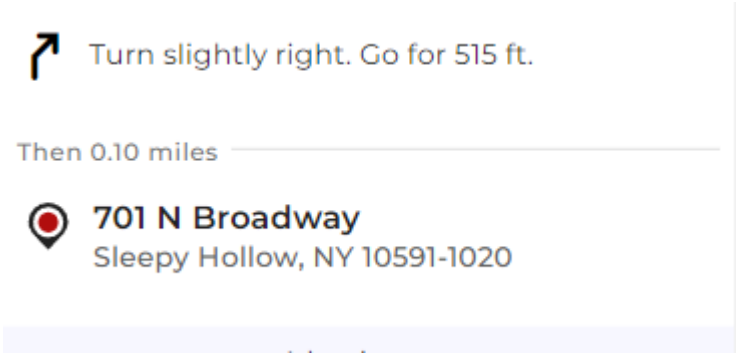
Then 3.77 miles

Turn right onto Phelps Ln toward Hospital. Go for 0.2 mi.

Then 0.16 miles

Continue straight ahead. Go for 69 ft.

Then 0.01 miles



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).

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

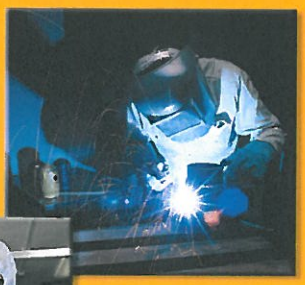
Attachment 2:
OSHA Poster

Job Safety and Health

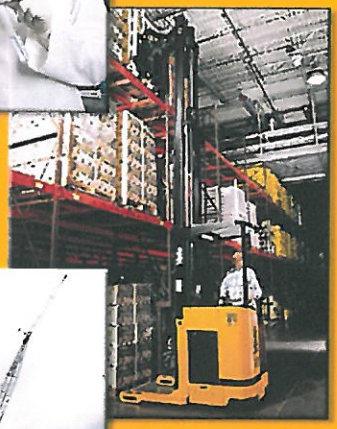
It's the law!

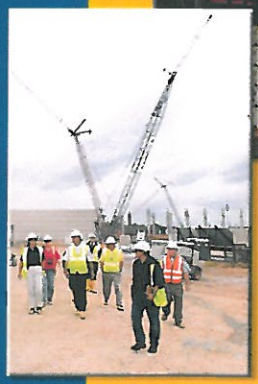
OSHA®

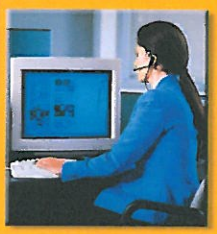
Occupational Safety and Health Administration
U.S. Department of Labor











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:
Field 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 A:
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 ➤						____	____	____	____	____	____	____	____	____	____	____	____

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

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.

Injury (1) Skin disorder (2) Respiratory condition (3) Poisoning (4) Hearing loss (5) All other illnesses (6)

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

Attachment 5– Health and Safety Orientation Signatory Page (continued)

Signature	Printed Name	Company	Date

Attachment 6:

Material Data Safety Sheets

SAFETY DATA SHEET

Creation Date 26-Sep-2009 **Revision Date** 31-Jan-2023 **Revision Number** 9

1. Identification

Product Name **Mesitylene**

Cat No. : **AC125580000; AC125580010; AC125580025; AC125580050; AC125582500**

CAS No 108-67-8
Synonyms 1,3,5-Trimethylbenzene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

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 3
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements

Flammable liquid and vapor
May be fatal if swallowed and enters airways
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
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
Keep cool
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
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: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
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)
Toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS No	Weight %
1,3,5-Trimethylbenzene	108-67-8	<100

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. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur. Risk of serious damage to the lungs (by aspiration).
Ingestion	Clean mouth with water and drink afterwards plenty of water. Do NOT induce vomiting. Call a physician or poison control center immediately. If vomiting occurs naturally, have victim lean forward.
Most important symptoms and effects	None reasonably foreseeable. Vapors may cause drowsiness and dizziness: Symptoms may be delayed: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.
Unsuitable Extinguishing Media	No information available
Flash Point	44 °C / 111.2 °F
Method -	No information available
Autoignition Temperature	550 °C / 1022 °F

Explosion Limits

Upper	6.00%
Lower	1.00%
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.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
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
3	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Do not flush into surface water or sanitary sewer system.

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/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Take precautionary measures against static discharges.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame. Flammables area. Incompatible Materials. Strong oxidizing agents. Nitric acid.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
1,3,5-Trimethylbenzene	TWA: 10 ppm		TWA: 25 ppm TWA: 125 mg/m^3	

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting equipment.

Personal Protective Equipment

Eye/face Protection Tight sealing safety goggles. Face protection 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.

Recommended Filter type: Organic gases and vapours filter. Type A. Brown. conforming to EN14387.

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	No information available
Melting Point/Range	-45 °C / -49 °F
Boiling Point/Range	163 - 166 °C / 325.4 - 330.8 °F @ 760 mmHg
Flash Point	44 °C / 111.2 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.00%
Lower	1.00%

Vapor Pressure	2.5 mbar @ 20 °C
Vapor Density	4.1 (Air = 1.0)
Specific Gravity	0.868
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	550 °C / 1022 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C9 H12
Molecular Weight	120.19

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, Nitric acid

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

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
1,3,5-Trimethylbenzene	Not listed	Not listed	LC50 = 24 g/m³ (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 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
1,3,5-Trimethylbenzene	108-67-8	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Not mutagenic in AMES Test

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 None known

Aspiration hazard Category 1

Symptoms / effects,both acute and delayed Vapors may cause drowsiness and dizziness: Symptoms may be delayed: Symptoms of overexposure may be 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

Toxic 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
1,3,5-Trimethylbenzene	Not listed	LC50: = 3.48 mg/L, 96h (Pimephales promelas)	Not listed	Not listed

Persistence and Degradability based on information available. May persist

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 UN2325
Proper Shipping Name 1,3,5-TRIMETHYLBENZENE
Hazard Class 3
Packing Group III

TDG

UN-No UN2325
Proper Shipping Name 1,3,5-TRIMETHYLBENZENE
Hazard Class 3
Packing Group III

IATA

UN-No UN2325
Proper Shipping Name 1,3,5-TRIMETHYLBENZENE
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No UN2325
Proper Shipping Name 1,3,5-TRIMETHYLBENZENE
Hazard Class 3
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
1,3,5-Trimethylbenzene	108-67-8	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
1,3,5-Trimethylbenzene	108-67-8	X	-	203-604-4	X	X	X	X	X	KE-34411

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

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
1,3,5-Trimethylbenzene	X	-	-	-	-

U.S. Department of Transportation
Reportable Quantity (RQ): N
DOT Marine Pollutant Y
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Moderate risk, Grade 2

Authorisation/Restrictions according to EU REACH Not applicable

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High

				Concern (SVHC)
1,3,5-Trimethylbenzene	108-67-8	-	-	-

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
1,3,5-Trimethylbenzene	108-67-8	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
1,3,5-Trimethylbenzene	108-67-8	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 26-Sep-2009
Revision Date 31-Jan-2023
Print Date 31-Jan-2023
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 01-Feb-2005 **Revision Date** 24-Dec-2021 **Revision Number** 5

1. Identification

Product Name **1,2,4-Trimethylbenzene**

Cat No. : **AC140090000; AC140090010; AC140090025; AC140090100; AC140090250**

CAS No 95-63-6
Synonyms Pseudocumene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

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 3
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Warning

Hazard Statements

Flammable liquid and vapor
Causes skin irritation
Causes serious eye irritation
Harmful if inhaled
May cause respiratory irritation



Precautionary Statements
Prevention
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
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
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
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
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
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)
Toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Benzene, 1,2,4-trimethyl-	95-63-6	> 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. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.
Ingestion	Clean mouth with water and drink afterwards plenty of water.
Most important symptoms and effects	Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.
Unsuitable Extinguishing Media	No information available
Flash Point	48 °C / 118.4 °F
Method -	No information available
Autoignition Temperature	500 °C / 932 °F

Explosion Limits

Upper	6.4%
Lower	0.9%
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.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
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	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Keep in suitable, closed containers for disposal. Soak up with inert absorbent material. Remove all sources of ignition. Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

Storage. Keep away from heat, sparks and flame. Flammables area. Keep container tightly closed in a dry and well-ventilated place. Incompatible Materials. Oxidizing agent.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Benzene, 1,2,4-trimethyl-			TWA: 25 ppm TWA: 125 mg/m^3	

Legend

NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. 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	No information available
Melting Point/Range	-44 °C / -47.2 °F
Boiling Point/Range	168 °C / 334.4 °F @ 760 mmHg
Flash Point	48 °C / 118.4 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.4%
Lower	0.9%
Vapor Pressure	7 mmHg @ 44.4 °C
Vapor Density	4.15 (Air = 1.0)
Specific Gravity	0.880
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	500 °C / 932 °F

Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C9 H12
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability No information available.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.

Incompatible Materials Oxidizing agent

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

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
Benzene, 1,2,4-trimethyl-	LD50 = 3280 mg/kg (Rat)	LD50 > 3160 mg/kg (Rabbit)	LC50 = 18 g/m³ (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 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
Benzene, 1,2,4-trimethyl-	95-63-6	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 Symptoms of overexposure may be 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

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
Benzene, 1,2,4-trimethyl-	Not listed	LC50: 7.19 - 8.28 mg/L, 96h flow-through (Pimephales promelas)	Not listed	EC50: = 6.14 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Benzene, 1,2,4-trimethyl-	3.63

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 UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Technical Name Benzene, 1,2,4-trimethyl-
Hazard Class 3
Packing Group III

TDG

UN-No UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Hazard Class 3
Packing Group III

IATA

UN-No UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Hazard Class 3
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Benzene, 1,2,4-trimethyl-	95-63-6	X	ACTIVE	-

Legend:
TSCA US EPA (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), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Benzene, 1,2,4-trimethyl-	95-63-6	X	-	202-436-9	X	X	X	X	X	KE-34410

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Benzene, 1,2,4-trimethyl-	95-63-6	> 95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

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
Benzene, 1,2,4-trimethyl-	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

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Benzene, 1,2,4-trimethyl-	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Benzene, 1,2,4-trimethyl-	95-63-6	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Benzene, 1,2,4-trimethyl-	95-63-6	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 01-Feb-2005
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
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 5.5
Revision Date 06/13/2014
Print Date 10/19/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 4,4′-DDD

Product Number : 49009
Brand : Supelco

CAS-No. : 72-54-8

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
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 3), H301
Acute toxicity, Dermal (Category 4), H312
Carcinogenicity (Category 2), H351
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)
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing 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.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P322	Specific measures (see supplemental first aid instructions on this label).
P330	Rinse mouth.
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 : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane

Formula : $C_{14}H_{10}Cl_4$

Molecular Weight : 320.04 g/mol

CAS-No. : 72-54-8

EC-No. : 200-783-0

Hazardous components

Component	Classification	Concentration
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane		
	Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H301, H312, H351, H410	-

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
Carbon oxides, Hydrogen chloride gas
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting 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 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.Normal measures for preventive fire protection.
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.

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
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.

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	94.0 - 96.0 °C (201.2 - 204.8 °F)
f)	Initial boiling point and boiling range	193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
l)	Vapour density	no data available
m)	Relative density	1.38 g/cm3
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	log Pow: 6.02
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
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 - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg
Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg
Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex).

Inhalation: no data available

LD50 Dermal - rabbit - 1,200 mg/kg
Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

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:	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

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: KI0700000

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 - other fish - 1.18 - 9 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
Indication of bioaccumulation.

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: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	1993-04-24

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.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

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

Copyright 2014 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: 06/13/2014 Print Date: 10/19/2018

SAFETY DATA SHEET

Version 5.6
Revision Date 05/07/2018
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 4,4′-DDT

Product Number : 386340
Brand : Aldrich
Index-No. : 602-045-00-7

CAS-No. : 50-29-3

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 3), H301
Acute toxicity, Dermal (Category 3), H311
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Oral (Category 1), H372
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)
H301 + H311 Toxic if swallowed or in contact with skin.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure if swallowed.
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.
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.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P281	Use personal protective equipment as required.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P361	Remove/Take off immediately all contaminated clothing.
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	:	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane 1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane
Formula	:	$C_{14}H_9Cl_5$
Molecular weight	:	354.49 g/mol
CAS-No.	:	50-29-3
EC-No.	:	200-024-3
Index-No.	:	602-045-00-7

Hazardous components

Component	Classification	Concentration
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane		
	Acute Tox. 3; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H301 + H311, H351, H372, 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. 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
Wear respiratory protection. 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.
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
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	1 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: 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: 107 - 110 °C (225 - 230 °F) - lit.
f)	Initial boiling point and boiling range	260.0 °C (500.0 °F)
g)	Flash point	72.0 - 77.0 °C (161.6 - 170.6 °F)
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	0.0000021 hPa (0.0000016 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.99 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 6.91
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
Oxidizing agents, Iron and iron salts.

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 - 87.0 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 300.0 mg/kg
Remarks: Behavioral:Tremor. Behavioral:Muscle weakness. Behavioral:Ataxia.

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

Limited evidence of carcinogenicity in animal studies

IARC:	2A - Group 2A: Probably carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
IARC:	2A - Group 2A: Probably carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
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
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: KJ3325000

CNS stimulation.

Pancreas. -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.01 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.01 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.003400 mg/l - 96.0 h
	LOEC - Oncorhynchus mykiss (rainbow trout) - 150 mg/l - 3.0 d
	NOEC - Oncorhynchus mykiss (rainbow trout) - 113 mg/l - 3.0 d
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 0.00108 mg/l - 48 h
Toxicity to algae	LC100 - Scenedesmus quadricauda (Green algae) - > 20 mg/l - 7 d

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 20 d - 0.001 mg/l
	Bioconcentration factor (BCF): 46,670

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: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Reportable Quantity (RQ): 1 lbsMarine pollutant:yes
Poison Inhalation Hazard: No

IMDG

UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Marine pollutant:yes

IATA

UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

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
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2008-06-17
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2008-06-17
WARNING! This product contains a chemical known to the State of California to cause cancer. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2008-06-17
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	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
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H301 + H311	Toxic if swallowed or in contact with skin.
H311	Toxic in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	2
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: 5.6 Revision Date: 05/07/2018 Print Date: 06/22/2019

SAFETY DATA SHEET

Version 5.6
Revision Date 05/07/2018
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 4,4′-DDT

Product Number : 386340
Brand : Aldrich
Index-No. : 602-045-00-7

CAS-No. : 50-29-3

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 3), H301
Acute toxicity, Dermal (Category 3), H311
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Oral (Category 1), H372
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)
H301 + H311 Toxic if swallowed or in contact with skin.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure if swallowed.
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.
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.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P281	Use personal protective equipment as required.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P361	Remove/Take off immediately all contaminated clothing.
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	:	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane 1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane
Formula	:	$C_{14}H_9Cl_5$
Molecular weight	:	354.49 g/mol
CAS-No.	:	50-29-3
EC-No.	:	200-024-3
Index-No.	:	602-045-00-7

Hazardous components

Component	Classification	Concentration
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane		
	Acute Tox. 3; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H301 + H311, H351, H372, 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. 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
Wear respiratory protection. 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.
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
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	1 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: 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: 107 - 110 °C (225 - 230 °F) - lit.
f)	Initial boiling point and boiling range	260.0 °C (500.0 °F)
g)	Flash point	72.0 - 77.0 °C (161.6 - 170.6 °F)
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	0.0000021 hPa (0.0000016 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.99 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 6.91
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
Oxidizing agents, Iron and iron salts.

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 - 87.0 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 300.0 mg/kg
Remarks: Behavioral:Tremor. Behavioral:Muscle weakness. Behavioral:Ataxia.

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

Limited evidence of carcinogenicity in animal studies

IARC:	2A - Group 2A: Probably carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
IARC:	2A - Group 2A: Probably carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
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
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: KJ3325000

CNS stimulation.

Pancreas. -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.01 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.01 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.003400 mg/l - 96.0 h
	LOEC - Oncorhynchus mykiss (rainbow trout) - 150 mg/l - 3.0 d
	NOEC - Oncorhynchus mykiss (rainbow trout) - 113 mg/l - 3.0 d
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 0.00108 mg/l - 48 h
Toxicity to algae	LC100 - Scenedesmus quadricauda (Green algae) - > 20 mg/l - 7 d

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 20 d - 0.001 mg/l
	Bioconcentration factor (BCF): 46,670

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: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Reportable Quantity (RQ): 1 lbsMarine pollutant:yes
Poison Inhalation Hazard: No

IMDG

UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Marine pollutant:yes

IATA

UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

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
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1993-02-16

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2008-06-17
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2008-06-17
WARNING! This product contains a chemical known to the State of California to cause cancer. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2008-06-17
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	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
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H301 + H311	Toxic if swallowed or in contact with skin.
H311	Toxic in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	2
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: 5.6 Revision Date: 05/07/2018 Print Date: 06/22/2019

SAFETY DATA SHEET

Version 5.6
Revision Date 05/24/2016
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Acenaphthylene

Product Number : 416703
Brand : Aldrich

CAS-No. : 208-96-8

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)
Acute toxicity, Oral (Category 4), H302
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

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)
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

Precautionary statement(s)
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.
P280 Wear eye protection/ face protection.

P280	Wear protective gloves.
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 + 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.
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

Formula	:	$C_{12}H_8$
Molecular weight	:	152.19 g/mol
CAS-No.	:	208-96-8
EC-No.	:	205-917-1

Hazardous components

Component	Classification	Concentration
Acenaphthylene		
	Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H302, H315, H319, H335	<= 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 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
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.
Provide appropriate exhaust ventilation at places where dust is formed.Normal measures for preventive fire protection.
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.

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
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
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
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	Melting point/range: 78 - 82 °C (172 - 180 °F) - lit.
f)	Initial boiling point and boiling range	280 °C (536 °F) - lit.
g)	Flash point	122.0 °C (251.6 °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	0.899 g/mL 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
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
LD50 Oral - Mouse - 1,760 mg/kg
Remarks: Autonomic Nervous System:Other (direct) parasympathomimetic. Respiratory disorder Blood: Hemorrhage.

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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.

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.

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
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: AB1254000

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)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Acenaphthylene)
Reportable Quantity (RQ): 5000 lbs

Poison Inhalation Hazard: No

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
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Acenaphthylene	208-96-8	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Acenaphthylene	208-96-8	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Acenaphthylene	208-96-8	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Acenaphthylene	CAS-No. 208-96-8	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer. Acenaphthylene	CAS-No. 208-96-8	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Eye Irrit.	Eye irritation
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
Skin Irrit.	Skin irritation

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	2

Fire Hazard:	1
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: 5.6 Revision Date: 05/24/2016 Print Date: 06/28/2019

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.

POCH

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 Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low		

		as possible. Suspected human carcinogen		
		Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. 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 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 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. cyclohexane-extractable fraction See Appendix C See Appendix A		
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 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 OSHA specifically regulated carcinogen		
		TWA	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C 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 - 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

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: 5.8 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 Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. 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

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: 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 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
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: 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. 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	:	1,2-Benzanthracene 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

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: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

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) 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 TWA: 1 mg/m³	IDLH: 250 mg/m³ 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 Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. 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 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 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. cyclohexane-extractable fraction See Appendix C 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. 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 4.4
Revision Date 12/01/2015
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : cis-Dichloroethylene

Product Number : 48597
Brand : Supelco
Index-No. : 602-026-00-3

CAS-No. : 156-59-2

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
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
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.
H332 Harmful if inhaled.
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.
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): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
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	:	C2H2Cl2
Molecular weight	:	96.94 g/mol
CAS-No.	:	156-59-2
EC-No.	:	205-859-7
Index-No.	:	602-026-00-3

Hazardous components

Component	Classification	Concentration
cis-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H332, 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
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
Carbon oxides, Hydrogen chloride gas

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.

Recommended storage temperature 2 - 8 °C

Handle and store under inert gas. Air and moisture sensitive. Light sensitive.

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
cis-Dichloroethylene	156-59-2	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

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.

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 Colour: light yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-80.0 °C (-112.0 °F)
f)	Initial boiling point and boiling range	60.0 - 61.0 °C (140.0 - 141.8 °F)
g)	Flash point	6.0 °C (42.8 °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	1.28 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. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Oxidizing agents

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
LC50 Inhalation - Rat - 13700 ppm
Remarks: Behavioral:Somnolence (general depressed activity). Liver:Fatty liver degeneration.

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is 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: KV9420000

narcosis, 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
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: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

Poison Inhalation Hazard: No

IMDG
UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

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
Fire Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

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.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H332	Harmful if inhaled.
H402	Harmful to aquatic life.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information
Copyright 2015 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: 4.4 Revision Date: 12/01/2015 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.0
Revision Date 05/14/2019
Print Date 07/17/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Cyanide, Total

Product Number : QC1496
Brand : Sigma-Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.2 Mixtures

No components need to be disclosed according to the applicable regulations.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at Room Temperature.
Storage class (TRGS 510): 12: Non Combustible Liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection not required. For nuisance exposures use type OV/AG (US) or type ABEK (EU EN 14387) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.6 Hazardous decomposition products

Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.
In the event of fire: see section 5

SECTION 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

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Water	CAS-No. 7732-18-5	Revision Date
Tripotassium hexacyanoferrate	13746-66-2	2015-07-08
Potassium hydroxide	1310-58-3	1989-08-11

New Jersey Right To Know Components

Water	CAS-No. 7732-18-5	Revision Date

California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.Tripotassium hexacyanoferrate	CAS-No. 13746-66-2	Revision Date 2016-10-21

SECTION 16: Other information

Further information
Copyright 2018 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.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.0 Revision Date: 05/14/2019 Print Date: 07/17/2019

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.
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.
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
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: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

SDS preview

ETHYLBENZENE

DANGER

100-41-4

by Fisher Scientific

Synonyms

Aethylbenzol [German], Benzene, ethyl-, CCRIS 916, Etilbenzene, Etylobenzen [Polish], Phenylethane, UNII-L5I45M5G0O, Aethylbenzol, AI3-09057, EC 202-849-4, Ethyl benzene, Ethylbenzeen, Ethylbenzeen [Dutch], Etilbenzene [Italian], Etylobenzen, HSDB 84, Ethylbenzene, Ethylbenzol, EB, EINECS 202-849-4, NCI-C56393, NSC 406903

Hazard statements

Harmful if inhaled
Highly flammable liquid and vapour
May be fatal if swallowed and enters airways
May cause damage to organs through prolonged or repeated exposure
May cause drowsiness or dizziness
May cause respiratory irritation
Suspected of causing cancer

Precautions

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Use only outdoors or in a well-ventilated area
Keep container tightly closed
Ground/bond container and receiving equipment
Use only non-sparking tools
Take precautionary measures against static discharge

Keep cool
Do NOT induce vomiting
Store locked up

Hazard category

Acute toxicity, inhalation, Aspiration hazard, Carcinogenicity, Flammable liquids, Specific target organ toxicity, repeated exposure, Specific target organ toxicity, single exposure; Narcotic effects, Specific target organ toxicity, single exposure; Respiratory tract irritation



200 View GHS Label&param1=ZmRwLjFfMDUyNjEwMDNORQ==&unique=1527865145)

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.

© 2017 Chemical Safety Software

SAFETY DATA SHEET

Version 6.1
Revision Date 03/25/2019
Print Date 06/22/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Fluorene

Product Number : 128333
Brand : Aldrich
CAS-No. : 86-73-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (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)
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P391 Collect spillage.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	$C_{13}H_{10}$
Molecular weight	:	166.22 g/mol
CAS-No.	:	86-73-7
EC-No.	:	201-695-5

Component	Classification	Concentration
Fluorene		
	Aquatic Acute 1; Aquatic Chronic 1; H400, H410 M-Factor - Aquatic Acute: 1	<= 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.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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid 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.

SECTION 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.
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

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Hazardous components without workplace control parameters

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Fluorene	86-73-7	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		3-hydroxybenzo(a)pyrene		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
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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: white
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 111 - 114 °C (232 - 237 °F) - lit.
f)	Initial boiling point and boiling range	298 °C 568 °F - lit.
g)	Flash point	151.0 °C (303.8 °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	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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

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

SECTION 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 - > 2.0 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 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 on OSHA's list of regulated carcinogens.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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: LL5670000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Fish - 0.82 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available(Fluorene)
Toxicity to algae	EC50 - Algae - 3.4 mg/l - 96 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 24 h - 0.0191 mg/l(Fluorene) Bioconcentration factor (BCF): 512

12.4 Mobility in soil
Adsorbs on 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.
Very toxic to aquatic life with long lasting effects.
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 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.

SECTION 14: Transport information

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluorene)
Reportable Quantity (RQ): 5000 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. (Fluorene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluorene)
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.

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Fluorene	CAS-No.	Revision Date

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	86-73-7	1993-04-24

Fluorene	CAS-No. 86-73-7	Revision Date 1993-04-24

New Jersey Right To Know Components

Fluorene	CAS-No. 86-73-7	Revision Date 1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information

Copyright 2018 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.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.1 Revision Date: 03/25/2019 Print Date: 06/22/2019

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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. Indeno[1,2,3-cd]pyrene	CAS-No. 193-39-5	Revision Date 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

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: 5.6 Revision Date: 12/11/2017 Print Date: 11/10/2018

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006
Version 6.0 Revision Date 10.11.2016
Print Date 17.07.2019
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 : Iron Metal Clinical

Product Number : NIST937
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.

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.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

2.2 Label elements

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

SECTION 4: First aid measures

4.1 Description of first aid measures

No data available

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
No data available

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
No data available

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
For personal protection see section 8.

6.2 Environmental precautions
No data available

6.3 Methods and materials for containment and cleaning up
No data available

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
No data available

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
No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	No data available
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation

Serious eye damage/eye irritation

Respiratory or skin sensitisation

Germ cell mutagenicity

Carcinogenicity

Reproductive toxicity

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure

Aspiration hazard

Additional Information
RTECS: Not available

SECTION 12: Ecological information

12.1 Toxicity

12.2 Persistence and degradability

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

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

14.1 UN number

ADR/RID: -	IMDG: -	IATA: -

14.2 UN proper shipping name

ADR/RID:	Not dangerous goods
IMDG:	Not dangerous goods
IATA:	Not dangerous goods

14.3 Transport hazard class(es)

ADR/RID: -	IMDG: -	IATA: -

14.4 Packaging group

ADR/RID: -	IMDG: -	IATA: -

14.5 Environmental hazards

ADR/RID: no	IMDG Marine pollutant: no	IATA: no

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

SAFETY DATA SHEET

Version 4.11
Revision Date 10/12/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Lead

Product Number : 391352
Brand : Aldrich

CAS-No. : 7439-92-1

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
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure (Category 2), H373
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)

H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
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.

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.
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.
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	:	Pb
Molecular weight	:	207.20 g/mol
CAS-No.	:	7439-92-1
EC-No.	:	231-100-4

Hazardous components

Component	Classification	Concentration
Lead		
	Acute Tox. 4; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H372, 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.

Keep in a dry 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	See 1910.1025		
Lead	7439-92-1	TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		See Appendix C		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	Lead	200 µg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			

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
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

b) Odour — No data available

c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 327.4 °C (621.3 °F) - lit.
f)	Initial boiling point and boiling range	1,740 °C (3,164 °F) - lit.
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	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 acids

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Lead 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

Rat
Cytogenetic analysis

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Lead)
NTP:	RAHC - Reasonably anticipated to be a human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Lead)
OSHA:	OSHA specifically regulated carcinogen (Lead)

Reproductive toxicity

Reproductive toxicity - Rat - Inhalation
Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral
Effects on Newborn: Behavioral.

Reproductive toxicity - Mouse - Oral
Effects on Fertility: Female fertility index (e.g., # females pregnant per females mated). Effects on Fertility: Pre-implantation mortality (e.g., reduction in numbe corpora lutea).

May damage fertility. May damage the unborn child.

Developmental Toxicity - Rat - Inhalation
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Developmental Toxicity - Rat - Oral
Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Developmental Toxicity - Rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Mouse - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OF7525000

anemia

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 1.19 mg/l - 96.0 h
	LC50 - Micropterus dolomieui - 2.2 mg/l - 96.0 h
	mortality NOEC - Salvelinus fontinalis - 1.7 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	mortality LOEC - Daphnia (water flea) - 0.17 mg/l - 24 h
	mortality NOEC - Daphnia (water flea) - 0.099 mg/l - 24 h
Toxicity to algae	mortality EC50 - Skeletonema costatum - 7.94 mg/l - 10 d

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus kisutch - 2 Weeks - 150 µg/l
	Bioconcentration factor (BCF): 12

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 substance, solid, n.o.s. (Lead)
Reportable Quantity (RQ): 10 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. (Lead)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)

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
Lead	7439-92-1	2015-11-23

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Lead	7439-92-1	2009-02-01
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Lead	7439-92-1	2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.

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: 4.11 Revision Date: 10/12/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.0
Revision Date 01/31/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Magnesium

Product Number : 200905
Brand : Sigma-Aldrich
Index-No. : 012-002-00-9

CAS-No. : 7439-95-4

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 Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable solids (Category 1), H228
Self-heating substances and mixtures (Category 1), H251
Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

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)
H228 Flammable solid.
H251 Self-heating: may catch fire.
H261 In contact with water releases flammable gases.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P223 Keep away from any possible contact with water, because of violent

	reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P235 + P410	Keep cool. Protect from sunlight.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P280	Wear protective gloves/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P407	Maintain air gap between stacks/ pallets.
P413	Store bulk masses greater than .? kg/ .? lbs at temperatures not exceeding .? °C/ .? °F.
P420	Store away from other materials.
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

3.1 Substances

Formula	:	Mg
Molecular weight	:	24.31 g/mol
CAS-No.	:	7439-95-4
EC-No.	:	231-104-6
Index-No.	:	012-002-00-9

Hazardous components

Component	Classification	Concentration
Magnesium (non pyrophoric)		
	Flam. Sol. 1; Self-heat. 1; Water-react. 2; H228, H251, H261	<= 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. 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
Dry powder

5.2 Special hazards arising from the substance or mixture
Magnesium oxide

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. Remove all sources of ignition. 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
Sweep up and shovel. 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). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a 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 formation of dust and aerosols.Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.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.
Never allow product to get in contact with water during storage.

Store under inert gas. Air and moisture sensitive.

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
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 industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
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 (EN 143) respirator cartridges as a backup to engineering controls. If th 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: Turnings
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 648 °C (1198 °F) - lit.
f)	Initial boiling point and boiling range	1,090 °C (1,994 °F) - lit.
g)	Flash point	()No data available
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	1 hPa at 621 °C (1150 °F)
l)	Vapour density	No data available
m)	Relative density	1.74 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available

o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	The substance or mixture is classified as self heating with the category 1.
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
Reacts violently with water.

10.4 Conditions to avoid
Heat, flames and sparks. Exposure to moisture

10.5 Incompatible materials
Acids, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Magnesium oxide
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 availableMagnesium (non pyrophoric)
Inhalation: No data available(Magnesium (non pyrophoric))
Dermal: No data available(Magnesium (non pyrophoric))
No data available(Magnesium (non pyrophoric))

Skin corrosion/irritation
No data available(Magnesium (non pyrophoric))

Serious eye damage/eye irritation
No data available(Magnesium (non pyrophoric))

Respiratory or skin sensitisation
No data available(Magnesium (non pyrophoric))

Germ cell mutagenicity

No data available(Magnesium (non pyrophoric))

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.

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.

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.

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(Magnesium (non pyrophoric))

No data available(Magnesium (non pyrophoric))

Specific target organ toxicity - single exposure
No data available(Magnesium (non pyrophoric))

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Magnesium (non pyrophoric))

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, chills, Fever, fatigue, muscle pain, joint pain, rash, Anorexia.(Magnesium (non pyrophoric))
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Magnesium (non pyrophoric))

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence(Magnesium (non pyrophoric))

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(Magnesium (non pyrophoric))

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
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. 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: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium
Poison Inhalation Hazard: No

IMDG
UN number: 1869 Class: 4.1 Packing group: III EMS-No: F-G, S-G
Proper shipping name: MAGNESIUM

IATA
UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium

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
Fire Hazard, Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Magnesium (non pyrophoric)	7439-95-4	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Magnesium (non pyrophoric)	7439-95-4	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Magnesium (non pyrophoric)	7439-95-4	1993-04-24

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.
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.

H228	Flammable solid.
H251	Self-heating: may catch fire.
H261	In contact with water releases flammable gases.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	2

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	2

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: 6.0 Revision Date: 01/31/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 3.15
Revision Date 03/05/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Mercury

Product Number : 215457
Brand : Sigma-Aldrich
Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

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)
Acute toxicity, Inhalation (Category 2), H330
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure (Category 1), H372
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)
H330 Fatal if inhaled.
H360 May damage fertility or the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.
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.
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.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
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

Formula	:	Hg
Molecular weight	:	200.59 g/mol
CAS-No.	:	7439-97-6
EC-No.	:	231-106-7
Index-No.	:	080-001-00-0

Hazardous components

Component	Classification	Concentration
Mercury		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, 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. 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
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. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.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.

Store under inert gas.
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic 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
Mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		

		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

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: 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 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 Colour: silver, white

b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C (673.9 °F) - lit.
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	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
l)	Vapour density	6.93 - (Air = 1.0)
m)	Relative density	13.55 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.00006 g/l at 25 °C (77 °F)
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

Relative vapour density	6.93 - (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
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Mercury/mercury 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

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3

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 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 on OSHA's list of regulated carcinogens.

Reproductive toxicity
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OV4550000

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	mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d - 0.25 µg/l

Bioconcentration factor (BCF): 155,986

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.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: A. W. Mercury
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

IATA
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury

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
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	CAS-No. 7439-97-6	Revision Date 2013-12-20

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
H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

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

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: 3.15 Revision Date: 03/05/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 5.10
Revision Date 06/21/2018
Print Date 11/10/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Naphthalene

Product Number : 84679
Brand : Sigma-Aldrich
Index-No. : 601-052-00-2

CAS-No. : 91-20-3

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 solids (Category 2), H228
Acute toxicity, Oral (Category 4), H302
Carcinogenicity (Category 2), H351
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)

H228	Flammable solid.
H302	Harmful if swallowed.
H351	Suspected of causing 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.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
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.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
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	:	$C_{10}H_8$
Molecular weight	:	128.17 g/mol
CAS-No.	:	91-20-3
EC-No.	:	202-049-5
Index-No.	:	601-052-00-2
Registration number	:	01-2119561346-37-XXXX

Hazardous components

Component	Classification	Concentration
Naphthalene		
	Flam. Sol. 2; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H228, H302, H351, 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
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 dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. 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
Sweep up and shovel. 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). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a 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
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.Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.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.
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
Naphthalene	91-20-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Hemolytic anemia Upper Respiratory Tract irritation Cataract Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		

		TWA	10 ppm 50 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	15 ppm 75 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10 ppm 50 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		PEL	0.1 ppm 0.5 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
	-	1-Naphthol + 2-Naphthol			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
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
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 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: flakes, granules Colour: white
b)	Odour	aromatic
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 79.5 - 81.0 °C (175.1 - 177.8 °F)
f)	Initial boiling point and boiling range	218 °C (424 °F) - lit.
g)	Flash point	80.0 °C (176.0 °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: 5.9 %(V) Lower explosion limit: 0.9 %(V)
k)	Vapour pressure	1.3 hPa (1.0 mmHg) at 53.0 °C (127.4 °F) 0.04 hPa (0.03 mmHg) at 25.0 °C (77.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.085 g/cm3 at 24.7 °C (76.5 °F)
n)	Water solubility	0.0308 g/l at 25 °C (77 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.4 at 25 °C (77 °F)
p)	Auto-ignition temperature	526.0 °C (978.8 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	1.05 mm2/s at 81.5 °C (178.7 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	31.8 mN/m at 100.0 °C (212.0 °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
Heat, flames and sparks.

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
LD50 Oral - Rat - 490.0 mg/kg

LC50 Inhalation - Rat - male and female - 4 h - > 0.4 mg/l
(OECD Test Guideline 403)

LD50 Dermal - Rabbit - 20,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation

Respiratory or skin sensitisation
Maximisation Test - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative

Rat - male
Result: negative

Carcinogenicity

Carcinogenicity - Rat - male and female - inhalation (vapour)
Tumorigenic:Tumors at site or application.

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Naphthalene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information

Repeated dose toxicity	Rat - male and female - Oral - NOAEL : 100 mg/kg - LOAEL : 400 mg/kg - OECD Test Guideline 408

RTECS: QJ0525000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer., Naphthalene is retinotoxic and systemic absorption of its vapors above 15ppm, may result in:, cataracts, optic neuritis, corneal injury, Eye irritation, Ingestion may provoke the following symptoms:, hemolytic anemia, hemoglobinuria, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Convulsions, anemia, Kidney injury may occur., Seizures., Coma.

Heart -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 7.9 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 2.16 mg/l - 48 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 2 % - Not readily biodegradable.

12.3 Bioaccumulative potential

Bioaccumulation	Fish Bioconcentration factor (BCF): 427 - 1,158

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

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: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, crude
Reportable Quantity (RQ): 100 lbsMarine pollutant:yes
Poison Inhalation Hazard: No

IMDG

UN number: 1334 Class: 4.1 Packing group: III EMS-No: F-A, S-G
Proper shipping name: NAPHTHALENE, CRUDE
Marine pollutant:yes Marine pollutant: yes

IATA
UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, crude

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
Naphthalene	91-20-3	2007-03-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	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
Naphthalene	91-20-3	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
Carc.	Carcinogenicity
Flam. Sol.	Flammable solids
H228	Flammable solid.
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

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: 5.10 Revision Date: 06/21/2018 Print Date: 11/10/2018

SAFETY DATA SHEET

Version 3.4
Revision Date 06/27/2014
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Heptadecafluorooctanesulfonic acid solution

Product Number : 77283
Brand : Aldrich

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
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 corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), H372
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 Danger

Hazard statement(s)
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.
H351 Suspected of causing cancer.
H360 May damage fertility or the unborn child.
H362 May cause harm to breast-fed children.
H372 Causes damage to organs through prolonged or repeated exposure.

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.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P263	Avoid contact during pregnancy/ while nursing.
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 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P321	Specific treatment (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing 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

3.2 Mixtures

Formula : $C_8HF_{17}O_3S$

Molecular Weight : 500.13 g/mol

Hazardous components

Component		Classification	Concentration
Heptadecafluorooctane-1-sulphonic acid			
CAS-No. EC-No. Index-No.	1763-23-1 217-179-8 607-624-00-8	Acute Tox. 4; Skin Corr. 1B; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; Aquatic Acute 2; Aquatic Chronic 2; H302 + H332, H314, H351, H360, H362, H372, H411	30 - 60 %

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

Take off contaminated clothing and shoes immediately. 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.Continue rinsing eyes during transport to hospital.

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
Carbon oxides, Sulphur oxides, Hydrogen fluoride

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting 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
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
Tightly fitting safety goggles. Faceshield (8-inch minimum). 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
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: clear, liquid Colour: light red
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	no data available
g)	Flash point	no data available
h)	Evapouration 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	1.250 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
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

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

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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
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

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

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.
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: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Heptadecafluorooctane-1-sulphonic acid)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3265 Class: 8 Packing group: II EMS-No: F-A, S-B
Proper shipping name: CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (Heptadecafluorooctane-1-sulphonic acid)
Marine pollutant: No

IATA
UN number: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Heptadecafluorooctane-1-sulphonic acid)

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Heptadecafluorooctane-1-sulphonic acid	1763-23-1	2009-07-17

New Jersey Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Heptadecafluorooctane-1-sulphonic acid	1763-23-1	2009-07-17

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.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Dam.	Serious eye damage
H302	Harmful if swallowed.
H302 + H332	Harmful if swallowed or if inhaled
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Lact.	Effects on or via lactation

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

Copyright 2014 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: 3.4 Revision Date: 06/27/2014 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 03/12/2019
Print Date 06/28/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorooctanoic acid

Product Number : 171468
Brand : Aldrich
CAS-No. : 335-67-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Hazard statement(s)	
H302 + H332	Harmful if swallowed or if inhaled.
H318	Causes serious eye damage.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Liver) through prolonged or repeated exposure.

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.
P263	Avoid contact during pregnancy/ while nursing.
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/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
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 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
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

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Pentadecafluorooctanoic acid Perfluorocaprylic acid Perfluorooctanoic acid
Formula	:	$C_8HF_{15}O_2$
Molecular weight	:	414.07 g/mol
CAS-No.	:	335-67-1
EC-No.	:	206-397-9

Component	Classification	Concentration
Pentadecafluorooctanoic acid		
	Acute Tox. 4; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H332, H318, H351, H360, H362, H372	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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
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
Continue rinsing eyes during transport to hospital.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 fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 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.

SECTION 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.
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

SECTION 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

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).

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	2.6 at 1 g/l
e)	Melting point/freezing point	Melting point/range: 55 - 56 °C (131 - 133 °F) - lit.
f)	Initial boiling point and boiling range	189 °C 372 °F at 981 hPa - lit.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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	0.69 hPa at 25 °C (77 °F)
l)	Vapour density	No data available
m)	Relative density	0.900 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

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Oxidizing agents, Reducing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride
Other decomposition products - No data available
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Inhalation: No data available
Dermal: No data available
LD50 Intraperitoneal - Rat - 189 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

Rat
DNA damage

Rat
DNA damage

Carcinogenicity
Suspected human carcinogens

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Pentadecafluorooctanoic acid)
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
Effects on or via lactation
Presumed human reproductive toxicant
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Liver

Aspiration hazard
No data available

Additional Information
RTECS: RH0781000

Cough, Shortness of breath, Headache, Nausea, Vomiting

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. 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.

SECTION 14: Transport information

DOT (US)
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Pentadecafluorooctanoic acid)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3261 Class: 8 Packing group: III EMS-No: F-A, S-B
Proper shipping name: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (Pentadecafluorooctanoic acid)

IATA
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Pentadecafluorooctanoic acid)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

New Jersey Right To Know Components

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information
Copyright 2018 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.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.2
Revision Date 05/25/2018
Print Date 06/29/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Phenanthrene

Product Number : P11409
Brand : Aldrich

CAS-No. : 85-01-8

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 Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

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 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)
H302 Harmful if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.

P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
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

Photosensitizer.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Molecular weight : 178.23 g/mol
CAS-No. : 85-01-8
EC-No. : 201-581-5

Hazardous components

Component	Classification	Concentration
Phenanthrene		
	Acute Tox. 4; Aquatic Acute 1; Aquatic Chronic 1; H302, 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. 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.
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

Component	CAS-No.	Value	Control parameters	Basis
Phenanthrene	85-01-8	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
	Remarks	1910.1002 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 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. cyclohexane-extractable fraction See Appendix C		

		See Appendix A		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Coal tar pitch volatiles (benzene or cyclohexane-soluble fraction) include fused polycyclic hydrocarbons (some of which are known carcinogens) 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.		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Phenanthrene	85-01-8	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

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

For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. 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: 98 - 100 °C (208 - 212 °F)
f)	Initial boiling point and boiling range	340 °C (644 °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	1.063 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 4.46
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

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
LD50 Oral - Mouse - 700.0 mg/kg
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
Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
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 fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 3.2 mg/l - 96.0 h(Phenanthrene)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia pulex (Water flea) - 0.35 mg/l - 48 h(Phenanthrene)

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation Pimephales promelas (fathead minnow) - 28 d
- 0.00255 mg/l(Phenanthrene)

Bioconcentration factor (BCF): 5,100

12.4 Mobility in soil

No data available(Phenanthrene)

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.

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. (Phenanthrene)
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. (Phenanthrene)
Marine pollutant : yes

IATA

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Phenanthrene)

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
Phenanthrene	85-01-8	2007-07-01

SARA 311/312 Hazards

Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date

Phenanthrene	85-01-8	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Phenanthrene	CAS-No. 85-01-8	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H302	Harmful if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
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: 6.2 Revision Date: 05/25/2018 Print Date: 06/29/2019

SAFETY DATA SHEET

Version 5.11
Revision Date 07/28/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Phenol

Product Number : W322318
Brand : Aldrich
Index-No. : 604-001-00-2

CAS-No. : 108-95-2

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
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 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Germ cell mutagenicity (Category 2), H341
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 3), H402
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 Danger

Hazard statement(s)

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H314	Causes severe skin burns and eye damage.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs through prolonged or repeated exposure.
H402	Harmful to aquatic life.
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.
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 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: 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

Vesicant., Rapidly absorbed through skin.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Hydroxybenzene
Formula	:	C_6H_6O
Molecular weight	:	94.11 g/mol
CAS-No.	:	108-95-2
EC-No.	:	203-632-7
Index-No.	:	604-001-00-2
Registration number	:	01-2119471329-32-XXXX

Hazardous components

Component	Classification	Concentration
Phenol		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Muta. 2; STOT RE 2; Aquatic Acute 3; Aquatic Chronic 2; H301 + H311 + H331, H314, H341, H373, H402, 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
Take off contaminated clothing and shoes immediately. 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.Continue rinsing eyes during transport to hospital.

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
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. 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. Light sensitive.
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic 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
Phenol	108-95-2	TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Lung damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	5 ppm 19 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		C	15.6 ppm 60 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption 15 minute ceiling value		
		TWA	5 ppm 19 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation The value in mg/m3 is approximate.		
		PEL	5 ppm 19 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
Aromatic compound	-	Phenol	250mg/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

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: 0.2 mm
Break through time: 56 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 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	6.0
e)	Melting point/freezing point	Melting point/range: 40 - 43 °C (104 - 109 °F) - lit.
f)	Initial boiling point and boiling range	182 °C (360 °F) - lit.
g)	Flash point	79.0 °C (174.2 °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: 8.6 %(V) Lower explosion limit: 1.7 %(V)
k)	Vapour pressure	6.3 hPa (4.7 mmHg) at 55.0 °C (131.0 °F) 0.5 hPa (0.4 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.071 g/mL at 25 °C (77 °F)

n)	Water solubility	84 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 1.46
p)	Auto-ignition temperature	715.0 °C (1,319.0 °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

Surface tension	38.2 mN/m at 50.0 °C (122.0 °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, Strong acids

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 - 410.0 - 650.0 mg/kg

LD50 Oral - Rat - 317.0 mg/kg
Remarks: Behavioral:Convulsions or effect on seizure threshold.

LC50 Inhalation - Rat - 8 h - 900 mg/m3

LD50 Dermal - Rabbit - 630.0 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
In vitro tests showed mutagenic effects

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 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
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: SJ3325000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Circulatory collapse, tachypnea, paralysis, Convulsions, Coma., necrosis of mouth and G.I. Tract, Jaundice, respiratory failure, cardiac arrest 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	LC50 - Leuciscus idus (Golden orfe) - 14.00 - 25.00 mg/l - 48 h
	LC50 - Carassius auratus (goldfish) - 36.10 - 68.80 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 56 mg/l - 48 h
Toxicity to algae	EC50 - Chlorella vulgaris (Fresh water algae) - 370.00 mg/l - 96 h

12.2 Persistence and degradability

Biodegradability	Result: - Readily biodegradable.

12.3 Bioaccumulative potential

Bioaccumulation	Danio rerio (zebra fish) - 5 h - 2 mg/l Bioconcentration factor (BCF): 17.5 Remarks: 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.
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: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1671 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: PHENOL, SOLID
Marine pollutant:yes

IATA

UN number: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid

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
Phenol	108-95-2	2007-07-01

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

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.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Dam.	Serious eye damage
H301	Toxic if swallowed.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs through prolonged or repeated exposure.
H402	Harmful to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Muta.	Germ cell mutagenicity
Skin Corr.	Skin corrosion
STOT RE	Specific target organ toxicity - repeated exposure

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: 5.11 Revision Date: 07/28/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Pyrene

Product Number : 185515
Brand : Aldrich

CAS-No. : 129-00-0

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 Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
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)
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

Rapidly absorbed through skin.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Benzo[<I>def</>]phenanthrene

Formula : $C_{16}H_{10}$
Molecular weight : 202.25 g/mol
CAS-No. : 129-00-0
EC-No. : 204-927-3

Hazardous components

Component	Classification	Concentration
Pyrene		
	Aquatic Acute 1; Aquatic Chronic 1; 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.

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

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 combu formation should be taken into consideration before additional processing
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.

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
Pyrene	129-00-0	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
	Remarks	1910.1002 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 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. cyclohexane-extractable fraction See Appendix C See Appendix A		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Pyrene	129-00-0	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

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: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 30 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 industria 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 le (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: crystalline 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: 145 - 148 °C (293 - 298 °F) - lit.
f)	Initial boiling point and boiling range	390.0 - 395.0 °C (734.0 - 743.0 °F)
g)	Flash point	> 200.0 °C (> 392.0 °F)
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	1.21 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 4.88
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

Bulk density	650 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
Risk of dust explosion.

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
Dermal: No data available(Pyrene)
No data available(Pyrene)

Skin corrosion/irritation

Serious eye damage/eye irritation

Respiratory or skin sensitisation
No data available(Pyrene)

Germ cell mutagenicity

No data available(Pyrene)

Carcinogenicity
No data available(Pyrene)
(Pyrene)

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: OSHA specifically regulated carcinogen (Pyrene)

Reproductive toxicity
No data available(Pyrene)

No data available(Pyrene)

Specific target organ toxicity - single exposure
No data available(Pyrene)

Specific target organ toxicity - repeated exposure

Aspiration hazard
No data available(Pyrene)

Additional Information
RTECS: UR2450000

Inhalation studies in animals have caused:, Liver toxicity, pulmonary pathologies, intragastric pathologies, neutropenia, leukopenia, anemia, Contact with skin can cause:, hyperemia, weight loss, hematopoietic changes, Dermatitis, Chronic effects, leukocytosis(Pyrene)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - > 2 mg/l - 96.0 h(Pyrene)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.002 - 0.003 mg/l - 48 h(Pyrene)

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	other fish - 48 h - 0.056 mg/l(Pyrene)
	Bioconcentration factor (BCF): 4,810

12.4 Mobility in soil
No data available(Pyrene)

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.

Avoid release to the environment.

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. (Pyrene)
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. (Pyrene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (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
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Pyrene	129-00-0	2008-11-03

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
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Pyrene	129-00-0	2008-11-03

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Pyrene	129-00-0	2008-11-03

New Jersey Right To Know Components

	CAS-No.	Revision Date
Pyrene	129-00-0	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 cancer.	129-00-0	2007-09-28

Pyrene

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

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: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Creation Date 24-Nov-2010 **Revision Date** 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Selenium(IV) oxide**

Cat No. : **AC193980000; AC193980100; AC193980500**

CAS No 7446-08-4
Synonyms Selenium dioxide

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

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)

Acute oral toxicity	Category 2
Acute dermal toxicity	Category 1
Acute Inhalation Toxicity - Dusts and Mists	Category 2
Skin Corrosion/Irritation	Category 1
Serious Eye Damage/Eye Irritation	Category 1
Germ Cell Mutagenicity	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Liver.	

Label Elements

Signal Word
Danger

Hazard Statements
Toxic if swallowed
Causes severe skin burns and eye damage
Suspected of causing genetic defects
May cause damage to organs through prolonged or repeated exposure
Fatal in contact with skin or if inhaled



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Wear protective gloves/protective clothing/eye protection/face protection
In case of inadequate ventilation wear respiratory protection
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
Do not get in eyes, on skin, or on clothing
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
Immediately call a POISON CENTER or doctor/physician
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
Immediately call a POISON CENTER or doctor/physician
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
Immediately call a POISON CENTER or doctor/physician
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
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)
Very toxic to aquatic life with long lasting effects
Other hazards
Hygroscopic.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Selenium dioxide	7446-08-4	>95

4. First-aid measures

Eye Contact	Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.
Inhalation	Remove to fresh air. Immediate medical attention is required. 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. If not breathing, give artificial respiration.
Ingestion	Do NOT induce vomiting. Call a physician or poison control center immediately.
Most important symptoms and effects	No information available.
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Carbon dioxide (CO_2). Carbon monoxide (CO).
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
4	0	1	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation. Avoid contact with skin, eyes or clothing. Keep people away from and upwind of spill/leak. Do not touch damaged packages or spilled material.
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.
Methods for Containment and Clean Up	Avoid dust formation. Wear self-contained breathing apparatus and protective suit. Sweep up and shovel into suitable containers for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling Handle product only in closed system or provide appropriate exhaust ventilation. Ensure adequate ventilation. Wear personal protective equipment/face protection. Avoid contact with skin, eyes or clothing. Avoid dust formation. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid ingestion and inhalation.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Corrosives area. Incompatible Materials. Strong oxidizing agents. Strong acids. Ammonia. Reducing Agent.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Selenium dioxide	TWA: 0.2 mg/m³	(Vacated) TWA: 0.2 mg/m³	IDLH: 1 mg/m³ TWA: 0.2 mg/m³	TWA: 0.2 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and 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 Solid
Appearance	Light cream
Odor	No information available
Odor Threshold	No information available
pH	2 10 g/L aq.sol
Melting Point/Range	315 °C / 599 °F
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	12.5 mmHg @ 70 °C
Vapor Density	Not applicable

Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	O2 Se
Molecular Weight	110.96

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Hygroscopic.

Conditions to Avoid Avoid dust formation. Incompatible products. Exposure to moist air or water.

Incompatible Materials Strong oxidizing agents, Strong acids, Ammonia, Reducing Agent

Hazardous Decomposition Products Carbon dioxide (CO_2), Carbon monoxide (CO)

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
Selenium dioxide	LD50 = 48 mg/kg (Rat)	LD50 = 4 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 Causes burns by all exposure routes

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Selenium dioxide	7446-08-4	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Animal experiments showed mutagenic and teratogenic effects

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure Liver

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.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

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.

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 UN3283
Proper Shipping Name SELENIUM COMPOUND, SOLID, N.O.S.
Technical Name (SELENIUM (IV) OXIDE)
Hazard Class 6.1
Packing Group II

TDG

UN-No UN3283
Proper Shipping Name SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class 6.1
Packing Group II

IATA

UN-No UN3283
Proper Shipping Name SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class 6.1
Packing Group II

IMDG/IMO

UN-No UN3283
Proper Shipping Name SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class 6.1
Packing Group II

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Selenium dioxide	7446-08-4	X	ACTIVE	-

Legend:
TSCA US EPA (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), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Selenium dioxide	7446-08-4	X	-	231-194-7	X	X	X	X	X	KE-30926

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Selenium dioxide	7446-08-4	>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
Selenium dioxide	X	-	X	-

Clean Air Act Not applicable

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Selenium dioxide	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
Selenium dioxide	10 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
Selenium dioxide	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 No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV -	REACH (1907/2006) - Annex XVII -	REACH Regulation (EC

	Substances Subject to Authorization	Restrictions on Certain Dangerous Substances	1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Selenium dioxide	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Selenium dioxide	7446-08-4	Not applicable	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Selenium dioxide	7446-08-4	Not applicable	Not applicable	Not applicable	Annex I - Y25

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 24-Nov-2010
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
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 6.2
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Sodium

Product Number : 483745
Brand : Aldrich

CAS-No. : 7440-23-5

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 # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350

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)
H260 In contact with water releases flammable gases which may ignite spontaneously.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H350 May cause cancer.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P260	Do not breathe dust or mist.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P281	Use personal protective equipment as required.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
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

Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Na
Molecular weight : 22.99 g/mol

Hazardous components

Component		Classification	Concentration
Sodium			
CAS-No. EC-No. Index-No.	7440-23-5 231-132-9 011-001-00-0	Water-react. 1; Skin Corr. 1B; Eye Dam. 1; H260, H314	>= 90 - <= 100 %
Paraffin oils			
CAS-No. EC-No.	8012-95-1 232-384-2	Asp. Tox. 1; H304, H304	>= 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
Take off contaminated clothing and shoes immediately. 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.Continue rinsing eyes during transport to hospital.

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
Dry powder

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sodium 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.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. 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). Do not flush with water. 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 combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.

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.
Never allow product to get in contact with water during storage.

Handle and store under inert gas. Air sensitive.

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
Paraffin oils	8012-95-1	STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 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	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation 2015 Adoption Not classifiable as a human carcinogen		
		Upper Respiratory Tract irritation 2015 Adoption Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		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
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		

		TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10 mg/m3	USA. NIOSH Recommended Exposure Limits

Hazardous components without 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

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 industria 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 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 (EN 143) respirator cartridges as a backup to engineering controls. If th 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: Pieces

b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 97.8 °C (208.0 °F) - lit.
f)	Initial boiling point and boiling range	883 °C (1621 °F) - lit.
g)	Flash point	82 °C (180 °F)
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	0.97 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
Reacts violently with water.

10.4 Conditions to avoid
Air Do not allow water to enter container.
Exposure to moisture

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, Sodium oxides
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

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
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, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Aspiration may lead to:, lipid pneumonia, Effects due to ingestion may include:, laxative effect, Gastrointestinal disturbance, 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
Burn in a chemical incinerator equipped with an afterburner and scrubber b 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. Dissolve or mix the material with a combustible solvent and burn in a chem scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
Reportable Quantity (RQ) : 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1428 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: SODIUM

IATA
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
IATA Passenger: Not permitted for transport

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
Reactivity Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	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.

Asp. Tox.	Aspiration hazard
Eye Dam.	Serious eye damage
H260	In contact with water releases flammable gases which may ignite spontaneously.
H304	May be fatal if swallowed and enters airways.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H350	May cause cancer.
Skin Corr.	Skin corrosion
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	2

NFPA Rating

Health hazard:	3
Fire Hazard:	4
Reactivity Hazard:	2
Special hazard.I:	W

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: 6.2 Revision Date: 05/28/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 4.11
Revision Date 06/28/2017
Print Date 06/22/2019

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 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 Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Potential Occupational Carcinogen Minimize workplace exposure concentrations. 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 Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Potential Occupational Carcinogen Minimize workplace exposure concentrations. 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 170 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	100 ppm 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 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 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) 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 Result: 11 % - Not readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 0.00343 mg/l 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

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: 4.11 Revision Date: 06/28/2017 Print Date: 06/22/2019

SAFETY DATA SHEET

Version 6.0
Revision Date 09/21/2017
Print Date 11/10/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Toluene

Product Number : 244511
Brand : Sigma-Aldrich
Index-No. : 601-021-00-3

CAS-No. : 108-88-3

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
Skin irritation (Category 2), H315
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure (Category 2), H373
Aspiration hazard (Category 1), H304
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.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
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.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
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.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	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 + 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

Formula	:	C_7H_8
Molecular weight	:	92.14 g/mol
CAS-No.	:	108-88-3
EC-No.	:	203-625-9
Index-No.	:	601-021-00-3
Registration number	:	01-2119471310-51-XXXX

Hazardous components

Component	Classification	Concentration
Toluene		
	Flam. Liq. 2; Skin Irrit. 2; Repr. 2; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H225, H304, H315, H336, H361, H373, 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. 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
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.

Handle and store under inert gas.

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
Toluene	108-88-3	TWA	100 ppm 375 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	150 ppm 560 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z37.12-1967		
		CEIL	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		Peak	500 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Visual impairment Female reproductive Pregnancy loss 2015 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 375 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 560 mg/m3	USA. NIOSH Recommended Exposure Limits

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Toluene	108-88-3	Toluene	0.0200 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Toluene	0.0300 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		o-Cresol	0.3000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		Toluene	0.02 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Prior to last shift of workweek			

		Toluene	0.03 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		o-Cresol	0.3mg/g Creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

Derived No Effect Level (DNEL)

Application Area	Exposure routes	Health effect	Value
Workers	Inhalation	Acute systemic effects	384 mg/m3
Workers	Inhalation	Acute local effects	384 mg/m3
Workers	Skin contact	Long-term systemic effects	384mg/kg BW/d
Workers	Inhalation	Long-term systemic effects	192 mg/m3
Workers	Inhalation	Long-term local effects	192 mg/m3
Consumers	Inhalation	Acute systemic effects	226 mg/m3
Consumers	Inhalation	Acute local effects	226 mg/m3
Consumers	Skin contact	Long-term systemic effects	226mg/kg BW/d
Consumers	Inhalation	Long-term systemic effects	56.5 mg/m3
Consumers	Ingestion	Long-term systemic effects	8.13mg/kg BW/d

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	2.89 mg/kg
Marine water	0.68 mg/l
Fresh water	0.68 mg/l
Marine sediment	16.39 mg/kg
Fresh water sediment	16.39 mg/kg
Sewage treatment plant	13.61 mg/l
Aquatic intermittent release	0.68 mg/l

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 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 Colour: colourless
b)	Odour	aromatic
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -93 °C (-135 °F)
f)	Initial boiling point and boiling range	110 - 111 °C (230 - 232 °F)
g)	Flash point	4.0 °C (39.2 °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: 7 %(V) Lower explosion limit: 1.2 %(V)
k)	Vapour pressure	29.1 hPa (21.8 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.865 g/mL at 25 °C (77 °F)
n)	Water solubility	0.5 g/l at 15 °C (59 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	535.0 °C (995.0 °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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

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
LD50 Oral - Rat - > 5,580 mg/kg

LC50 Inhalation - Rat - 4 h - 12,500 - 28,800 mg/m3

LD50 Dermal - Rabbit - 12,196 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Rat
Liver
DNA damage

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 identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Damage to fetus possible
Suspected human reproductive toxicant

Reproductive toxicity - Rat - Inhalation
Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Experiments have shown reproductive toxicity effects in male and female laboratory animals.

Developmental Toxicity - Rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

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: XS5250000

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	LC50 - Oncorhynchus mykiss (rainbow trout) - 7.63 mg/l - 96 h
	NOEC - Pimephales promelas (fathead minnow) - 5.44 mg/l - 7 d
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 8.00 mg/l - 24 h
	Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h
Toxicity to algae	EC50 - Chlorella vulgaris (Fresh water algae) - 245.00 mg/l - 24 h
	EC50 - Pseudokirchneriella subcapitata (green algae) - 10.00 mg/l - 24 h

12.2 Persistence and degradability

Biodegradability	Result: - Readily biodegradable.

12.3 Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d - 0.05 mg/l
	Bioconcentration factor (BCF): 90

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.

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: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1294 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: TOLUENE

IATA
UN number: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene

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
Toluene	108-88-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Toluene	108-88-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Toluene	108-88-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Toluene	108-88-3	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. Toluene	108-88-3	2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.
Repr.	Reproductive toxicity
Skin Irrit.	Skin 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

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: 6.0 Revision Date: 09/21/2017 Print Date: 11/10/2018

SAFETY DATA SHEET

Version 4.10
Revision Date 01/04/2018
Print Date 06/28/2019

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 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 cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		STEL	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		Potential Occupational Carcinogen See Appendix C 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 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 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 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) 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. 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. 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

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: 4.10 Revision Date: 01/04/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 3.16
Revision Date 03/05/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Vinyl chloride

Product Number : 387622
Brand : Aldrich
Index-No. : 602-023-00-7

CAS-No. : 75-01-4

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)
Flammable gases (Category 1), H220
Gases under pressure (Liquefied gas), H280
Carcinogenicity (Category 1A), H350
Simple Asphyxiant,

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)

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer. May displace oxygen and cause rapid suffocation.

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.
P280	Wear protective gloves/ protective clothing/ eye protection/ face

	protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P405	Store locked up.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Chloroethylene
Formula	:	C_2H_3Cl
Molecular weight	:	62.50 g/mol
CAS-No.	:	75-01-4
EC-No.	:	200-831-0
Index-No.	:	602-023-00-7

Hazardous components

Component	Classification	Concentration
Vinyl chloride		
	Flam. Gas 1; Press. Gas Liquefied gas; Carc. 1A; SA ; H220, H280, H350,	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

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.

6.3 Methods and materials for containment and cleaning up
Clean up promptly by sweeping or vacuum.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
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.

Contents under pressure. Light sensitive.
Storage class (TRGS 510): 2A: Gases

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
Vinyl chloride	75-01-4	TWA	1 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Lung cancer Confirmed human carcinogen		
		STEL	5 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	5 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		See 1910.1017		

		Potential Occupational Carcinogen 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.

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 120 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.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Liquefied gas
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -153.8 °C (-244.8 °F) - lit.
f)	Initial boiling point and boiling range	-13.4 °C (7.9 °F) - lit.
g)	Flash point	-61.0 °C (-77.8 °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: 33 %(V) Lower explosion limit: 3.6 %(V)
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	0.911 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.
Contains the following stabiliser(s):
Hydroquinone (>=0 - <=0.0001 %)
Phenol (>=0 - <=0.01 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Chemically active metals, Copper

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
No data available

LC50 Inhalation - Rat - 0.3 h - 180000 ppm
Remarks: Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold. Respiratory disorder

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 is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Human carcinogen.

IARC:	1 - Group 1: Carcinogenic to humans (Vinyl chloride)
NTP:	Known - Known to be human carcinogen (Vinyl chloride)
OSHA:	OSHA specifically regulated carcinogen (Vinyl chloride)

Reproductive toxicity
No data available

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

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: KU9625000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -
Stomach - Irregularities - Based on Human Evidence (Phenol)
Liver - Irregularities - Based on Human Evidence

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
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: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1086 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: VINYL CHLORIDE, STABILIZED

IATA
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
IATA Passenger: 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
Phenol	108-95-2	2007-07-01
Hydroquinone	123-31-9	2007-03-01

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Sudden Release of Pressure Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01
Hydroquinone	123-31-9	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	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
Vinyl chloride	75-01-4	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

	May displace oxygen and cause rapid suffocation.
Carc.	Carcinogenicity
Flam. Gas	Flammable gases
H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer.
Press. Gas	Gases under pressure
SA	Simple Asphyxiant

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	3

NFPA Rating

Health hazard:	2
Fire Hazard:	4
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: 3.16 Revision Date: 03/05/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 4.19
Revision Date 08/07/2018
Print Date 11/10/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Xylenes

Product Number : 247642
Brand : Sigma-Aldrich

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 3), H226
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure (Category 2), H373
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, Liver, Kidney, H373
Aspiration hazard (Category 1), H304
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)

H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs (Central nervous system, Liver, Kidney)

	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.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
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.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	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 + 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	:	Xylene mixture of isomers
Formula	:	C_8H_{10}
Molecular weight	:	106.17 g/mol
Registration number	:	01-2119488216-32-XXXX

Hazardous components

Component	Classification	Concentration
Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H226, H304, H315, H332, H335, H373, H401	90 - 100 %
Ethylbenzene		
	Flam. Liq. 2; Acute Tox. 4; Carc. 2; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H225, H304, H332, H351, H373, H401	20 - 30 %

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
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
Dry powder Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

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 non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

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.
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): 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
Xylene	1330-20-7	STEL	150 ppm 655 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	100 ppm 435 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	The value in mg/m3 is approximate.		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
Ethylbenzene	100-41-4	TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Cochlear impair Kidney damage (nephropathy) Upper Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		

		TWA	100 ppm 435 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125 ppm 545 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		PEL	5 ppm 22 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	30 ppm 130 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
	-	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
alkylbenzene		Sum of mandelic acid and phenyl glyoxylic acid	0.15g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		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 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: clear, liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	< 0 °C (< 32 °F)
f)	Initial boiling point and boiling range	137 - 140 °C (279 - 284 °F) - lit.
g)	Flash point	25 °C (77 °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: 7 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	24 hPa (18 mmHg) at 37.70 °C (99.86 °F)
l)	Vapour density	3.67 - (Air = 1.0)
m)	Relative density	0.86 g/mL 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

Relative vapour density	3.67 - (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
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

LD50 Oral - Rat - male - 3,523 mg/kg
Remarks: (ECHA)

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Skin - Rabbit
Result: Irritations
Remarks: (IUCLID)

Drying-out effect resulting in rough and chapped skin. After long-term exposure to the chemical: Dermatitis

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

In animal experiments: - Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Mutagenicity (mammal cell test): chromosome aberration.
Result: negative
(National Toxicology Program)

Ames test
Salmonella typhimurium
Result: negative

Carcinogenicity

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Ethylbenzene)
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
Acute oral toxicity - Gastrointestinal disturbance
Acute inhalation toxicity - mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract, Inhalation may lead to the formation of oedemas in the respiratory tract.

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.

Blurred vision, Incoordination., Headache, Nausea, Vomiting, Dizziness, Weakness, anemia, Prolonged or repeated exposure to skin causes defatting and dermatitis.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:
Systemic effects:
Headache, somnolence, Dizziness, euphoria, agitation, spasms, respiratory paralysis, Unconsciousness, narcosis, inebriation
Effect potentiated by: ethanol
Other dangerous properties can not be excluded.
Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence (Ethylbenzene)

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
Toxic to aquatic life.
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. 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: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ): 100 lbsReportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

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
Ethylbenzene	100-41-4	2007-07-01
Xylene	1330-20-7	1993-04-24

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Reportable Quantity F003 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Xylene	1330-20-7	1993-04-24
Ethylbenzene	100-41-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Xylene	1330-20-7	1993-04-24
Ethylbenzene	100-41-4	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.	100-41-4	2007-09-28
Ethylbenzene		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H332	Harmful if inhaled.

H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure if inhaled.
H401	Toxic to aquatic life.
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

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: 4.19 Revision Date: 08/07/2018 Print Date: 11/10/2018

Appendix E:

Community Air Monitoring Plan

SESI
CONSULTING ENGINEERS

COMMUNITY AIR MONITORING PLAN

FOR

Portion of Former Ossining Works Site, Operable Unit 1
30 Water Street
Ossining, New York
BCP# C360172

Prepared For:

WB 30 Water Street, LLC
480 Bedford Road
Chappaqua, New 10514

Prepared By:

SESI CONSULTING ENGINEERS

959 Route 46E, Floor 3, Suite 300

Parsippany, New Jersey 07054

Project No. 11498

May 2023/Updated December 2024

Table of Contents

LIST OF ACRONYMS ..... **i**

1.0 INTRODUCTION **1**

2.0 OBJECTIVES **1**

3.0 METHODS **1**

3.1. CONTINUOUS MONITORING 2

3.2. PERIODIC MONITORING 2

4.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS **2**

5.0 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS **3**

6.0 SPECIAL REQUIREMENTS FOR WORK WITHIN 20 FEET OF POTENTIALLY EXPOSED INDIVIDUAL STRUCTURES **4**

LIST OF ACRONYMS

Acronym	Definition
CAMP	Community Air Monitoring Plan
mcg/m^3	micrograms per cubic meter
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PID	Photoionization Detector
PM-10	Less than 10 micrometers
ppm	Parts Per Million
RAWP	Remedial Action Work Plan
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This document presents a Community Air Monitoring Plan (CAMP) for the Remedial Action Work Plan (RAWP) for the proposed development at 30 Water Street, Ossining, New York (the "Site").

The Site, which is the subject of this RAWP, is approximately 2.815 acres. The Site is identified by the Westchester County Clerk as Section 89.19, Block 6, Lots 26, 27, 28, and 29. The Site has been developed since 1855 and historically has been a Manufactured Gas Plant (MGP) that initially included the production of coal gas, later replaced by the production of carbureted water gas using the Lowe carbureted gas method. MGP operations continued until 1929, the plant was placed in standby status in 1930, and the MGP was retired from service in 1943. From 1970 until the present day, the Ossining Department of Public Works has used the Site as a storage facility and parking lot. The Department of Public Works had a petroleum bulk storage facility on the northern portion of the Site. That facility was closed in 2005. The Site is located in a residential, commercial and industrial area in Ossining and is bounded by Central Avenue to the north, Main Street to the south, and North Water Street to the west.

2.0 OBJECTIVES

The objective of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that may arise during all ground intrusive activities, and potentially contaminated soil and material handling and staging. In addition, the CAMP is intended to ensure that dust and contaminants are not leaving the work zone**.**

3.0 METHODS

The CAMP will include continuous monitoring for particulate matter (e.g. airborne "dust") and volatile organic compounds (VOCs) during the planned remedial excavation and construction activities. A total of three (3) CAMP stations will be established: one (1) at the upwind location and two (2) at the downwind locations.

Any CAMP exceedances will be reported to the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) on the same business day and as soon as possible. Notification of the exceedance will be sent via email along with the reason for the exceedance, the measure(s) taken to address the exceedance, and if the exceedance was resolved.

3.1. CONTINUOUS MONITORING

Continuous monitoring for particulates and VOCs will be conducted during all ground intrusive activities including soil borings, monitoring well installations, and archaeological excavations.

3.2. PERIODIC MONITORING

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

4.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e. the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using a photoionization detector (PID) equipped with a 10.6 ev lamp. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate

emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.
- All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

5.0 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust-suppression techniques must be employed. Work may continue with dust-suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust-suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust-suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

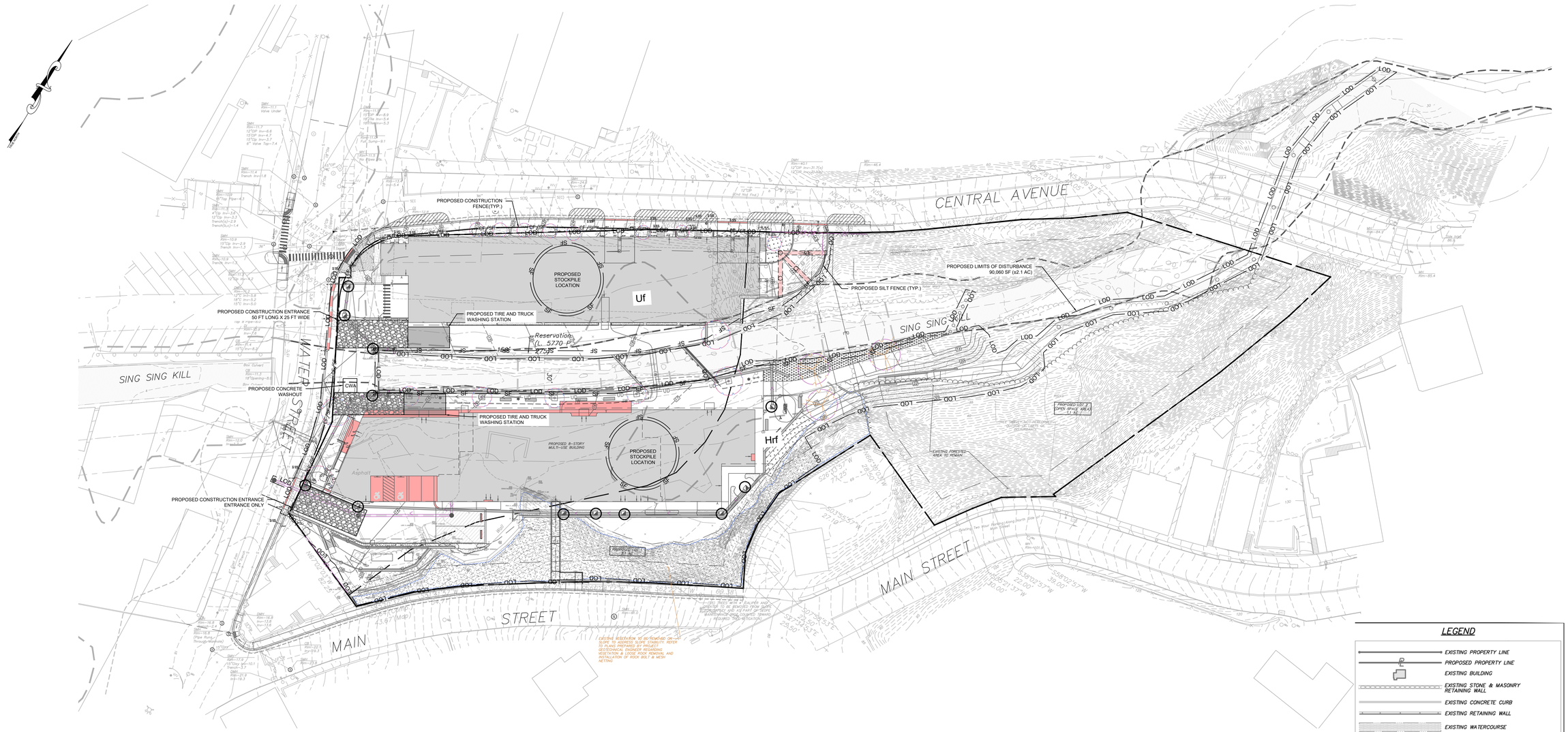
6.0 SPECIAL REQUIREMENTS FOR WORK WITHIN 20 FEET OF POTENTIALLY EXPOSED INDIVIDUAL STRUCTURES

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

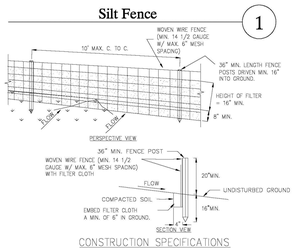
- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed one (1) ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Appendix F:

Soil Erosion and Sediment Control Plans


CENTRAL AVENUE
MAIN STREET
MAIN STREET
WATER STREET
SING SING KILL
SING SING KILL
PROPOSED CONSTRUCTION FENCE(TYP.)
PROPOSED STOCKPILE LOCATION
PROPOSED TIRE AND TRUCK WASHING STATION
PROPOSED CONSTRUCTION ENTRANCE 50 FT LONG X 25 FT WIDE
PROPOSED CONCRETE WASHOUT
PROPOSED TIRE AND TRUCK WASHING STATION
PROPOSED STOCKPILE LOCATION
PROPOSED CONSTRUCTION ENTRANCE ENTRANCE ONLY
PROPOSED LIMITS OF DISTURBANCE 90,060 SF (±2.1 AC)
PROPOSED SILT FENCE (TYP.)
Reservation (L. 5770 P. 27)
PROPOSED 8-STORY MULTI-USE BUILDING
Asphalt
PROPOSED OPEN SPACE AREA 1.1 AC
EXISTING FORESTED AREA TO REMAIN
EXISTING DRIVEWAY TO BE REMOVED AND REGRADED

Silt Fence (1)

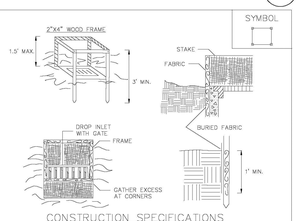


CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE SPACED EITHER 7'' OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	SILT FENCE

Filter Fabric Inlet Protection (2)

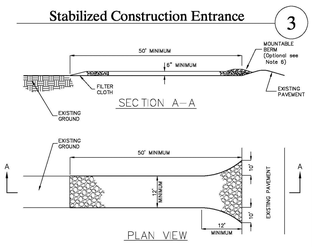


CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85, BURLAP MAY BE USED FOR SHORT TERM APPLICATIONS.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2" x 4" WOOD OR EQUIVALENT, METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2" x 4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY.
7. MAXIMUM DRAINAGE AREA 1 ACRE

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	FILTER FABRIC DROP INLET PROTECTION

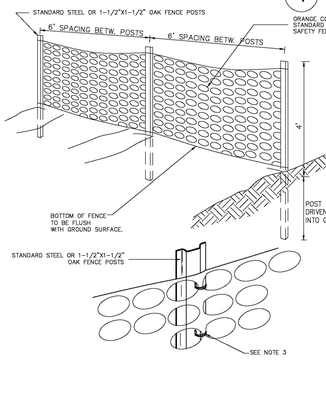
Stabilized Construction Entrance (3)



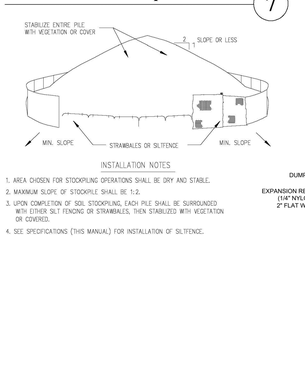
NOTES:

1. STONE SIZE – USE 3/4" – 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – AS REQUIRED, BUT NOT LESS THAN 50 FEET.
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – 12 FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. 24 FOOT MINIMUM IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – TO BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DRIPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING – WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

Construction Fence/Tree Protection (4)

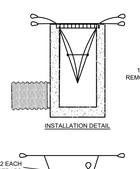


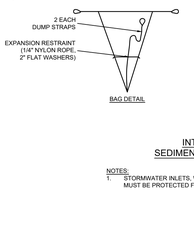
Soil Stockpile (7)

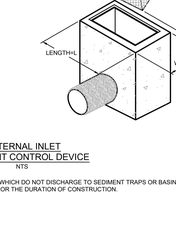


INSTALLATION NOTES

1. AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF STOCKPILE SHALL BE 1:2.
3. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH EITHER SILT FENCING OR STRAWBALES, THEN STABILIZED WITH VEGETATION OR COVERED.
4. SEE SPECIFICATIONS (THIS MANUAL) FOR INSTALLATION OF SILTFENCE.





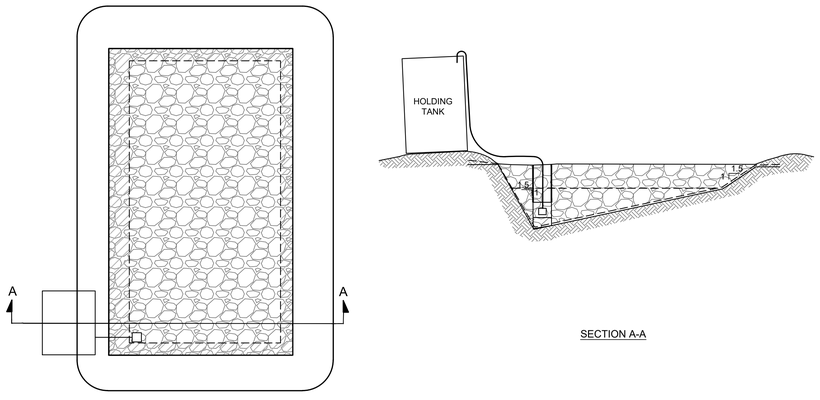


INTERNAL INLET SEDIMENT CONTROL DEVICE

NTS

NOTES:

1. STORMWATER INLETS, WHICH DO NOT DISCHARGE TO SEDIMENT TRAPS OR BASINS, MUST BE PROTECTED FOR THE DURATION OF CONSTRUCTION.



PLAN

SECTION A-A

TRUCK WASH DETAIL - PLAN & SECTION

N.T.S.

GENERAL NOTES

- DETAILS SHOWN IN ANY SECTIONS APPLY TO ALL SIMILAR SECTIONS UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL ESTABLISH ALL GRADES, LINES, LEVELS, AND BENCH MARKS AS REQUIRED. SUBGRADE AND FINISHED GRADES SHALL CONFORM TO ELEVATIONS SHOWN ON THE DRAWINGS.
- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITY LOCATIONS.
- THE CONTRACTOR SHALL PROVIDE, MAINTAIN, AND OPERATE PUMPS, SUMPS, TRENCHES, AND OTHER APPROVED EQUIPMENT METHODS TO KEEP EXCAVATIONS FREE FROM WATER AND TO KEEP WORK FROM BEING DAMAGED BY WATER DURING ALL STAGES OF CONSTRUCTION.
- THE CONTRACTOR SHALL PROVIDE FOR THE TEMPORARY FLOW OF WATER DURING THE STAGES OF CONSTRUCTION.
- THE CONTRACTOR AND SUBCONTRACTORS SHALL VISIT AND EXAMINE THE PREMISES IN ORDER TO FULLY UNDERSTAND ALL OF THE EXISTING CONDITIONS PERTAINING TO THEIR WORK.
- ALL DIMENSIONS AND DETAILS SHOWN ON CONTRACT DRAWINGS SHALL BE FIELD VERIFIED AND COORDINATED BY THE G.C. BEFORE PROCEEDING WITH WORK.
- THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND MUNICIPAL LAWS, ORDINANCES AND CONSTRUCTION CODES. HE SHALL GIVE ALL NOTICES AND OBTAIN ALL PERMITS NECESSARY FOR THIS WORK. HE SHALL NOTIFY THE OWNER IF IN HIS OPINION ANY WORK IS OMITTED OR IF ANY WORK OR MATERIAL SHOWN OR SPECIFIED IS NOT IN ACCORDANCE WITH GOOD PRACTICE OF THESE RULES.
- WORK TO BE DONE SHALL BE ALL INCLUSIVE AND ANY WORK NOT SPECIFICALLY MENTIONED BUT REASONABLY IMPLIED SHALL BE INCLUDED. THIS INCLUDES ANY PATCH WORK NECESSARY.
- THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL TEMPORARY FENCES, RAILINGS AND OTHER SAFEGUARDS, AND PROVIDE DANGER SIGNS, LIGHTING, ETC., AS REQUIRED AROUND ALL OPENINGS, EXCAVATIONS, AND ELSEWHERE AS NECESSARY. ALL SHALL BE PROVIDED IN ACCORDANCE WITH OSHA AND THE REQUIREMENTS OF THE OWNER.
- THE DRAWINGS SHOW THE INTENT OF THE WORK. CONTRACTOR IS RESPONSIBLE FOR METHODS AND MEANS OF CONSTRUCTION. SCHEDULING OF ALL WORK INCLUDING DEMOLITION TO BE COORDINATED WITH OWNER.
- ALL EXCAVATED PAVEMENT MATERIALS SHALL BE TRUCKED OFFSITE AND BECOME THE FULL RESPONSIBILITY OF THE CONTRACTOR UNLESS OTHERWISE DIRECTED BY OWNER.
- ALL PAVEMENT CUTTING SHALL BE CONTINUOUS CUT WITH A WATER-COOLED, SELF-POWERED DIAMOND CIRCULAR SAW, THROUGH FULL THICKNESS OF PAVEMENT.
- ALL STORM SEWER PIPE TO BE HDPE, UNLESS OTHERWISE NOTED.
- ALL ROOF DRAINS TO BE CONNECTED TO ONSITE STORM SYSTEM.
- EXISTING SURVEY MONUMENTS ENCOUNTERED, WHETHER SHOWN ON THE PLAN OR NOT, SHALL BE PROTECTED DURING CONSTRUCTION.
- COMPACTED FILL MATERIAL IN BUILDING AND PAVED AREAS MAY CONSIST OF SUITABLE EXCAVATED EXISTING FILL OR OFF-SITE BORROW. IMPORTED BORROW MATERIAL SHOULD CONSIST OF PREDOMINANTLY CLEAN GRANULAR FILL. THE MAXIMUM PARTICLE SIZE SHOULD BE LIMITED TO 6± INCHES.
- THE THICKNESS OF THE INDIVIDUAL LIFTS OF FILL SHOULD BE LIMITED TO 12 INCHES. ALL FILL SHOULD BE COMPACTED TO A MINIMUM DENSITY OF 95 PERCENT OF MODIFIED PROCTOR (ASTM D-1557).
- SESI SHOULD PROVIDE ENGINEERING INSPECTION AND IN-PLACE DENSITY TESTING DURING COMPACTED FILL CONSTRUCTION TO DETERMINE THAT THE WORK IS DONE IN A SATISFACTORY MANNER AND IN ACCORDANCE WITH THE PLANS. SUBSOIL MATERIAL SHOULD BE INSPECTED PRIOR TO BEING TRUCKED TO THE SITE.
- LOCATIONS FOR TELEPHONE, ELECTRIC, AND CABLE TV LINES TO BE INSTALLED IN LOCATIONS AS DETERMINED BY RESPECTIVE UTILITY COMPANIES.
- ALL ROOF DRAINS SHALL BE SCHEDULE 40 UNLESS OTHERWISE NOTED.
- ANY EXCAVATION BELOW DESIRED GRADE DUE TO OVER EXCAVATION OR WET SOIL CONDITIONS SHALL BE BACKFILLED WITH ½" CLEAN STONE.
- ALL PARKING STALLS SHALL BE MARKED WITH FOUR INCH WIDE WHITE LINES.
- SHOP DRAWINGS FOR ALL MATERIALS BEING INSTALLED WITHIN THE R.O.W. MUST BE SUBMITTED TO CWP-DPW FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
- ALL CATCH BASINS, GRATES, TRENCH DRAINS & CURB PIECES MUST INCLUDE ECO-FRIENDLY MARKINGS
- NO SNOW STORAGE IS PERMITTED WITHIN THE CITY RIGHT-OF WAY.
- A SWPPP MEETING MUST BE HELD WITH DPW PRIOR TO THE START OF ANY SOIL DISTURBANCE. THE ENGINEER OVERSEEING THE SWPPP, THE OWNER AND THE CONTRACTOR MUST BE PRESENT.
- THE PLANS INDICATE THE EXISTING STREET CATCH BASINS FRONTING THE PROPERTY WILL REMAIN. ALL THESE CATCH BASINS WILL REQUIRE THAT THEIR CASTINGS BE REPLACED WITH ECO-FRIENDLY CURB PIECE MODELS AND BICYCLE- SAFE GRATES, IF THEY'RE NOT ALREADY. THIS WORK IS IN ACCORDANCE WITH DPW'S STANDARD CONSTRUCTION DETAILS. IF ANY OF THE DRAINAGE STRUCTURES ARE FOUND TO BE IN NEED OF REPAIR, IT SHALL BE UPDATED, REPLACED OR REPAIRED, AT THE DEVELOPER'S EXPENSE, AS DIRECTED BY THE COMMISSIONER OF PUBLIC WORKS.
- IF AN ELECTRIC VAULT WILL BE REQUIRED FOR THE PROPOSED BUILDING INCLUDE, ITS LOCATION ON THE PLANS. ANY PROPOSED ELECTRIC VAULTS FOR THE NEW BUILDING MUST BE WHOLLY WITHIN THE PRIVATE PROPERTY.
- THE PROPOSED DRIVEWAY LAYOUT DOES NOT PERMIT THE CITY TO PROVIDE TRASH/RECYCLING PICKUP. TRASHAND RECYCLING PICKUP MUST BE HANDLED BY A PRIVATE CARTING SERVICE.
- ALL STREET LIGHT WORK MUST BE COORDINATED WITH DPW - BUREAU OF STREET LIGHTING PRIOR TO CONSTRUCTION. SINCE THE PROPOSED SEWER FLOW IS GREATER THAN 2,500 GALLONS/DAY THE APPLICANT WILL NEED HEALTH DEPT APPROVAL FOR THE SANITARY SEWER SERVICE PRIOR TO INSTALLATION.
- THE CONTRACTOR MUST HAVE AN EMPLOYEE CARRY A CURRENT NYSDEC ISSUED TRAINED INDIVIDUAL CARDAND BE PRESENT ON SITE AT ALL TIMES DURING SOIL DISTURBING ACTIVITIES
- COORDINATE WITH THE U.S. POST OFFICE FOR THE SPECIFICATIONS AND THE PLACEMENT (WITHIN PRIVATE PROPERTY) OF THE COMMUNITY MAILBOX. THE STREET ADDRESS AND UNIT NUMBERS WERE ASSIGNED BY DPW ON 2/19/19.
- SHOP DRAWINGS FOR ALL MATERIALS BEING INSTALLED WITHIN THE ROW MUST BE SUBMITTED TO CWP-DPW FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
- THE CITY'S COMMISSIONER OF PUBLIC WORKS MUST CERTIFY TO THE WESTCHESTER COUNTY DEPARTMENTOF HEALTH, AS THE AGENT FOR THE NEW YORK STATE DEPARTMENT OF HEALTH, THE ADEQUACY OF THE MUNICIPAL WATER AND SEWER SYSTEM AND SERVICES WITH RESPECT TO THE PROPOSED BUILDING.
  a. THE APPLICANT WILL BE REQUIRED TO PROVIDE SANITARY INFRASTRUCTURE IMPROVEMENTS TO REDUCE INFILTRATION AND INFLOW (I&I). THE IMPROVEMENTS WILL INCLUDE THE LINING OF FIVE (5) SANITARY SEWER MANHOLES AND FIVE-HUNDRED-SEVENTY (570) LINEAR FEET (LF) OF EXISTING SEWER MAINS LOCATED IN THE VICINITY OF THE PROJECT AND SHALL BE AT THE DEVELOPER'S EXPENSE. THE LOCATIONS OF MANHOLES AND SEWER MAINS TO BE LINED SHALL BE DETERMINED BY THE COMMISSIONER OF PUBLIC WORKS.
- BACKFLOW PREVENTION DEVICES MUST BE INSTALLED ON THE FIRE AND DOMESTIC WATER SERVICES. THESE DEVICES MUST BE LOCATED IN A UTILITY ROOM THAT MUST ALSO ACCOMMODATE A MASTER WATER METER (METRON SPECTRUM). THE APPLICATION FOR THE BACKFLOW DEVICE INSTALLATIONS MUST BE PREPARED BY A LICENSED NEW YORK STATE PROFESSIONAL ENGINEER AND SUBMITTED TO THE DEPARTMENT OF PUBLIC WORKS FOR REVIEW AND SUBSEQUENT FINAL APPROVAL BY THE WESTCHESTER COUNTY DEPARTMENT OF HEALTH. THE FLOOR DRAIN FOR SAID ROOM MUST BE ADEQUATE TO COMPLY WITH WHITE PLAINS DEPARTMENT OF PUBLIC WORKS AND WESTCHESTER COUNTY DEPARTMENT OF HEALTH REQUIREMENTS.
- INTERFERENCE MAY BE ENCOUNTERED WITH EXISTING UTILITIES (I.E. – WATER, DRAIN, SEWER, GAS, ELECTRIC, TRAFFIC CONTROL, COMMUNICATION, ETC.) THAT LIE WITHIN THE WORK AREA. TEST PITS MUST BE PERFORMED IN THE AREA OF UNDERGROUND UTILITY CROSSINGS, INCLUDE ALL UTILITIES IN THE PLANS WITHIN THE ROW AND ON THE PROFILE OF THE PROPOSED STORM DRAIN PIPE WITHIN THE ROW.
- IF DEWATERING IS NEEDED DURING CONSTRUCTION, A SEDIMENT TANK WILL BE REQUIRED AND MAY ONLY DISCHARGE TO THE STORM DRAIN. NO GROUNDWATER IS PERMITTED TO BE PUMPED FROM THE SITE INTO THE CITY'S SANITARY SEWER MAINS. DEWATERING WILL ONLY BE PERMITTED DURING CONSTRUCTION; THE PROJECT MUST BE DESIGNED IN SUCH A WAY THAT NO GROUNDWATER IS DISCHARGED INTO THE MUNICIPAL STORMWATER SYSTEMAFTER CONSTRUCTION.
- CONSTRUCTION OF ALL STORMWATER FACILITIES MUST BE UNDER THE SUPERVISION OF THE STORMWATER DESIGN ENGINEER OF RECORD, AND AN AS-BUILT MUST BE PROVIDED TO THE DEPARTMENT OF PUBLIC WORKS, SIGNED AND SEALED BY THIS ENGINEER, OR BY A NEW YORK STATE LICENSED LAND SURVEYOR. A REQUIRED MAINTENANCE AGREEMENT FOR ALL ON-SITE STORMWATER MANAGEMENT MEASURES MUST BE EXECUTED ALONG WITH ALL NECESSARY PERMITS, PRIOR TO THE CONSTRUCTION OF ANY PERMANENT STORMWATER FACILITY AND REMAIN IN EFFECT WITH THE TRANSFER OF THE PROPERTY. THIS DOCUMENT MUST BE COMPLETED IN ACCORDANCE WITH THE CITY'S LOCAL LAW REQUIREMENTS AND COORDINATED WITH THE CORPORATION COUNSEL. AN APPROPRIATE ESCROW ACCOUNT MUST BE ESTABLISHED BY THE COMMISSIONER OF PUBLIC WORKS FOR THE MAINTENANCE OF SAID STORMWATER FACILITIES. THE COMMISSIONER OF PUBLIC WORKS HAS THE RIGHT TO UTILIZE THIS ESCROW ACCOUNT TO PERFORM MAINTENANCE WORK SHOULD THE OWNER FAIL TO BE RESPONSIVE. FURTHER, THE CITY THROUGH THE DEPARTMENT OF PUBLIC WORKS SHALL RECEIVE 20% OF ALL COSTS, IF CWP-DPW MUST CONTRACT THE WORK, AS AN ADMINISTRATIVE FEE. A STANDARD DPW STORMWATER MAINTENANCE AGREEMENT MUST BE EXECUTEDWITH
- THE CITY AND APPROVED BY THE CORPORATION COUNSEL PRIOR TO THE ISSUANCE OF A TEMPORARY CERTIFICATE OF OCCUPANCY.
- ALL EXISTING STREET TREES MUST BE PROTECTED DURING CONSTRUCTION. IF STREET TREES ARE TO BE REMOVED THE APPLICANT MUST COORDINATE WITH DPW PRIOR TO REMOVAL. ANY REMAINING CITY TREES MAY BE ADVERSELY AFFECTED BY THE CONSTRUCTION ACTIVITIES FOR THE PROJECT, WHICH COULD LEAD TO THE TREES DYING, REQUIRING THEIR REMOVAL BY THE APPLICANT. THE APPLICANT MUST MATCH INCH FOR INCH THE SIZE OF THE TREE(S) BEING REMOVED WITH NEW TREES. IF THE ROW ADJACENT TO THE SITE CANNOT ACCOMMODATE ENOUGH TREES TO MATCH INCH FOR INCH, THE APPLICANT MAY PROVIDE ADDITIONAL TREES TO BE PLACED IN THE CITY STOCK FOR PLANTINGS IN THE ROW. ALL TREE SPECIES BEING PROPOSED WITHIN THE CITY'S ROW MUST BE NATIVE SPECIES AND WILL REQUIRE APPROVAL FROM THE COMMISSIONER OF PUBLIC WORKS PRIOR TO ORDERING AND PLANTING.
- ALL CONSTRUCTION UNDER THE JURISDICTION OF THE CITY OF WHITE PLAINS DEPARTMENT OF PUBLIC WORKS (DPW) MUST BE IN ACCORDANCE WITH DPW STANDARDS REGARDLESS OF WHAT MAY BE SHOWN OR OMITTEDON THE PLAN.
- THE SIDEWALK MUST MAINTAIN ITS CURRENT GRADE THROUGH THE DRIVEWAYS WITH THE PROPOSED DRIVEWAY APRON RAMPED UP TO MEET THE EXISTING GRADE OF THE SIDEWALK FROM THE CURB CUT PER THE CWP- DPW STANDARD DETAIL FOR DRIVEWAY APRONS.
- PROVIDE DPW WITH A COPY OF ANY AGREEMENT HELD BETWEEN THE APPLICANT AND THE ADJACENT OWNERFOR THE PROPOSED PLANTINGS LOCATED ON THE ADJACENT PROPERTY IN THE REAR OF THE BUILDING.
- DURING CONSTRUCTION, SEDIMENT AND EROSION CONTROLS SHALL BE IN ACCORDANCE WITH THE CURRENTDPW STANDARDS. DPW RESERVES THE RIGHT TO ORDER ADDITIONAL SEDIMENT AND EROSION CONTROL PRACTICES INSTALLED DURING CONSTRUCTION.
- ALL CONSTRUCTION WORK SHALL BE SUBJECT TO THE CITY'S CONSTRUCTION MANAGEMENT PROTOCOL. THIS PROTOCOL INCLUDES, AMONG OTHER THINGS, A CONSTRUCTION MANAGEMENT PLAN, EROSION AND SEDIMENTATION CONTROL MEASURES, HOURS OF OPERATION, PARKING, SITE ACCESS, ETC.

SOIL EROSION AND SEDIMENT CONTROL NOTES

1) CONSTRUCTION SEQUENCING NOTES
A) PRIOR TO COMMENCING ANY CLEARING, GRUBBING, EARTHWORK ACTIVITIES, ETC. AT THE SITE, THE CONTRACTOR SHALL FLAG THE WORK LIMITS AND SHALL INSTALL ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES (I.E. SILT FENCES, TREE PROTECTION/BARRIER FENCES, STABILIZED CONSTRUCTION ENTRANCES, STORM DRAIN SEDIMENT FILTERS, ETC.) INDICATED ON THE PROJECT DRAWINGS. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE START OF ANY EARTH DISTURBANCE ACTIVITIES TO THE SATISFACTION OF THE ENGINEER.
B) THE CONTRACTOR SHALL INSTALL TEMPORARY DIVERSION MEASURES WITH ASSOCIATED STABILIZATION MEASURES (I.E., VEGETATIVE COVER, DRAINAGE DITCH SEDIMENT FILTERS, STORM DRAIN SEDIMENT FILTERS, ETC.) AS NEEDED
C) THE CONTRACTOR SHALL COMMENCE SITE CONSTRUCTION ACTIVITIES AS REQUIRED WITHIN THE PHASE OF WORK UNDER CONSTRUCTION
D) IMMEDIATELY FOLLOWING COMPLETION OR SUSPENSION OF CONSTRUCTION ACTIVITIES IN ANY PORTION OF THE SITE, PERMANENT VEGETATION SHALL BE ESTABLISHED ON ALL EXPOSED SOILS.
E) ALL CATCH BASINS AND DRAINAGE LINES SHALL BE CLEANED OF ALL SILT AND DEBRIS.
F) THE CONTRACTOR SHALL MAINTAIN ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES AND IMMEDIATELY ESTABLISH PERMANENT VEGETATION ON THE AREAS DISTURBED DURING THEIR REMOVAL.

TOPSOIL SPECIFICATIONS:
1. EXISTING EXCESS TOPSOIL TO BE REMOVED AND STORED IN TOPSOIL STOCKPILES SUFFICIENTLY REMOVED FROM OTHER EXCAVATION OR DISTURBANCE TO AVOID MIXING. SILT FENCE OR DIVERSIBLES ARE TO BE INSTALLED AROUND TOPSOIL STOCKPILE AREAS

SITE PREPARATION:
1. COMPLETE ROUGH GRADING AND FINAL GRADE, ALLOWING FOR DEPTH OF TOPSOIL TO BE ADDED.
2. SCARIFY ALL COMPACT, SLOWLY PERMEABLE, MEDIUM AND FINE TEXTURED SUBSOIL AREAS. SCARIFY AT APPROXIMATELY RIGHT ANGLES TO THE SLOPE DIRECTION IN SOIL AREAS THAT ARE STEEPER THAN 5%.
3. REMOVE REFUSE, WOODY PLANT PARTS, STONES OVER 3 INCHES IN DIAMETER, AND OTHER LITTER.

TOPSOIL MATERIALS:
1. THE FURNISHING OF NEW TOPSOIL SHALL BE OF A BETTER OR EQUAL TO QUALITY OF THE EXISTING ADJACENT TOPSOIL. IT SHALL MEET THE FOLLOWING CRITERIA:

A. TOPSOIL SHALL HAVE AT LEAST 2% BY WEIGHT OF FINE TEXTURED STABLE ORGANIC MATERIAL, AND NO GREATER THAN 6%.
B. TOPSOIL SHALL HAVE NOT LESS THAN 30% FINE TEXTURES MATERIAL (PASSING THE No. 200 SIEVE) AND NOT MORE THAN 15% CLAY.
C. TOPSOIL SHALL BE RELATIVELY FREE OF STONES OVER 134" DIAMETER, TRASH, NOXIOUS WEEDS, AND WILL HAVE LESS THAN 15% GRAVEL BY VOLUME.

APPLICATION AND GRADING:
1. TOPSOIL SHALL BE DISTRIBUTED TO A UNIFORM DEPTH OVER THE AREA. IT SHALL NOT BE PLACED WHEN IT
(I) PARTLY FROZEN, MUDDY, OR ON FROZEN SLOPES OR OVER 12" SNOW, OR STANDING WATER.
2. AFTER GRADING IS COMPLETED, THE TOPSOIL AREAS SHALL BE PROMPTLY FERTILIZED, SEEDED, MULCHED AND STABILIZED BY "TRACKING" WITH SUITABLE EQUIPMENT.
3. APPLY TOPSOIL IN THE FOLLOWING AMOUNTS FOR INTENDED USE:
A. MOWED LAWN: 4 TO 6 INCHES
B. UNMOWED AREA: 2 TO 4 INCHES

2) DESCRIPTION OF WORK
A) CONTRACTOR SHALL MEASN NECESSARY TO INSTALL, INSPECT AND MAINTAIN, AND REMOVE TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES AS SHOWN ON THE DRAWINGS AND AS REQUIRED TO MINIMIZE THE EROSION AND UNSPECIFIED TRANSPORT OF SOIL FROM THE SITE.
3) QUALITY ASSURANCE
A) GENERAL
I. INSTALL AND MAINTAIN IN COMPLIANCE WITH THE NEW YORK STATE DEPARTMENT OF ENVIROMENTAL CONSERVATION GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES.
1) RETAIN A COPY OF THE PROJECT'S NOTICE ON INTENT (NOI) A BRIEF DESCRIPTION OF THE PROJECT, POSTED IN A PROMINENT PLACE FOR PUBLIC VIEWING NEAR THE CONSTRUCTION SITE. THE NOI SHALL REMAIN POSTED UNTIL THE CONSTRUCTION IS COMPLETE AND A NOTICE OF TERMINATION (NOT) HAS BEEN FROM THE REGIONAL OFFICE OF THE NYSDEC. THE NOT SHALL BE SUBMITTED WITHIN 30 DAYS TO THE DAY OF THE CESSATION OF CONSTRUCTION ACTIVITIES TO THAT DAY OF THE FINAL NOTICE OF TERMINATION (NOT) SUBMISSION.
II. INSTALL IN ACCORDANCE WITH THE DRAWINGS OR NEW YORK STANDARDS AND SPECIFICATIONS FOR SOIL EROSION & SEDIMENT CONTROL, MARCH 2003 (THE "BLUE BOOK") EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES MANUAL SERIES, WESTCHESTER COUNTY, NY, 1991 (W.C. GUIDELINES) WHICHEVER IS STRICTER
III. INSTALL SILT FENCE OR OTHER BARRIERS SUCH THAT ALL STORM WASTE RUNOFF FROM DISTURBED AREAS IS DIVERTED TO SOIL EROSION AND SEDIMENTATION FACILITIES.
IV. NO CHANGES TO THE SOIL EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE MADE WITHOUT APPROVAL OF THE OWNER'S REPRESENTATIVE.
V. NO WORK SHALL BE DONE BEYOND LIMITS OF PROTECTIVE FENCING. ALL EQUIPMENT AND PERSONNEL CAN BE CONFINED. MEASURES CAN BE TAKEN TO PREVENT DISTURBED ALL ANY TIME.
VI. THE CONTRACTOR SHALL COMPLY WITH APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS RELATING TO THE PREVENTION AND ABATEMENT OF POLLUTION.
B) PRODUCT DATA: SUBMIT MANUFACTURER'S CATALOGUE CUTS, SPECIFICATIONS AND INSTALLATION INSTRUCTIONS FOR SILT FENCES, FILTER FABRICS, STRAWBALES, CATCH BASIN FILTERS, TRASH RACKS, ANTI-DEBRIS COLLARS, AND SEDIMENT TRAP INSERTS AND BARRELS, PIPES.
4) WORK SCHEDULING
A) PRECONSTRUCTION PHASE:
I. INSTALL STABILIZED CONSTRUCTION ENTRANCE, ALL AREAS DAMAGED BY EROSION OR WHERE SEED HAS NOT ESTABLISHED SHALL BE REPAIRED AND RE-STABILIZED IMMEDIATELY.
II. PRIOR TO CONSTRUCTION ENTRANCE IF REQUIRED
1) STABILIZED CONSTRUCTION ENTRANCE SHALL BE INSPECTED DAILY AND AFTER EVERY STORM EVENT THAT EQUALS OR EXCEEDS ½" INCH. CHECK FOR MUD, SEDIMENT BUILDUP AND PAD INTEGRITY. MAKE DAILY INSPECTIONS DURING WET WEATHER. RESHAPE PAD AS NEEDED FOR DRAINAGE AND RUNOFF CONTROL. WASH AND REPLACE STONE AS NEEDED. THE ENTIRE STONE IN THE ENTRANCE SHOULD BE WASHED OR REPLACED WHENEVER THE ENTRANCE FAILS TO REDUCE MUD BEING CARRIED OFF-SITE BY VEHICLES. IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROADS BY BRUSHING OR SHOVELING. REMOVE TEMPORARY CONSTRUCTION ENTRANCE AS SOON AS THERE ARE NO LONGER NEEDED TO PROVIDE ACCESS TO THE SITE.
III. PRIOR TO BUILDING VEGETATION AND WATER-SHED, INSTALL PERIMETER SILT FENCEANY BALES AND SILT FENCE.
1) SILT FENCE
INSPECT FOR DAMAGE EVERY SEVEN DAYS AND AFTER EVERY STORM EVENT THAT EQUALS OR EXCEEDS ½2 INCH. MAKE ALL REPAIRS IMMEDIATELY. REMOVE SEDIMENT FROM THE UP-SLOPE FACE OF THE FENCE BEFORE IT ACCUMULATES TO A HEIGHT EQUAL TO ½ THE HEIGHT OF THE FENCE. IF FENCE FABRIC TEARS, BEGINS TO DECOMPOSE, OR IN ANYWAY BECOMES INEFFECTIVE, REPLACE THE AFFECTED SECTION OF FENCE IMMEDIATELY
IV. PRIOR TO GRUBBING AND GRADING WITHIN A SPECIFYC WATER SHED INSTALL:
1) SILT FENCE AND STRAWBALES
2) TEMPORARY EARTH DIVERSIBLES
B) CONSTRUCTION PHASE:
I. INSPECT AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES UNTIL THEIR REMOVAL AS SPECIFIED. INSP

Appendix G:

ISS Implentation Plan (Renova)

FINAL

IN-SITU STABILIZATION CONSTRUCTION MANAGEMENT PLAN

Ossining Gas Works DPW Site

30 Water Street, Ossining, NY 10562

May 2025

Prepared for:

Griffon Construction, LLC

480 Bedford Road, Building 300, Chappaqua, NY 10514

Prepared by:

Renova Environmental Company

3417 Sunset Avenue, Ocean Township, NJ 07712

RENOVA environmental company

In-Situ Stabilization
Construction Management Plan

FINAL

Ossining Gas Works DPW Site
30 Water Street, Ossining, NY 10562

May 2025

CERTIFICATION:
I hereby certify that the enclosed Report, shown and marked in this submittal, is proposed to be incorporated with the finalized contract between Renova and Griffon Construction, LLC. This Document has been prepared in accordance with the Griffon Construction, LLC Bid Specification and is hereby submitted for approval.

Prepared by:



5/22/2025

Brenna Ilg, Renova Assistant Project Manager — Date

Reviewed by:



5/22/2025

Jim Seliga, Renova Project Manager — Date

Received by:

Michael Burke, Griffon Project Manager — Date

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 SITE DESCRIPTION 1
3.0 PROJECT TEAM AND ORGANIZATION 2
4.0 PROJECT COMMUNICATION 3
5.0 PROJECT TASKS 5
6.0 ACCESSWAY PLAN 5
6.1 Traffic Control Plan 6
7.0 SITE PREPARATION 6
7.1 Temporary Facilities & Support Systems 6
7.1.1 Staging Areas 6
7.2 Protection of Existing Utilities & Structures 7
7.3 Site Clearing & Leveling 7
7.4 Construct Mixing Batch Plant 7
7.5 Erosion and Sediment Control Plan 8
8.0 CONCRETE AND ASPHALT DEMOLITION AND OFF-SITE DISPOSAL 9
9.0 PRE-EXCAVATION AND LOADOUT OF CLEAN OVERBURDEN SOIL 9
10.0 SING SING KILL RIVER BYPASS 9
11.0 ON-SITE STORMWATER HANDLING/MANAGEMENT 9
12.0 WATER TREATMENT FACILITY 10
13.0 IN-SITU STABILIZATION 10
13.1 Methodology 10
13.3 Quality Control Plan 14
13.3.1 Batch Proportions 14
13.3.2 ISS Mixing 14
13.3.3 Coring 15
13.3.4 Analytical Testing & Standards 16
13.3.5 Surveying Methodology & As-Builts 16

13.3.6 Community Air Monitoring Work Plan 17
13.3.7 Noise Monitoring 17
14.0 SOIL MANAGEMENT PLAN 18
14.1 Waste Handling, Storage, & Transportation 18
15.0 SITE RESTORATION PLAN 18
16.0 DEMOBILIZATION 19

FIGURES

Figure 1 ..... Site Layout Map
Figure 2 ..... Batch Plant Process Flow Diagram
Figure 3 ..... Cell Layout
Figure 4 ..... Cell Layout Remedial Depths

APPENDICES

Appendix A ..... Batch Plant Specifications
Appendix B ..... Dewatering System Process Flow Diagram
Appendix C ..... NYSDEC In-Situ Stabilization QA/QC
Appendix D ..... Sampling Chamber
Appendix E ..... Sing Sing River Shoring System

1.0 INTRODUCTION

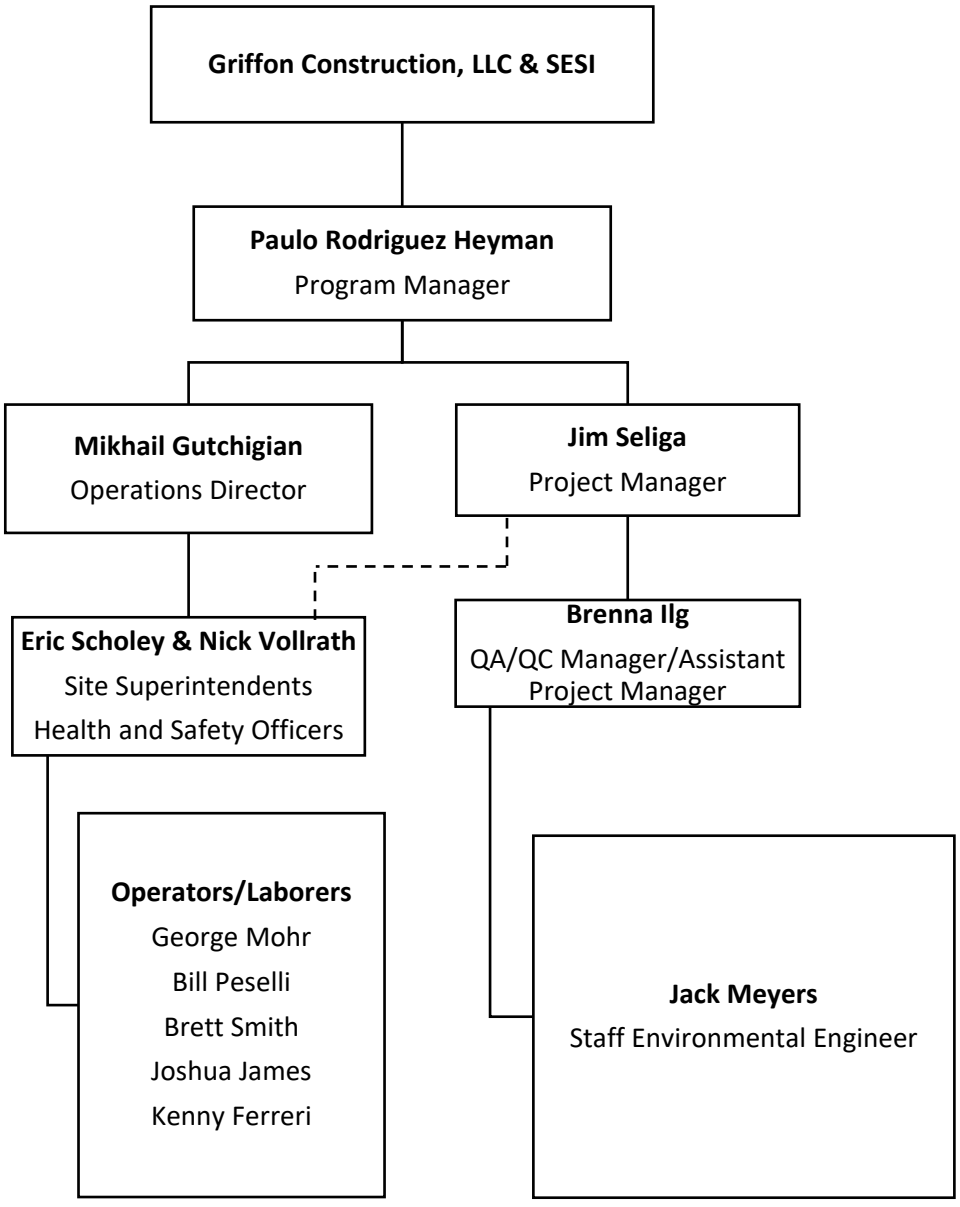
Renova Environmental Company (Renova) has prepared this *In-Situ Stabilization Construction Management Plan* to facilitate project activities for Remediation, ISS, and Site Work Services at Ossining Gas Works DPW Site located at 30 Water Street, Ossining, NY, 10562.

2.0 SITE DESCRIPTION

The site is located at 30 Water Street, Ossining, NY 10562 (site). Historic operations on the site have included Manufactured Gas Plant Operations. The northside of the Sing Sing Kill River was recently occupied by the Village of Ossining Department of Public Works. The primary constituents of concern in the site soil includes MGP compounds including BTEX, SVOCs, VOCs, and metals, as well as other contaminants exceeding cleanup levels. Remedial action by In-situ Stabilization (ISS) of the impacted soil on the Southside of the Sing Sing Kill River will be enacted as a means of containing the contaminants from impacting the groundwater. Cement and blast furnace slag cement will be introduced into the impacted soils to increase the soil strength and reduce permeability resulting in protecting of the groundwater by diverted it around the remediation zone. General Site Layout is illustrated on **Figure 1**.

3.0 PROJECT TEAM AND ORGANIZATION

The Renova Project Team consists of the following individuals and entities:



4.0 PROJECT COMMUNICATION

The objective of project communication is to ensure that appropriate persons are aware of any issues or concerns that may be expressed by the various stakeholders during the construction program. For this project, a list of key project personnel is included below.

Mr. Michael Burke is the Griffon Construction, LLC (Griffon) Project Manager for the Site and will serve as the lead representative for Griffon, and is responsible for general regulatory oversight, technical administration, and project planning of the negotiated contract. In that position, Griffon may provide in-scope direction to Renova and assures the terms of the negotiated services. Griffon administers the scope and coordinates criteria and technical oversight for the project.

Mr. Fuad Dahan of SESI Consulting Engineers (SESI) is the Professional Engineer for the project. SESI is responsible for the design of the Remedial Action Work Plan and outside agency interface.

Mr. Paulo Rodriguez Heyman will serve as the Program Manager and is responsible for oversight of the contract. Mr. Heyman will communicate directly with Griffon, as well as the Renova Project Manager and Site Superintendent, to verify that contracted work is completed in a timely manner and in accordance with the agreed upon Specifications and regulatory requirements.

Mr. Jim Seliga will serve as the Project Manager (PM) and is responsible for day-to-day management and coordination of the project scope, subcontractors, field personnel schedule, and budget. Mr. Seliga will communicate directly with Griffon, as well as the Renova Site Superintendent, to verify that contracted work is completed in a timely manner, in accordance with the agreed upon Specifications and regulatory requirements, and to ensure that the proper project documentation procedures are followed. Mr. Seliga will also have responsibility for supervisory project billing review and invoicing.

Mr. Mikhail Gutchigian will serve as the Operations Director and is responsible for management and coordination of the on-Site personnel, equipment, and Site activities. Mr. Gutchigian will communicate directly with the Renova Site Superintendent to verify that contracted work is completed in an efficient and effective manner, in accordance with the agreed upon Specifications and regulatory requirements, and to assure smooth on-Site operations.

Brenna Ilg will serve as the Quality Assurance / Quality Control (QA/QC) and Assistant Project Manager. She is responsible for overall quality control on this project and will work directly with Mr. Seliga and with the Site Superintendent. She will also be responsible for the oversight of the project engineer and

oversight of all on-site project coordination and documents, such as the tracking tables, quality control test results, and report, and will communicate daily with the PM.

Mr. Eric Scholey and Nick Vollrath will serve as the Site Superintendents and Health and Safety Officers. Mr. Scholey and Mr. Vollrath are responsible for overall Site health and safety; oversight and coordination of field activities; management of on-Site subcontractors; and management of Site operational activities. Mr. Scholey will be responsible for the completion of the daily tailgate safety meeting, and will communicate daily with the PM.

Mr. Jack Meyers will serve as the Project Engineer. Mr. Meyers is responsible for all on-site project coordination and documents, such as the tracking tables, quality control test results, and report, and will communicate daily with the PM and Assistant PM.

Resumes and applicable certifications for contract personnel have been included in the *Site Safety & Health Plan* (SSHP) for the project (Renova 2024), submitted separately.

Contact information for contract personnel is included in the following table:

NAME	TITLE	PHONE NUMBERS
Michael Burke	Project Manager, Griffon	Cell: (845) 745-0219
Fuad Dahan, NYS PE	Project Engineer, SESI	Office: 862-702-5719 Cell: 973-747-9567
Paulo Rodriguez Heyman	Program Manager, Renova	Office: (732) 659-1000 Cell: (609) 492-4600
Mikhail Gutchigian	Operations Director, Renova	Office: (732) 659-1000 Cell: (609) 489-9209
Jim Seliga	Project Manager, Renova	Office: (732) 659-1000 Cell: (609) 351-6771
Brenna Ilg	QA/QC Manager, Renova	Office: (732) 659-1000
Eric Scholey Nick Vollrath	Site Superintendent, Renova Site Superintendent, Renova	Cell: (732) 309-6503 Cell: (609) 361-4211
Brenna Ilg	Assistant Project Manager, Renova	Office: (732) 659-1000
Jack Meyers	Staff Environmental Engineer	Office: (732) 659-1000

5.0 PROJECT TASKS

The primary tasks included in this Scope of Work (SOW) are:

1. *Mobilization & Site Preparation*

   Site preparation activities will include mobilization, installation of remediation erosion controls, installation of construction fencing around the Renova Batch Plant area, construction, calibration, and QC of batch plant equipment, and establishment of work zones. Renova will obtain all local permits and approvals to execute the ISS work, including temporary occupancy permits for trailers, as necessary.

2. *Site Clearing & Leveling*

   Renova will clear and remove trees in the work areas as needed to access ISS treatment areas. Renova will remove existing concrete and asphalt pavement (454 tons) and direct load into trucks provided by others. Renova will excavate pre-cut of top 5 feet (ft) over entire ISS area on the South side (8,400 tons) and direct load soil into trucks provided by others.

3. *In-Situ Stabilization of Contaminated Soil*

   A slurry of Portland cement and Ground Granular Blast Furnace Slag will be batch mixed and blended for treatment of approximately 10,340 CY of soil.

4. *Retaining Wall Construction*

   Renova will install a cofferdam and a dual 60" diameter N12 HDPE pipe to bypass the Sing Sing Kill River to accommodate retaining wall construction. Renova will remove existing walls South side Recon walls RW #1 and RW #2 and North side Recon wall RW #3 and RW #9. Renova will install a Recon modular block wall.

5. *Site Restoration & Demobilization*

   At the completion of the ISS work, ISS cell areas will be graded to flat, level conditions with no mounding of soil or ISS materials. Equipment and vehicles will be cleaned and decontaminated, temporary Site facilities will be removed, and the Site will be cleared of any waste or debris generated by the work activities.

6.0 ACCESSWAY PLAN

In order to access the Site, personnel and equipment will mobilize to the parking lot located on the Southwest corner of the intersection of Water Street and Quimby Street in addition to the Site.

Any individual (worker, subcontractor, visitor, etc.) who arrives to the Site will be required to check in at Renova's onsite temporary office facility prior to accessing any work area. Individuals will be briefed on Site-specific safety procedures from the Renova approved SSHP (Renova 2024), COVID-19 safety procedures, and personal protective equipment (PPE) requirements. Each individual will sign that they

have reviewed and understand the safety requirements. This document will be kept in the Renova trailer for review at any time.

6.1 Traffic Control Plan

Renova's on-Site temporary office facility, silos, and batch plant will be located in the parking lot located on the Southwest corner of the intersection of Water Street and Quimby Street, across the street from the Site. The Access roads will be built, as needed, to all ISS treatment areas. Renova will install piping through the box culvert to allow for the slurry delivery lines to go under roads and not stop vehicle or construction traffic from other activities. Renova personnel will direct and spot any trucks moving within the Site which are associated with the contract work.

7.0 SITE PREPARATION

Prior to ISS treatment activities, Site preparation activities will be completed in accordance with the Bid Specification.

7.1 Temporary Facilities & Support Systems

For the duration of this project Renova will maintain an on-Site temporary office facility, a trailer located in the parking lot located on the Southwest corner of the intersection of Water Street and Quimby Street. Adjacent to the office trailer, portable restrooms and hand washing facilities are available for Renova personnel and their subcontractors. Portable restrooms will remain locked and secure to limit usage to Renova and associated individuals.

Temporary utilities including electric (generator), and water will be installed for use throughout the contract work. Temporary electric service will be connected to Renova's office trailer. A mobile "hotspot" device will be used to allow remote work and general communications capabilities on-Site.

In order to complete the ISS activities, Renova will construct a temporary mixing batch plant on-Site. Batch plant specifications are included as **Appendix A**. The batch plant will require water supply to operate; Renova will run temporary 2-inch high-density polyethylene (HDPE) water service aboveground from the existing hydrant to the on-Site batch plant. The aboveground line will be blown out daily to prevent freezing. The existing hydrant is located at the Northwest corner of the intersection of Water Street and Quimby Street. The permit for use of the existing hydrant has been applied for.

7.1.1 Staging Areas

Equipment staging and materials storage shall be confined within the designated staging/storage areas. These areas include:

- Renova's On-Site Temporary Office Facility including two (2) storage containers
- Renova's On-Site Batch Plant area storage container
- Heavy Machinery Staging Area
- Materials Staging / Delivery Receiving Area

General Site Layout is included as **Figure 1**.

7.2 Protection of Existing Utilities & Structures

A New York 811 one call will be made to identify public utilities on-Site. Renova will protect or support all utilities and existing monitoring wells not designated for removal, as well as adjacent buildings, properties, residences, businesses, trees, walls, and other structures. ISS activities in close proximity to active above and/or below grade utilities or nearby structures will be performed in a manner protective of these structures, unless the utility and/or structure is noted as inactive or acceptable to be removed. ISS mixing near the house in area ISS-J will be done in narrow alternating sections so that the structure will not become undermined. Based on the length of the area, it will most likely be broken into 2 or 3 sections.Renova will take all practical measures to minimize adverse impacts from execution of the contract work on or those of businesses and residences adjacent to the Site.

7.3 Site Clearing & Leveling

Trees and debris located within ISS treatment areas will be removed, or otherwise relocated as needed to perform the work. Once cells have been mixed, depressed grade areas on-Site will be filled and leveled to create safe conditions for personnel, equipment, and materials.

7.4 Construct Mixing Batch Plant

Renova will install a mixing batch plant on-Site, comprised of one (1) fully automatic STS Scheltzke Mix-Pump-Container (MPC) 1030-160-D with mixing plant control system, two (2) STS 270 BBL Skid Mount 40-ton Silos, and associated delivery hosing. The specifications of the mixing batch plant equipment as provided by the manufacturers are included as **Appendix A**. Fall arrest equipment is inherent in the design of the silos; Renova personnel will be clipped into the silo fall arrest system in the event a worker must ascend the silos for maintenance or otherwise.

Figure 2 illustrates the batch plant process flow sequence. The following system details are provided in the manufacturer specifications:

Mix performance rate	Between 1 and 24 m^3/hour (31 CY/hour)
Process discharge flow rate	605 L/min (160 GPM)

Batch plant operation will consist of the following processes. Materials in the dry bulk storage trailers (pigs) and active supply silos will be gravity fed into, and then pumped though the MPC utilizing two (2) vertical plunger pumps. A tank colloid mixer combines the materials and removes dust. Water supplied by the hydrant will be introduced to the MPC, and a slurry is discharged via HDPE piping to the designated ISS treatment area(s). No pretreatment of the contaminated material is anticipated at this time.

Controls associated with batch plant operation are detailed in **Appendix A** and summarized on the following table:

Operation	**Control**
Delivery pump	ON/OFF push button; Automatic start push button
Tank colloid mixer with dust removal system	Pneumatically controlled
Fluid levels	Ultrasonic sensor
Water meter	Pneumatically controlled
Fully automatic water metering	START push button
Pressure adjustment	Rotary knob
Flow rate control	Rotary knob
Mixer and agitator	ON/OFF push button; Rotation speed: valves
Main battery	Switch
Voltage and power control	Control lamp
Hydraulic motor	ON/OFF push button
Mixture selection	Preselect switch
“Automatic,” “Hand,” or “Auto Preselect” Operation	Switch
“Dewatering all valves” or “Suspension/Water”	Switch
Remote control	ON/OFF switch
Emergency stop	Switch

7.5 Erosion and Sediment Control Plan

During all on-Site activities and until final acceptance, erosion and sediment control measures will be implemented and maintained according to the Soil Erosion and Sediment Control Plan (SESC) in the Remedial Action Work Plan (RAWP) (SESI, 2024). Erosion and sediment control devices will include silt fence, silt socks, straw bales, and concrete pier/debris deflectors. All erosion and sediment control measures will be inspected daily to ensure that channels, ditches, and pipes are clear of debris, embankments and berms have not been breached, and devices are intact. Temporary erosion control

measures will be removed from the Site upon work completion, and the Site transferred over to those responsible for development.

8.0 CONCRETE AND ASPHALT DEMOLITION AND OFF-SITE DISPOSAL

Concrete and asphalt around and within the remediation area will be removed to accommodate the ISS activities. Concrete shall be broken up to manageable sizes with a hydraulic hammer and direct loaded into rolloff containers or into tandem dump trucks, provided by Griffon, for off-site disposal.

9.0 PRE-EXCAVATION AND LOADOUT OF CLEAN OVERBURDEN SOIL

Upon removal of concrete and bituminous asphalt pavement surface, pre-excavation of overburden soil will proceed. In order to maintain a level area, create a contained working area, and to accommodate the increase in overall volume of material, or "swell," the entire ISS area (South side) will be pre-cut to the 5-ft below finished grade, as specified in the contract documents. A loading area will be located adjacent to the excavation. Pre-excavated soil will be direct loaded on dump trucks for off-site disposal provided by Griffon. Once excavated to the proposed subgrade, ISS remediation will proceed.

Renova will coordinate the anticipated shipment schedule with a permitted facility. Griffon will coordinate the appropriate trucks to meet Renova's requested production. Renova personnel will direct and spot trucks during loading activities. All trucks should be initially inspected by Griffon to confirm compliance with DOT safety requirements, that there are no holes in the body, they have a working backup alarm, etc. A Griffon representative will brief each driver.

10.0 SING SING KILL RIVER BYPASS

Sing Sing Kill River flow will be bypassed around the work area as shown on drawings S-1, TD-1, SD-1&2, X-1,2,3,4and D-1&2 . The bypass system will consist of an earthen cofferdam and dual 60" diameter N12 HDPE pipe to divert water downstream and away from the adjacent work area. As shown on the contract documents, the dual 60" HDPE N12 pipe will be placed on the riverbed. A sand bag cofferdam berm will be placed around the pipe immediately upstream of the work area. The cofferdam will direct the river flow into the HDPE pipe bypass. Upon completion of the retaining wall construction, the cofferdam and pipe will be removed and the river bottom restored to its original shape.

11.0 ON-SITE STORMWATER HANDLING/MANAGEMENT

Stormwater controls will be implemented to minimize stormwater from entering the ISS area. Prior to commencement of major site activities, Renova will ascertain the pitch of the existing pavement and determine the current flow of the stormwater. A continuous earthen berm shall be placed around the ISS

area as a barrier to prevent stormwater from entering the remediation area. The berm will direct stormwater towards the nearest storm inlet, or discharge drainage area. Any water resulting from dewatering will be disposed of after treatment per the WCDOH permit.

12.0 WATER TREATMENT FACILITY

Groundwater encountered during retaining wall excavation will be managed appropriately. A construction dewatering system will be mobilized and set up on-site for pretreatment of encountered groundwater. The dewatering system shall include submersible sump/dewatering pumps, pretreatments system, carbon media filtration system, and storage tanks. Renova will tie-in to the existing Westchester DPW 4" sanitary line located in the NW corner of the existing building. Treated water will be disposed of into this sewage system. Sumps and dewatering pumps will be installed, as necessary, at appropriate locations along the retaining wall subgrade for water removal. Water from the south side of the Sing Sing will be pumped and treated prior to disposal within the sewage system. The dewatering flow system diagram is included as **Appendix B**.

13.0 IN-SITU STABILIZATION

Renova will provide all labor, equipment, and materials to construct and perform ISS treatment activities for the stabilization/remediation of soils and contaminated media on-Site. A mixture of reagents has been designed based on results of bench study ISS procedures:

6% Portland Type I Cement

2-6% Ground Granular Blast Furnace Slag

Renova has evaluated the effectiveness of pilot cell sample results and during the full scale ISS the mix may be amended as necessary. Any deviations to the base mix design will approved from the NYDEC prior to mixing. Safety data sheets (SDS) for both Portland Cement and Ground Granular Blast Furnace Slag are included in Renova's SSHP for the project (Renova 2024) and will be maintained on-Site throughout the contract work in the construction office available for review at any time during working hours.

13.1 Methodology

The ISS treatment areas will be divided into mixing cells. For field execution, the layout of the cells will be determined and coordinated by Renova. Corner or control points will be established utilizing GPS equipment and marked with survey stakes in the field. To ensure full and complete mixing, horizontally adjacent cells will overlap with previously treated cells and treated to within less than one foot of the full prescribed ISS depth; therefore, primary and secondary (overlapping) corner points will be established and documented. Vertical depth of mixing activities will be monitored using a machine mounted GPS system.

Renova will provide cell numbers and proposed mix design to the Project Team periodically, prior to the mixing of those cells. The mixing will generally from the southeast towards the southwest then from the northeast towards the northwest. The anticipated cell mixing order will be ISS-A, ISS-B, ISS-F, ISS-H, ISS-G, ISS-M, ISS-J (south), then ISS-J1. Once the South side of the mix area has been completed the crew will start in the northeast middle cells ISS-C, ISS-D, ISS-E, ISS-I, ISS-K, and ISS-B1. This order will allow for the crew to keep a clean corridor along the Sing Sing where trucks can carry out impacted soil and carry in clean fill cap material without coming into contact with impacted soil. When those cells have been mixed the crew will shift to the cells along the river where the water treatment system and trench box shoring will be required. The sequence along the Sing Sing will be ISS-C, ISS-K, ISS-D, ISS-I, ISS-E and finally ISS-L. A series of trench boxes will be used to hold back the Sing Sing riverbed. The top of the trench boxes will extend several feet above the existing riverbed, and they will be placed parallel with the river. The crew will install temporary chain link fence draped with polyethylene sheeting as necessary to protect the riverbed and any clean areas from cross contamination. The crew will install steel plates at the open ends of each series of boxes to prevent material from sloughing into the cell. This order will allow for a hard wall of mixed soil along the entire length of Sing Sing. This will cutoff impacted groundwater from flowing into the Sing Sing while we're working on the final ISS pass. Impacted groundwater will be pumped from the mix area as necessary to the onsite treatment plant. During the Recon block retaining wall installation all impacted soil will have been already mixed, therefore it will eliminate the risk of cross contamination. The trench boxes will be removed concurrently with the Recon block wall installation.

After the completion of mixing in the Southern portion of the site, Renova will mix the two cells on the Northern portion of the site. These two cells, ISS-BB-1 and ISS-BB-2, will be cut down 5' and mixed to 37'. The proposed excavator for the Southern portion will have a max reach of 33'. In order to facilitate ISS of this deeper area, a long reach excavator with a 60' reach will be utilized. The conventional excavator will be used for the initial mix to 33', with the long reach excavator employed supplementally to achieve terminal depth. A draft Cell Layout plan is included as **Figure 3**.

In addition to the batch plant, Renova intends to utilize the following equipment to mix the cells:

- (1) LiuGong 936E 80,000 lb. Class Excavator or Equivalent
- (1) Link Belt 350 80,000 lb. Class Excavator with 30' Reach, or Equivalent

These machines have the necessary weight, breakout force, and depth/reach capabilities to adequately perform soil mixing.

Recognizing the harsh conditions that ISS mixing poses to excavators, Renova will maintain an on-Site inventory of spare parts (hydraulic cylinders, hoses, ground engagement tooling, etc.) to minimize downtime.

Before starting work in a treatment cell, the excavator operator will create 1-2-foot soil berms on the edges of the cell, resulting in a slight depression or bowl in the center. This will provide a controlled work area in which to apply and contain the grout mixture. ISS will be performed from existing grade of the pre-excavated area to the prescribed depth elevation, until the soil and reagents have been thoroughly mixed/homogenized. Renova anticipates that most areas will require approximately 3 hours of mixing until the pre-determined volume of grout has been thoroughly blended. It is estimated that a 12-15% increase in volume will occur for each cell mixed.

The mixing excavator will operate from the outside of the cell on a suitable platform to maintain stability and achieve depth control.

Prior to mixing and in accordance with the layout of each discrete treatment cell, Renova will calculate the soil mass and reagent component addition. Batching calculations will determine the total weight for each reagent and total slurry volumes to be applied. Renova will mix and batch grout utilizing a water to reagent ratio not exceeding 1.5:1.0 and will strive to maintain the ratio closer to 1:1, to reduce soil bulking or swell. The exact ratio will be optimized and maintained during the pilot study. Renova will utilize on-Site service water taken from a municipal hydrant and HDPE tubing will transport the water for all ISS and batching operations. Renova will maintain reagent storage inventory for a minimum of three days of ISS production, or 1,800 CYs of treatment. Renova will maintain an on-Site inventory in order to maintain a reagent delivery schedule to minimize downtime.

The reagent slurry will be produced by the Scheltzke MPC 1030 batch plant and will be pumped through grout hose to the mixing cell using a positive displacement pump. Volumes of slurry pumped to the cell, as well as reagent component volumes, will be recorded and documented for each treatment cell. The MPC 1030 utilizes load scales on the mixing tank for precision monitoring and feed control of reagent or components. The MPC 1030 has a primary mixing tank, blending a typical mixed batch volume of 260 gallons, and a holding/agitation tank with a volume exceeding 750 gallons (approximately three batches). Mixing is thorough and consistent, both in the initial mixing tank and agitation/holding tank. The mixing tank will quickly produce a single-weighted batch of grout and send it to the holding/agitation tank for delivery on demand to the mixing operation or treatment cell.

The delivery system on the MPC 1030 is a duplex piston pump with variable speed control that can easily provide flows from as little as 2 gallons per minute (GPM) to an excess of over 150 GPM and at pressures exceeding 500 pounds per square inch (PSI). Renova will utilize electronic instrumentation in the MPC

1030 to monitor flow rates and total volumes produced and applied. In addition to the electronic controls of MPC 1030. Renova planned ISS production rates are a treated volume of 600 CY per day and a reagent grout volume over 12,000 gallons utilizing the MPC 1030.

Grout slurry will be delivered to the treatment cell as mixing proceeds. The mixing excavator(s) will be used to homogenize the grout and soil over the entire length, width, and depth of the cell. Depending on the dimensions of the cell, mixing excavator(s) will need to move laterally along the long side of the cell to reach and mix all soil within the cell.

Each operator's soil blending technique will vary. Generally, soil will be loosened with the mixing excavator starting from soils at the surface working downward, allowing the slurry to infiltrate, until target depth is reached. Soil will be scooped, dumped, flipped, moved from one side to the other, etc., and any overburden berms will be incorporated into the cell.

Mixing will proceed to the prescribed depth according to the RAWP (SESI 2024) and will only be deemed completed once the Renova Site Superintendent approves the cell as homogeneous, prior to sampling. Renova anticipates a typical daily processing rate of approximately 600 CY of in-place material per day per mixing team.

At the end of each day or during work stoppage**,** grout will be present in the equipment, piping, and hoses that will harden over time. For any other work stoppage, Renova will flush grout from the equipment, piping, and hoses. Grout will be flushed from the system with clean water. All flushed grout and rinse water will be pumped into the treatment area and allowed to permeate into the adjacent treatment cell. Mixing excavators will be power washed with hot water in between each cell and at the end of each day. Water supply lines will be flushed with compressed air.

Renova understands that adjustments to the mix design are required based on actual field and soil conditions. In addition to constant visual observation of ISS treated materials, Renova will monitor early ISS performance testing (7-day) for trends which would indicate the need to adjust the specified reagent or water ratios. Data will be provided to Griffon on a weekly basis at a minimum. If for any reason mix design needs to be reevaluated, it will be resubmitted for NYSDEC approval.

Renova will maintain strict Process Control (PC) throughout the ISS implementation. The grout volume (batching calculation) for each treatment cell/column is calculated based on the surface area, depth, and overlap portions of each cell. Design batching calculations (water/reagent addition by weight) and grout

volume calculations (dosing/treated area) will be summarized and maintained in an electronic Quality Control Production Log (QCPL). The QCPL will be updated daily and provided on a weekly basis with other project submittals.

Renova will not use reagents if they contain frozen material. In addition, Renova will not treat contaminated material if it contains frozen material. ISS activities will not be performed during severe rainfall events that could potentially result in excess moisture to the mixture. Renova will determine during rain events if mixing can continue without degradation of the designed mix. Renova will make sure surface runoff does not infiltrate the material being stabilized by creating 1-2 foot soil berms around the cell. Once the cell has cured, the soil berms created for the cured cell will be treated as the adjacent cell undergoes soil treatment. Cure time will depend on soil consistency and groundwater presence/elevation. The increase in volume from the previously treated and cured cell will alleviate the need to berm that side of the cell, thereby acting as a barrier for surface runoff. In the event that the increase in volume is not sufficient for this purpose, additional soil will be placed as needed to create a barrier. Silt socks may also be utilized as needed to deflect runoff. In the event of heavy rainfall greater than 2" per day, Renova will adjust water levels in the ISS mixture to assure that the ratio of water to reagent is maintained.

13.3 Quality Control Plan

The following sections describe the Quality Control procedures to be followed throughout the contract work.

13.3.1 Batch Proportions

Prior to mixing and in accordance with the layout of each discrete treatment cell, Renova will calculate the soil mass and reagent component addition. Batching calculations will determine the total weight for each reagent and total slurry volumes to be applied. Renova will mix and batch grout utilizing a water to reagent ratio not exceeding 1.5:1.0 and will strive to maintain the ratio closer to 1:1, to reduce soil bulking or swell. The exact ratio will be optimized and maintained after the completion of initial test cells. Renova will utilize on-Site service water taken from a municipal hydrant and HDPE tubing will transport the water for all ISS and batching operations. Renova will provide reagent storage capable of holding a minimum of three days of ISS production, or 1,800 CYs of treatment.

13.3.2 ISS Mixing

To ensure the proper depths are reached during mixing, excavators will be equipped with a custom depth measuring system on the boom. This will allow the operator and others on-Site to confirm the prescribed depth of mixing has been achieved.

The on-Site Project Engineer will tabulate and provide the following information per ISS column or cell area:

- ID (treatment cell)
- ISS cell corner point coordinates
- Surface elevation at top of ISS
- Total installed depth of ISS (elevation)
- Location/depth of post-mix representative sample
- Start time and finish time
- Quantity of grout used
- Diagram of ISS area depicting location and overlap configuration; and
- QC sample location and performance testing results.

Renova will submit these quality control test results to Griffon immediately upon receipt and Renova's review during ISS activities.

13.3.3 Coring

Coring will be performed after the completion of the ISS to confirm that the mix has achieved the environmental objectives outlined in the RAWP (SESI, 2024).

One core borehole will be advanced for every 5,000 square feet of ISS treatment area. To allow early coring information to be incorporated in adjusting ISS operations, the first coring location will be completed when the ISS treatment project area is no more than 25 percent complete. Core borehole locations will be biased towards areas with the greatest soil contamination, areas where contamination is in direct contact with the bedrock surface, and/or locations where difficulties in the ISS process were encountered. Core boreholes will be placed in locations where individual treatment columns or cells overlap, to the extent possible. Core boreholes will be advanced to at least a foot below the monolith design or bedrock, if encountered. If coring reveals previously undocumented areas of contamination, delineation (and remediation, as necessary) of that contamination may be required outside the QA/QC program. Cores shall be archived following coring activities. Cores may be discarded upon final inspection by the Department. Following initial inspection, the Department may require cores to be retained to compare to future cores or to document issues that will need to be resolved. To allow any needed corrective actions to commence before the monolith cures to a point making corrective action difficult or impossible, core inspection by the Department will occur as soon as possible but not later than 48 hours of the core's collection. To identify potential areas of concern for the coring program, documentation on

the volume/shrinkage of grout obtained during ISS installation will be reviewed. Areas where excessive grout was lost during ISS implementation will be targeted for coring.

All coring activities will be performed in accordance with the RAWP (SESI, 2024) and the NYSDEC ISS QA/QC, which is included as **Appendix C**.

13.3.4 Analytical Testing & Standards

Renova will obtain representative samples of the treated material to confirm performance criteria are in accordance with NYSDEC ISS QA/QC, which is included as **Appendix C**. At a minimum, Renova will collect samples at a frequency of one per 500 CY of treated soil, or at least one per crew/production day. Samples will be collected using an excavator attachment sampling chamber. Pictures of the sampling chamber are included as **Appendix D**. Renova will collect samples for the following parameters:

Sampling Parameter and Frequency	Criteria for Compliance
Unconfined Compressive Strength (UCS) (ASTM D1633) (7-day, 14-day, or 28-day) at one per 500 CY or one per crew each day.	50 psi
Permeability (ASTM D5084) (7-day, 14-day, or 28-day) at one per 500 CY or one per crew each day.	1×10^{-6} cm/sec

The laboratory which will be used for the UCS, and permeability analysis is to be determined. The Laboratory will provide data deliverables in the form of excel spreadsheet files detailing results, and the complete data packages will be provided in PDF upon final reporting. The ISS samples will be held on-Site for 3-4 days or until cured before shipping them to the laboratory. The samples will be kept in a temperature-controlled environment to ensure proper curing.

Samples will be visually inspected for the following criteria, and the results recorded:

- Visible NAPL
- Non-mechanical induced cracking within the core
- Percent of core sample recovered

Indirect indications of unmixed NAPL will also be recorded, such as:

- NAPL coating on equipment and tools

13.3.5 Surveying Methodology & As-Builts

ISS cells to be mixed will be laid out and staked at the start of each workday (or week, as applicable based on current project activities and overall status). Cells will be located using Topcon GNSS survey equipment

and horizontal corners of each cell will be marked in the field. Once cells are laid out correctly, ISS mixing activities will commence.

Once the ISS cell has been mixed and target depth is achieved, ultimate cell extents will be recorded using the Topcon and utilized to create As-Built drawings of the cells, Sitewide.

13.3.6 Community Air Monitoring Work Plan

A Site-specific *Community Air Monitoring Plan* (CAMP) has been prepared by SESI and submitted under separate cover. All work performed by Renova will be completed in compliance with the CAMP. Any perimeter air monitoring will be completed by others and exceedances will be communicated to Renova and addressed by Renova in accordance with the CAMP.

SESI shall monitor the perimeter of the site air quality and notify Renova of any exceedance of airborne particulate and VOC levels. Renova will adhere to the approved CAMP for the duration of the work.

Renova will maintain nuisance dust suppression by periodically wetting down haul roads, as necessary, especially at times of heightened activity such as material loading for transport and disposal. Water will come from an onsite hydrant/water source. For odor suppression, a foam generating unit and containers of foam will be kept onsite and ready to be used at any time onsite. The foam will produce a thick, long-lasting foam barrier for immediate suppression of odors, dust, and volatile organic compounds (VOCs) for a period of 24 to 48 hours. The odor suppressing foam will be applied by Renova as directed by Griffon. The odor suppressing foam will be supplied by Atmos Technologies. The SDS for the odor control foam will be maintained on-Site for the duration of contract work and is included in Renova's approved SSHP (Renova 2024). The odor suppressing foam will be utilized to suppress any odors, even if the VOC levels are below the action limit as described in the CAMP.

13.3.7 Noise Monitoring

Consistent with OSHA:1910.95, hearing protection is made **available** when noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 decibels (dBA). To approximate this level, if a person must shout to communicate with someone 3 feet away from them, noise is likely greater than 85 dBA, and hearing protection is **recommended**. Hearing protection is **required** when the 8-hour time weighted average (TWA) sound level $\geq$ 90 dBA. Renova will monitor noise levels within the active work area(s) with a decimeter on-Site and record decibel levels to determine where hearing protection may be required. Where noise exposure meets or exceeds this level, noise is listed as a physical hazard in the job hazard analysis for the tasks/operation, and hearing protection is included as one of the control measures (PPE).

Hearing protection is also required for any employees who have not yet had a baseline audiogram or who have experienced a standard threshold shift and are exposed to an 8-hour time weighted average sound level ≥ 85 dBA. Employees exposed to an 8-hr TWA sound level ≥ 85 dBA participate in a Hearing Conservation Program.

Hearing protection is provided to all Renova employees. Renova employees are trained annually on hearing conservation and are required to wear hearing protection when the noise levels on-Site approach 85 dBA.

14.0 SOIL MANAGEMENT PLAN

This Soil Management Plan (SMP) applies to all waste generated from the activities performed as part of the contract work. The SMP establishes the framework for managing waste from initial generation through final disposition.

Site maintenance and cleanup activities will be completed during progress of the work, at the completion of the work, and in accordance with the RAWP (SESI, 2024). Cleanup shall be conducted to keep the Site free from accumulations of waste materials, rubbish, and windblown debris resulting from project operations.

14.1 Waste Handling, Storage, & Transportation

Waste materials generated by ISS work that cannot be recycled will be disposed in a legal manner at an off-Site, state-approved landfill, in accordance with Federal, New York State, local laws and regulations, and the contract terms. Debris will be stockpiled on-Site until it is loaded into triaxle trucks to be transported to the appropriate facility for disposal. Items to be recycled, including metal, will be kept separate from other waste and recycled as appropriate. Waste containers will be labeled and transported to the ultimate disposal locations in accordance with all applicable U.S. Department of Transportation (USDOT) regulations. All material/debris will be reduced in size to meet the requirements of its respective disposal facility.

15.0 SITE RESTORATION PLAN

Following ISS activities, Renova will restore the grade of ISS areas to a flat, level condition with no mounding of ISS material or soil. Swell will be cut in order to allow for 4 feet of fill to prepare the site for proposed development. All debris related to ISS activities will be removed and or stockpiled at an approved centralized staging area on-Site for future off-Site disposal.

16.0 DEMOBILIZATION

During the project, equipment for certain tasks will be removed from the Site as the work progresses and as it is no longer needed. At the completion of ISS activities, Renova will conduct equipment decontamination and Site teardown work. Renova will decontaminate all equipment and vehicles utilized for handling and management of hazardous and/or regulated materials as required prior to removing from Site. The ISS batch plant and temporary facilities will be cleaned, dismantled, and demobilized from the Site. Renova will remove any fencing, construction barricades, Site/access control, and contractor equipment upon completion of work. Renova will remove any trash generated by our work activities. The Site will be restored to the contractually acceptable condition upon work completion.

Renova's Project Manager and Site Superintendent will perform a walkthrough with Griffon to ensure that all work areas have been restored to the satisfaction of Griffon and per the contract specifications. Within 30 days of completion of work, and prior to final payment approval, Renova will provide closeout submittals documenting final completion of the work. Final deliverables include final laboratory reports, final surveyor plans of ISS cell locations, final daily logs and field notes, final weights of all import reagents and materials for ISS mix, final updated ISS Implementation Plan and Cell Layout Map, final closeout documentation for any open permits required to conduct the Work, and manifests or bill of lading for material disposed off-Site.

FIGURES



RENOVA
environmental company
3417 SUNSET AVENUE, OCEAN, NJ 07712
PHONE: (732)659-1000
www.renovaenviro.com

LEGEND:

WORK AREA

SCALE IN FEET
0 40 80

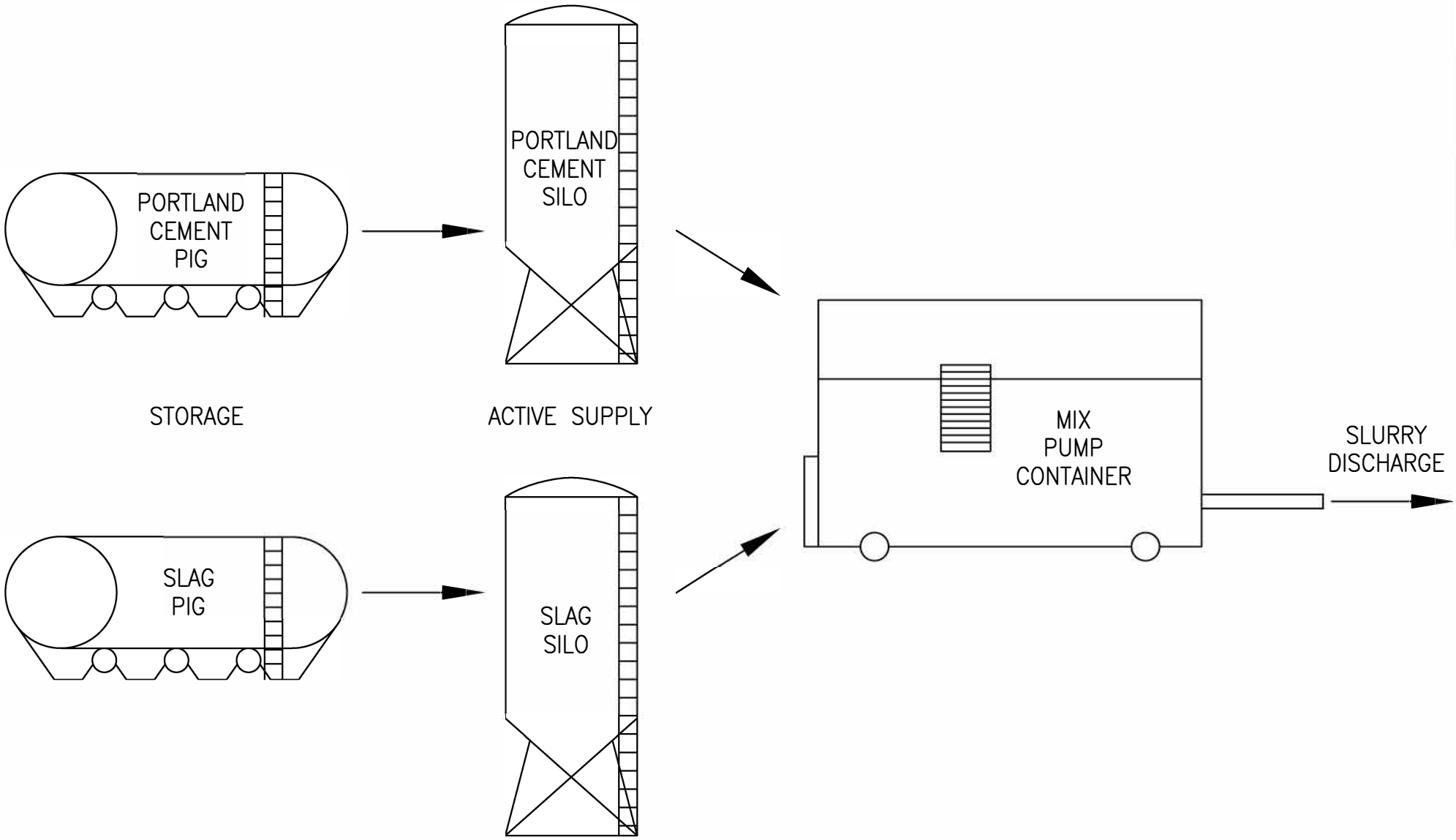
SITE LAYOUT

30 WATER STREET
OSSINING, NEW YORK

FIGURE 1

DATE: 12/20/2024

DRAWN BY: BI



RENOVA
environmental services
3417 SUNSET AVENUE, OCEAN, NJ 07712
PHONE: (732)659-1000
www.renovaenviro.com

LEGEND:

NOT TO SCALE

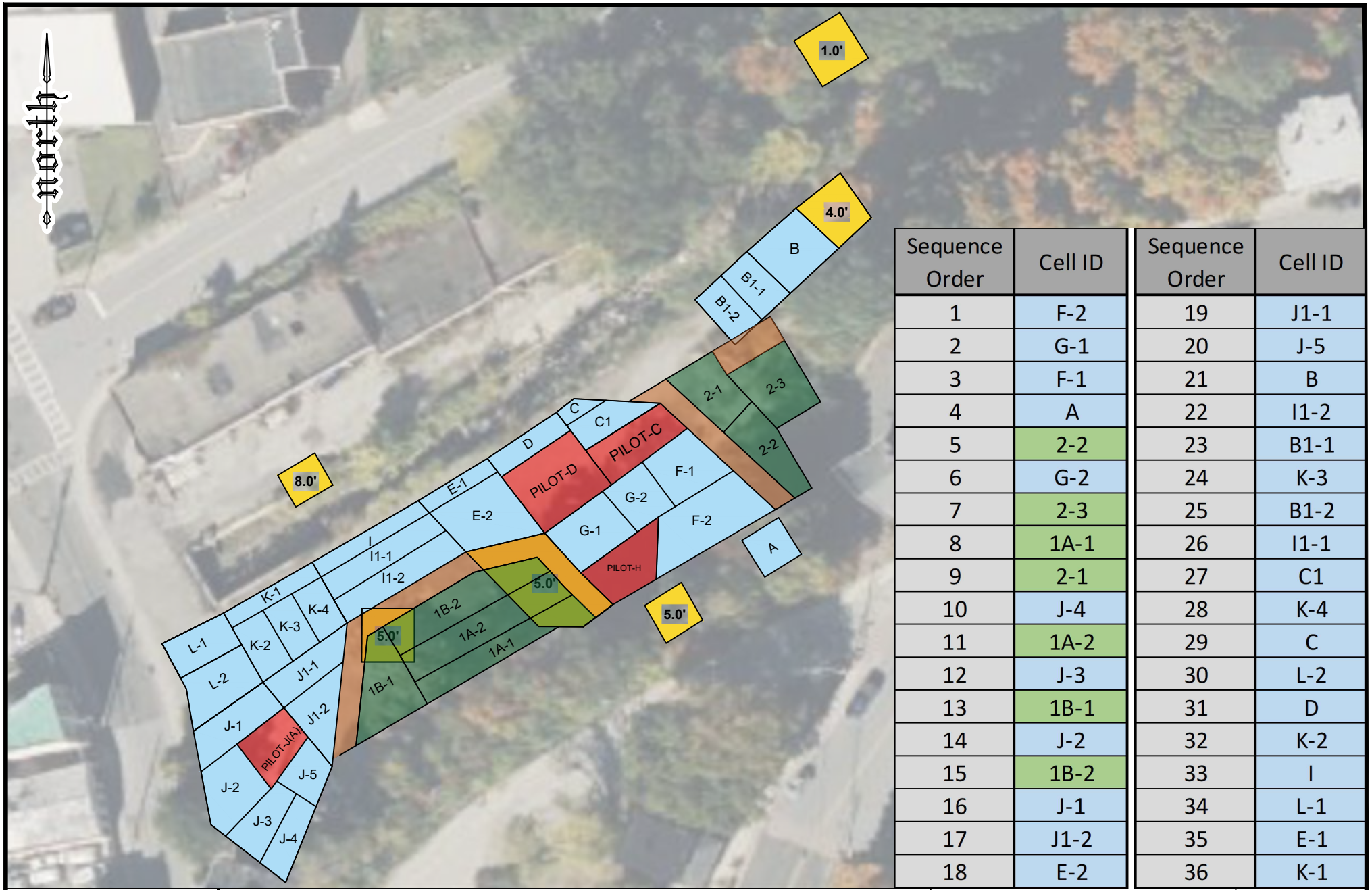
BATCH PLANT PROCESS FLOW DIAGRAM

IN-SITU STABILIZATION/SOLIDIFICATION TREATMENT SYSTEM
ABSOLUTE AUTO TRUCK SALVAGE CO. INC.
245 MOUNTAIN AVENUE, MIDDLESEX, NEW JERSEY

FIGURE 4

DATE: 07/30/20

DRAWN BY: AL



Sequence Order	Cell ID	Sequence Order	Cell ID
1	F-2	19	J1-1
2	G-1	20	J-5
3	F-1	21	B
4	A	22	I1-2
5	2-2	23	B1-1
6	G-2	24	K-3
7	2-3	25	B1-2
8	1A-1	26	I1-1
9	2-1	27	C1
10	J-4	28	K-4
11	1A-2	29	C
12	J-3	30	L-2
13	1B-1	31	D
14	J-2	32	K-2
15	1B-2	33	I
16	J-1	34	L-1
17	J1-2	35	E-1
18	E-2	36	K-1

RENOVA environmental company
3417 SUNSET AVENUE, OCEAN, NJ 07712
PHONE: (732)659-1000
www.renovaenviro.com

LEGEND:

PILOT MIX AREA
ISS MIX AREA
10' BUFFER
STRUCTURAL MIX AREA
EXCAVATION ONLY AREA

SCALE IN FEET
0 60 120

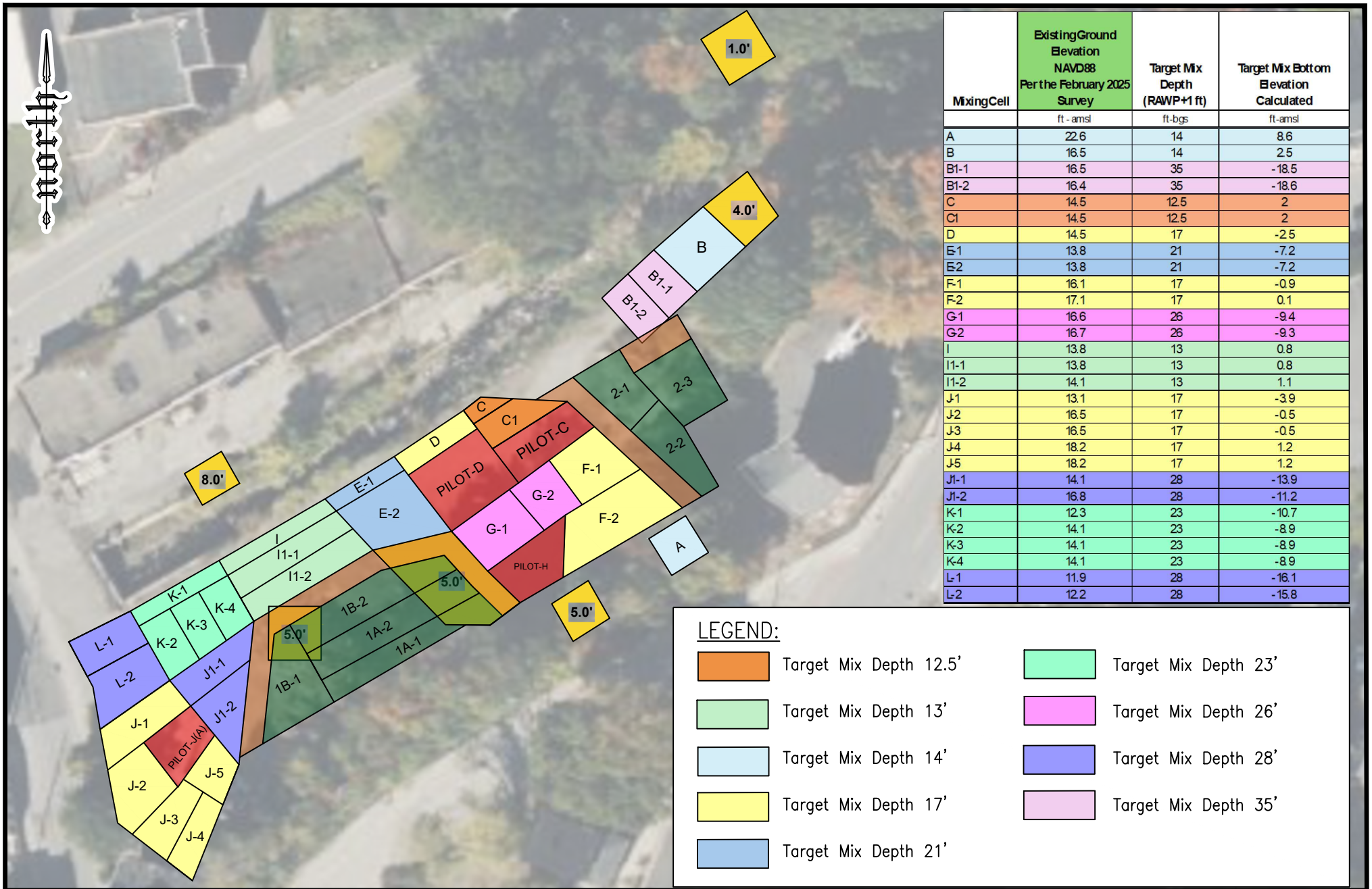
CELL LAYOUT SEQUENCE

30 WATER STREET
OSSINING, NEW YORK

FIGURE X

DATE: 5/23/2025

DRAWN BY: BI



Mixing Cell	Existing Ground Elevation NAVD88 Per the February 2025 Survey	Target Mix Depth (RAWP+1 ft)	Target Mix Bottom Elevation Calculated
	ft - amsl	ft-bgs	ft-amsl
A	22.6	14	8.6
B	16.5	14	2.5
B1-1	16.5	35	-18.5
B1-2	16.4	35	-18.6
C	14.5	12.5	2
C1	14.5	12.5	2
D	14.5	17	-2.5
E-1	13.8	21	-7.2
E-2	13.8	21	-7.2
F-1	16.1	17	-0.9
F-2	17.1	17	0.1
G-1	16.6	26	-9.4
G-2	16.7	26	-9.3
I	13.8	13	0.8
I1-1	13.8	13	0.8
I1-2	14.1	13	1.1
J-1	13.1	17	-3.9
J-2	16.5	17	-0.5
J-3	16.5	17	-0.5
J-4	18.2	17	1.2
J-5	18.2	17	1.2
J1-1	14.1	28	-13.9
J1-2	16.8	28	-11.2
K-1	12.3	23	-10.7
K-2	14.1	23	-8.9
K-3	14.1	23	-8.9
K-4	14.1	23	-8.9
L-1	11.9	28	-16.1
L-2	12.2	28	-15.8

LEGEND:

- Target Mix Depth 12.5'
- Target Mix Depth 13'
- Target Mix Depth 14'
- Target Mix Depth 17'
- Target Mix Depth 21'
- Target Mix Depth 23'
- Target Mix Depth 26'
- Target Mix Depth 28'
- Target Mix Depth 35'

3417 SUNSET AVENUE, OCEAN, NJ 07712
PHONE: (732)659-1000
www.renovaenviro.com

LEGEND:

- PILOT MIX AREA
- STRUCTURAL MIX AREA
- 10' BUFFER
- EXCAVATION ONLY AREA

SCALE IN FEET
0 30 60

CELL LAYOUT REMEDIAL DEPTHS

30 WATER STREET
OSSINING, NEW YORK

FIGURE Y

DATE: 5/27/2025

DRAWN BY: BI

APPENDIX A

PRODUCT INFORMATION

Mix-Pump-Container
MPC 1030-160-D
with mixing plant control system AUT



Technical Data

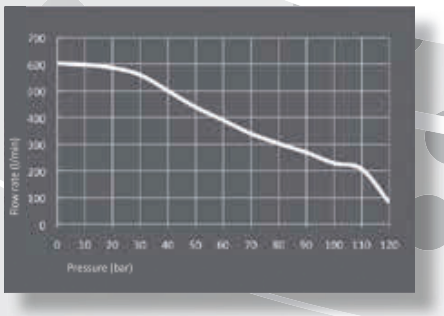
Drive	Diesel-hydraulic
Drive Power	Diesel-engine Scania DC-09-080A with turbo charger and inter cooler, 5-cylinder in-line, displacement: 9,3 l, 202 kW [275 HP] at 2.100 U/min.
Exhaust Emission	EU Step III b / U.S. EPA TIER 4 interim, SCR-catalytic converter, carbamide injection (AdBlue)
Fuel consumption	+/- 47 l Diesel/h [12,4 gal U.S.] at 1.500 rpm (depending on application!)
Fuel tank	Made of Aluminium, 500 l volume [132 gal U.S.]
Connections inlet	
Water	G 3 BSPP AG DN 75 - B-coupling 2 x G 1 BSPP IG DN 25 - GEKA
Connections outlet	
Hydraulic	Quick couplings for two screw conveyors
Pressure line	G 1 ½ BSPP IG DN 40 - 38 S
Circulation line	G 1 BSPP IG DN 25 - RD 38
Dimensions (L x W x H)	6.260 x 2.480 x 2.690 (mm)
Weight	approx. 12.000 kg

Application
Fully automatic mixing and pumping of cement, fly ash and bentonite suspensions at anchoring, fillings, flushings, pressings, piling and vibrating jobs, soil mixing WSM (Single, Twin-, Triple-Mix) and Cutter-Soil-Mixing CSM

Performance Mixer with weighing system
Feed per screw conveyor:
Mix performance W/Z 1,0 up to 24 m³/h

Performance Delivery Pump

Pressure	max. 120 bar[1)]	[max. 1.740 psi][1)]
Flow rate	max. 605 l/min[1)]	[max. 159 gal U.S.][1)]



[1)] Infinitely variable. Both max. performances are not simultaneously possible. 1 bar = 1 x 10^5 N / m^2
[2)] FKD = liquid components dosage
(Status April 2013 / technical changes reserved)

scheltzke.de

SCHELTZKE STS SPEZIALTIEFBAU MASCHINEN

Mix-Pump-Container
MPC 1030-160-D
with mixing plant control system AUT



Standard Features

Framework
20ft-Container of skid steel frame, partially enclosed with partition panel, floor and oil pan, floor drain DN 50, mixing and storing tank in a separate room, four towing devices, machine room sound proofed, lockable doors, optional on a rolling base frame (multiliftsystem DIN 30722), foldable safety grids around the machine, finishing 2K-paint RAL 5005 (signal blue) or on customer desire unicoloured

Diesel Drive
diesel-engine Scania DC-09-080A with turbo charger and inter cooler, 5-cylinder in-line, displacement: 9,3 l, 202 kW [275 HP] at 2.100 U/min., starter batterys, exhaust silencer approx. 30 dB/A

Hydraulic
oil tank volume 700 l [185 gal U.S.], axial piston pump and toothed wheel pumps, oil cooler with thermostat, main and control oil filter, oil filling and ventilation filter, electrical oil filter pollution control, oil level and tempara-ture indicator, manometer for hydraulic pressure and control oil, pressure and flow infinitely variable

Delivery Pump
vertical two plunger pump Ø 160 mm, flow rate per double stroke V = 11,2 l [2,96 gal U.S.], pump valves (suction and pressure line) self-acting (disc valves), circulation and pump-down valves manually actuated, flow rate adjustment electro-proportional, automatic grease system for plunger sealing bushes, plunger oil tank

Delivery Pressure Measurement
manometer 0-250 bar [3.626 psi] Ø 100 mm completely with stainless steel membrane, electronic pressure sensor 0-250 bar [3.626 psi], 4-20 mA, G ½ BSPP AG

Water Metering
water storing and dosing tank V = 900 l [238 gal U.S.], fixed overflow pipe, water connection C-coupling with flushing connection and butterfly valve DN 50 pneumatically controlled, water tank inlet valve DN 50 and water tank outlet valve DN 150 pneumatically controlled, fully-automatic water metering with fluid level indicator and pressure sensor

Mixing Tank Colloid Mixer
round tank with conical floor, volume 1.200 l [317 gal U.S.], effective volume 1.000 l [264 gal U.S.], mixer drive electric motor 11,0 kW, foldable and lockable tank covers, cover for screw conveyor inlet with inspection flap, hopper with bag ripper, circulation and pump-down valves DN 80 pneumatically controlled, dust removal system with filtration, NO DOSING SCREW CONVEYOR NECESSARY (Standard screw conveyors usable!)

Tools in Mixing Tank
4 fast turning mixing tools on one common drive shaft with pump down function, 3 mixing blades Ø 250 mm, 1 pumping wheel Ø 210 mm, drive shaft bearing above mixer fluid level (no stuffing box, so dry running possible w/o any problems!)

Storing Tank
round tank with straight floor, volume 3.000 l [792 gal U.S.], effective volume 2.700 l [713 gal U.S.], agitator drive hydraulic motor (rotation speed infi nitely variable), foldable and lockable tank covers, suspension inlet DN 100 with intake basket, suspension outlet DN 80 with pneumati-cally controlled valve and suction basket, cleaning cover sidewise, slowly turning agitator with a floor scraper and stream screen

Fluid Level Control
fluid level control per ultrasonic sensor

Operating Devices
rotary knob for max. pressure adjustment bar [psi], rotary knob for max. flow rate l/min. [gal U.S.], valves for infinitely variable mixer and agitator rotation speed, flow rate counter l/min. [gal U.S.] and l/total [gal U.S./total] with zero-setting, auto pre-select counter for flow rate l/total [gal U.S./total], battery main switch, control lamp for control voltage and power, ON/OFF push-button for hydraulic motor, delivery pump, mixer and agitator, ON/OFF switch for remote control, START push-button for fully-automatic water metering, AUTOMATIC START push-button for delivery pump, switch DEWATERING ALL VALVES or SUSPENSION/WATER (dewatering winter time / flushing with water), EMERGENCY STOP switch

Weighing System
pre-select switch for three mixtures, switch for AUTOMATIC, HAND or AUTO PRE-SELECT operation (mixtures), push-button AUTOMATIC START (mixtures), LCD display with adjustment of the weighing system for total weight (water and solid), batch pre-select counter with zero-setting for mixtures, LCD display for fluid level control (storing tank) per ultrasonic sensor

Accessories (included)
operating instruction and spare part list, special tools for operation and maintenance, cable remote control 15 m and cable reel 100 m, circulation hose, remote control up to 800 m or 3 km range, high pressure cleaner with hydraulic drive, 950 rpm, 210 bar (3.045 psi, industrial device, fixed installed), air compressor with hydraulic drive (fixed installed), working lamps for mixing and storing tank

Further devices, special equipments and accessories on request!

scheltzke.de

STS Scheltzke GmbH & Co. KG . Diamantstrasse 14 . D-65468 Trebur
Tel.: 0049 6147 - 501740 . Fax: 0049 6147 - 501741 . info@scheltzke.de

SCHELTZKE STS SPEZIALTIEFBAU MASCHINEN

MTW Operations & Maintenance Manual

(406) 254-1930 sales@montanatankworks.com

270BBL Skid Mount Silo



Intro-

Thank you for purchasing a Montana Tank Works Silo. We are grateful for the opportunity to work with you and plan on providing exceptional service along the way.

In this manual you will find basic descriptions of the equipment along with maintenance and guidelines for proper use and operation of the equipment.

Safety-

Only informed users may operate this equipment. All users that are operating or working with an MTW silo must read, understand, and follow this manual and all local, state, and Federal laws and safety codes must be followed in conjunction with safe and proper operation and maintenance of the equipment.

All warning, caution, and instruction signs must be followed. If a sign is non-legible or falling off the silo, replacement signs must be put on to maintain clear safety instructions and operating directions.

All guards and safety covers must be installed and properly tightened and may only be removed or worked on once the power is turned off and safety procedures are in place to prevent system from turning on.

There are many different hazards associated with operating heavy equipment. Please work safely with a clear focus when around this unit. No one may operate this unit under the influence of drugs or alcohol. Many hazards are explained throughout this manual. However, Not all potential hazards are foreseen. Safety in the field during operation is critical and ultimately is the responsibility of the equipment operators.

The MTW SafeSys Fall Arrest System safety manual **MUST** be followed at all times when using the Ladder. If you don't have a copy of this manual on hand please contact the manufacturer immediately to get a copy. This is a very important manual and needs to be thoroughly gone through and followed at all times. Failure to do so could result in serious injury or even death.

If there are any questions on personal safety or the safe operation of this equipment please contact Montana Tank Works.

Application-

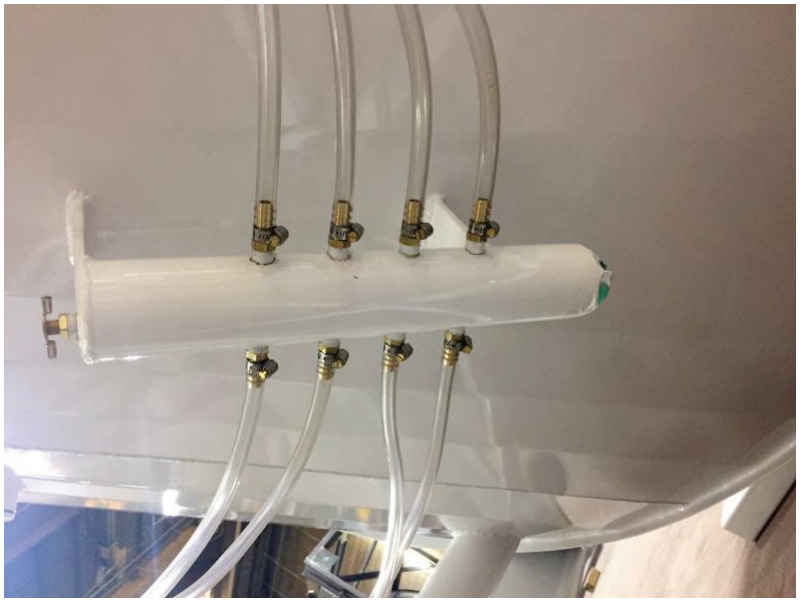
The 270bbl silo is intended for storing and discharging dry powder products such as powdered cement and fly ash only. For different products please contact the manufacturer to see if the product will work with the 270bbl silo. MTW does not assume any responsibility for injuries or damages resulting from the misuse of the equipment or improper safety measures.

Initial Set up-

Upon receipt of your new 270bbl silo there are some basic items that will need to be looked at. Because of the customization of these products, some silos might have more or less customized items than this document details. If there are any questions please contact the manufacturer.

Before filling silo: Silo base must be set on firm level footing. Allow a safe distance from edges, slopes and any uneven ground. Contact an engineer or specialist to ensure ground is stable enough to support silo fully loaded. Note: Some units will have optional Bolt Pads on the base to bolt silo to ground. Contact an engineer or specialist to ensure safe and proper installation. Leveling the silo must be done prior to filling. Failure to do this could result in damaged silo along with serious personal injury or death.

Air Manifold for air pads: Your silo has come with aerator pads plumbed into a manifold located on the bottom of the silo's cone as shown below. Please note: **ALL air must be clean and dry** or premature failure will occur to the air pads and can affect the silo's ability to operate properly causing failure to the silo or screw conveyor. When using a compressor the manifold will require roughly 14-25 PSI for proper aerator operation. Each aerator requires 1.1 CFM. (Approx. 9 CFM for 8 Air Pads) The aeration system is typically run when the discharge auger or screw conveyor is running. This system is meant to help fluidize the powder to allow for better and more consistent flow. Sometimes it is necessary to let the aeration system run for up to 30 minutes prior discharging to help with flow.



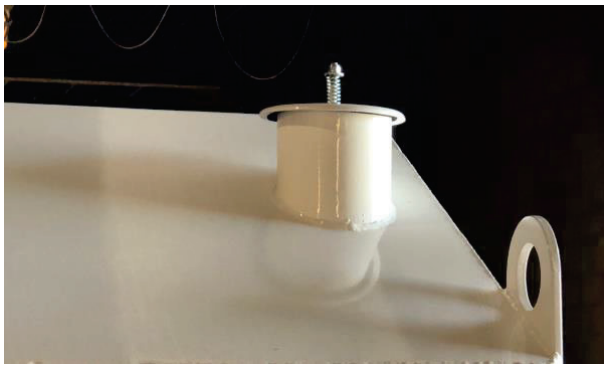
WAM Pulse Jet Dust House: Your silo should be equipped with a WAM Zero Dust house. This unit is a 7 cartridge system that can handle 1500CFM of Cement and 1300 CFM of Fly Ash. This unit will require 3CFM at 90PSI. For more information please visit https://wamgroup.com/en-GB/corporate/Product/SILOTOP ZERO/Silo-Venting-Filters



Bin Level Indicators (BLI) and Warning System: If your silo is equipped with Bin Level Indicators and a Warning Light and buzzer package you have taken an additional step to prevent overfilling of the silo. The BLI's and horn should come wired to the Warning Light box (Photo Below). This will be your guide to know when the silo is full and to stop filling and when the silo is low and you can prepare for your next fill. The red strobe light is connected to the top Bin Level Indicator and will go on along with the horn once the product has filled the silo. The factory setting allows for the horn to run for 1 minute and then stop while keeping the red strobe light on until the product has fallen below the top BLI. The green strobe light is connected to the lower BLI and this green light will come on once the product has fallen below the lower BLI. This Warning system should come with a standard 120v plug on the bottom of the box to power the unit unless your silo was supplied with a control panel. If you have a control panel included, the Warning Light System should be wired directly into the panel. NOTE: The Warning Light System must be powered and working properly or failure and overfill may occur. The Switch located below the Warning light package is the on/off switch for your WAM Pulse Jet Silotop Dusthouse which is wired into the same 120v plug for your convenience.



Relief Valve Your silo will have a relief valve located on the top of the silo to help prevent the silo from over pressurizing. This is a crucial item to maintain to prevent damage, injury or even death. The relief valve is used in the event that the silo filter becomes plugged or jammed and doesn't allow for the air and pressure to be released or vented from the silo. Adjust the lid by loosening the nut when filling the silo until leakage occurs. Then tighten nut until leakage stops and follow that with tightening the nut 1 more turn. Periodic adjustment may be necessary. This Valve must never be sealed tight or plugged or silo could explode during filling. (Photo Next Page)



Check bolts, nuts, and other connections to ensure all items are properly tightened.



Screw Cradles Your silo will have 2 screw cradles to store screw conveyor during travel. When adding or removing screw conveyor to these cradles, all local, State, and Federal safety laws must be followed. The top section of the cradle is bolted on to the bottom section of the cradle and will be removed to fit the screw conveyor in its proper place. Once it is properly placed in the cradles, with the discharge end pointed down between the handrail and the sidewall, the top section can be bolted on to the bottom section of the cradle. Ensure the bolts are tight and the screw is not able to move in the cradle. Failure to do this can result in damage of the screw, silo or personal injury and even death.



Operation and Start Up

-Before use all users must familiarize themselves with this manual and follow all instructions and safety procedures during use and set up. The MTW SafeSys Fall Arrest System safety manual **MUST** be followed at all times when using the Ladder.

-Set base on firm level footing and anchor silo as necessary. Allow a safe distance from edges, slopes and any uneven ground. Contact an engineer or specialist to ensure silo is adequately anchored and set.

- Ensure all Initial set up procedures have been followed.

- Check WAM Stainless Steel Pulse Jet dust filter system cartridges and replace any that are broken, damaged or clogged. For more information on this unit including tech sheets visit https://wamgroup.com/en-GB/corporate/Product/SILOTOP ZERO/Silo-Venting-Filters.

- Walk around silo and inspect for structural damage and other general safety concerns. Address these concerns and call manufacturer with any questions prior to operation.

- For 270bbl silos equipped with the scale system see Operation packet for scale system.

- Ensure all electrical connections are up to code and plugged in.

- Check screw feed for compacted product by unbolting the inspection plate located at the bottom of the screw conveyor and break out any hardened product. Close inspection gate when finished.

- Test the screw rotation to ensure it is moving in the proper rotation.

- Make sure Relief Valve is in proper working condition. Lid should be taken off to check for product build up. See Relief Valve initial set up for more details.

- Give a visual inspection of the aerator pads to ensure they are functioning properly. If they are broken or plugged the pads will need to be replaced

- Do a visual inspection on the manhole cover gasket and relief valve gasket to check for rips, cracks, tears, or obstructions that could cause the gasket to fail to seal. If there is damage to the gaskets they will need to be replaced.

- Ensure the power and air going to the WAM Pulse Jet Dusthouse is on and Connect the fill hose of the truck to the 4" fill pipe located on the bottom of the silo cone.

- Silo should then be filled at 7PSI max until the silo is nearly full (If Warning light package is installed on this unit the Red Strobe Light should flash once product has reached the top and filling should be stopped immediately)



- After the silo is filled, the WAM Pulse Just Dusthouse should remain on and running for approximately 30 minutes. This process should be repeated after every use to keep filter cartridges cleaned. Doing this should greatly lengthen the life of your filter.

- It is recommended to turn on your air to the aeration manifold and allow the aeration pads to help fluidize the product a few minutes prior to discharging product if the product has been sitting.

- It is not recommended to leave product in screw conveyor overnight or for long periods of time. Disengage the clutch and discharge remaining product out of the screw conveyor.

Transport

- NOTE: Silo MUST BE COMPLETELY EMPTY prior to moving.

- Remove screw prior to moving.

- Secure or remove all parts that can come loose during shipping.

- Driver must perform inspection to ensure product is safe to transport.

Common Replacement parts

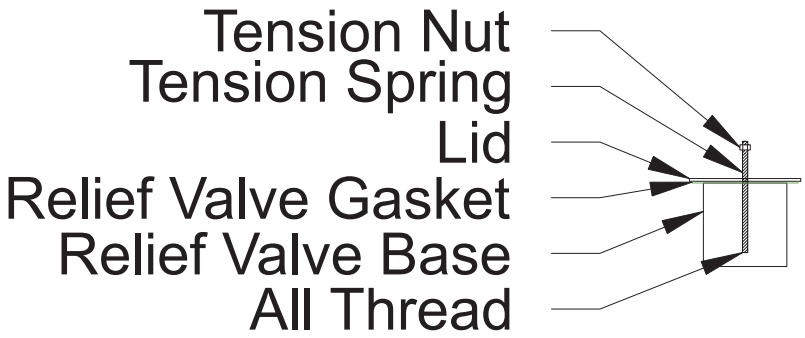
There are certain items that need to be replaced more often than others. Below is a list of these items and their item number.

AIRR0001 - Aeration Pads (Located on Bottom Cone)

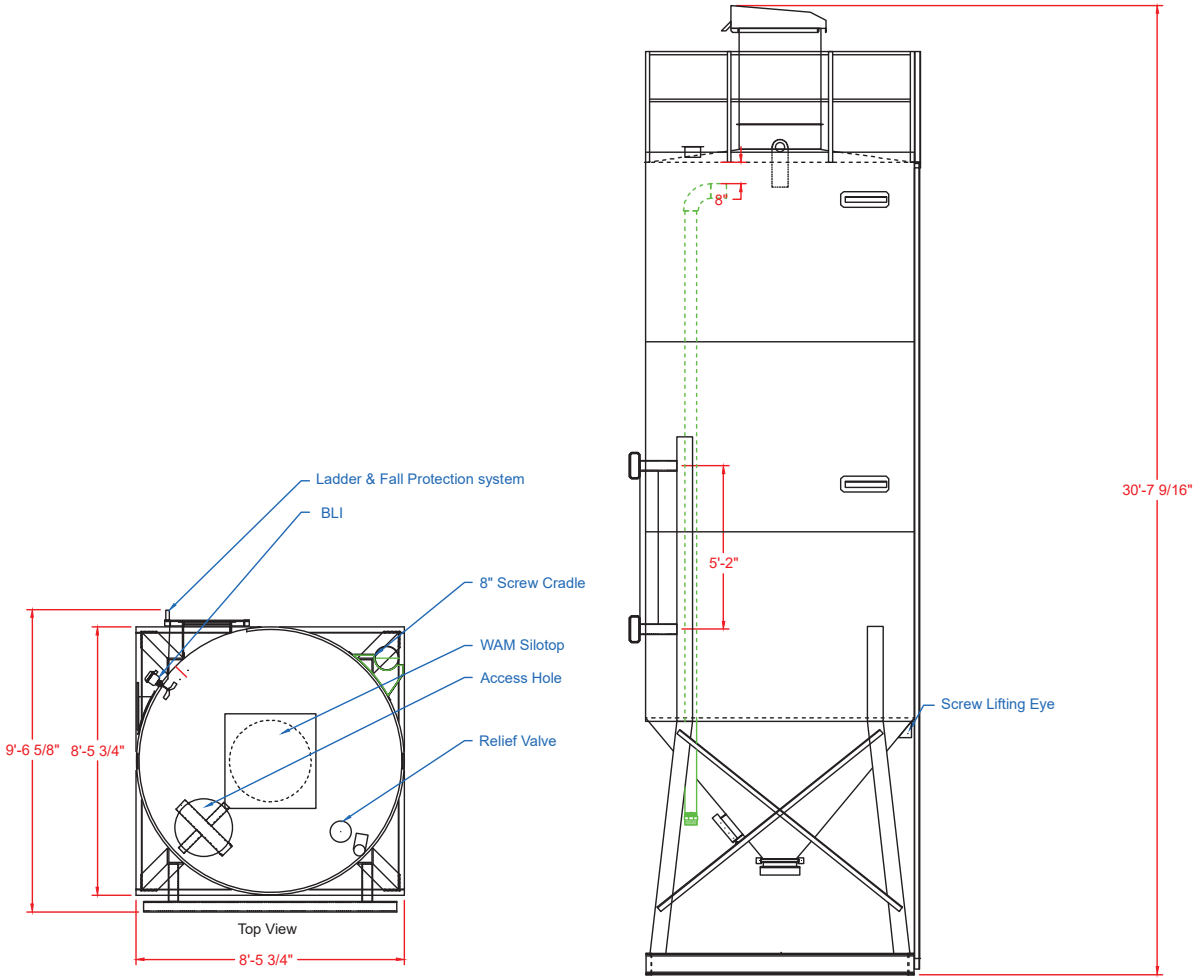
MANR0001- Manway Gasket

RELR0001 - Relief Valve Gasket

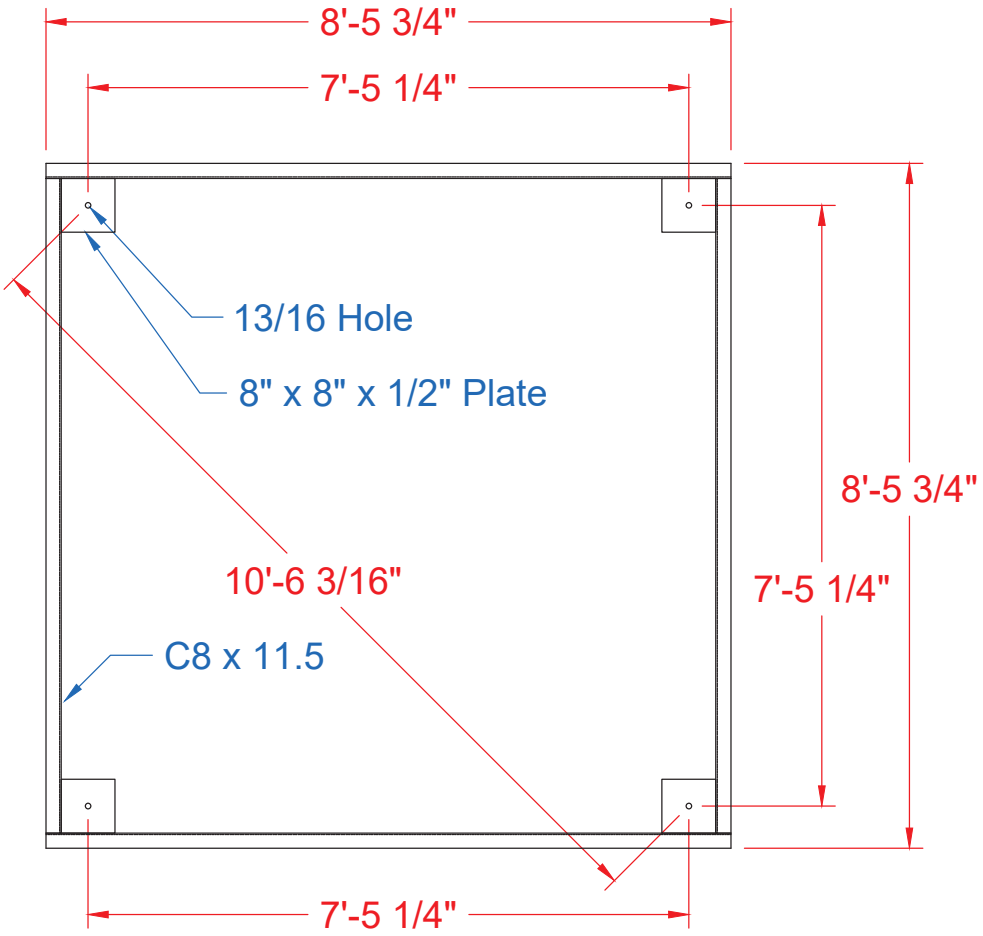
Additional Information and Quick Guides
Relief Valve Detail



Silo Drawing with Dimensions & Specs



270 Skid Mount Detail



Optional Bolt Pads

Montana Tank Works, Inc. 4119 2nd Ave. S. Billings, MT 59101
406-254-1930 406-256-5802 fax

Aeration Instructions-

Only DRY air must be used.

12 to 25 PSI is optimum at the manifold, 14 cfm is maximum.

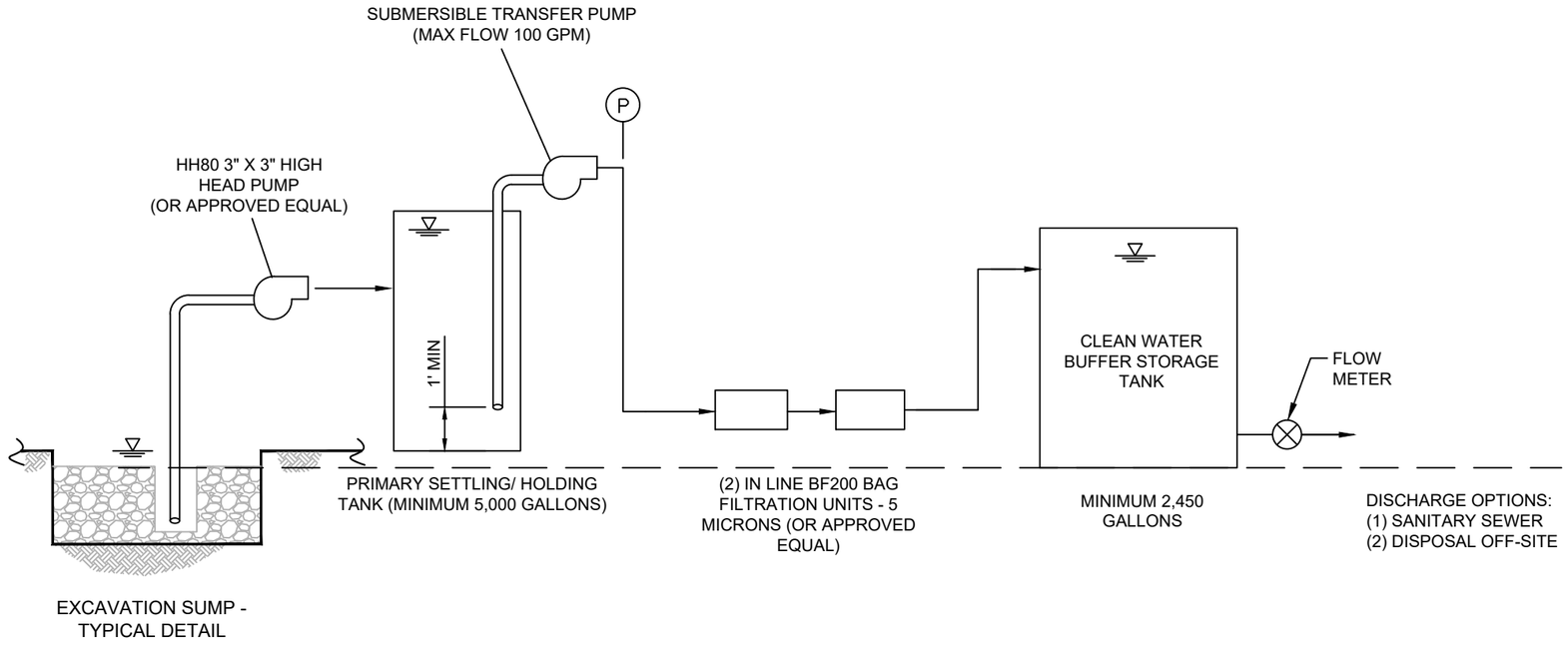
Each aerator uses 1.1 cfm, therefore

8 aerators requires 8.8 cfm at the manifold.

10 aerators requires 11 cfm at the manifold.

12 aerators requires 13.2 cfm at the manifold.

APPENDIX B



EXCAVATION SUMP -
TYPICAL DETAIL

CONSTRUCTION DEWATERING PLAN NOTES:

1) THE ELEVATION OF THE WATER TABLE VARIES IN RESPONSE TO RAINFALL, HOWEVER, IT IS EXPECTED THAT GROUNDWATER WILL BE ENCOUNTERED DURING INVESTIGATION AND EXCAVATION WILL REQUIRE SDEWATERING.

2) IT WILL BE NECESSARY TO DEWATER THE SITE FOR INSTALLATION OF THE SOE AND COMPLETION TO THE EXCAVATION. THIS MAY BE ACCOMPLISHED USING DEWATERING SUMPS INSTALLED WITHIN THE EXCAVATION.

3) BASED ON LIMITED AVAILABLE GROUNDWATER DATA, THE GROUNDWATER IS IMPACTED WITH VOLATILE ORGANIC COMPOUNDS (VOCs), SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs), METAL's AND PER AND POLY FLUOROALKYL SUBSTANCES (PFAs) ABOVE NYSDEC TECHNICAL OPERATIONAL GUIDANCE SERIES (TOGS) 1.1.1 GA AMBIENT WATER QUALITY STANDARDS (AQWS).

4) TREATMENT OF THE GROUNDWATER, PRIOR TO OFF-SITE DISCHARGE, WILL BE ACCOMPLISHED USING SETTLING AND FILTRATION. OFF-SITE DISCHARGE WILL BE TO THE SANITARY SEWER. ALL APPROPRIATE PERMITS WILL BE OBTAINED PRIOR TO OFF-SITE DISCHARGE, IF NEEDED.

5) CONSTRUCTION DEWATERING IS EXPECTED TO BE REQUIRED FOR APPROXIMATELY 3-MONTHS.

6) PERIODIC SAMPLING WILL BE CONDUCTED TO ENSURE THE DISCHARGE REQUIREMENTS ARE MET. SESI CONSULTING ENGINEERS WILL COLLECT EFFLUENT SAMPLES PRIOR TO DISCHARGE. ANALYSIS AND FREQUENCY OF SAMPLE COLLECTION WILL BE PROVIDED BY VILLAGE OF OSSINING UPON PERMIT APPROVAL.

7) A STORAGE TANK WILL ACT AS A BUFFER FOR STORAGE TO MAINTAIN COMPLIANCE WITH THE DAILY, MONTHLY, AND TOTAL DISCHARGE ALLOWANCES PER THE COUNTY OF WESTCHESTER.

8) A FLOW METER AND TOTAL VOLUME LOGGER WILL BE INSTALLED PRIOR TO DISCHARGE INTO THE SANITARY SEWER TO REPORT THE TOTAL DISCHARGE INTO THE SANITARY SEWER.

9) ALL EQUIPMENT TO BE CLEANED AND DEMOBILIZED AT THE COMPLETION OF DEWATERING ACTIVITIES AND SLUDGE FROM THE SYSTEM CLEANOUT TO BE SAMPLED AND DISPOSED OF AT APPROVED FACILITIES.

LEGEND:

(1) (P) = PRESSURE GAUGE

(2) ⊗ = VALVE

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.

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS.

JAMES VANDER VLIET, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 091466-1

dwg by: AW
chk by: JVV
scale: NTS
date: 06/25/2024

Cert of Auth #24GA27934700
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

project: 30 WATER STREET
OSSINING, NEW YORK

title: CONSTRUCTION DEWATERING SYSTEM
PROCESS FLOW DIAGRAM

job no: 11498
drawing no:

FIGURE-1

N: \ACAD\11498\CAD\11498.DWG.PFD.DWG 07/01/24 04:20:39PM, alan.ward, LAYOUT:WATER-2

APPENDIX C

NYSDEC In-Situ Solidification QA/QC

1.0 GENERAL

1.1 Introduction

Technology Description

In-situ solidification (ISS) is an established remediation treatment technology which can prevent migration of and exposure to certain contaminants in media including soil, sludge, and sediment. The ISS process is increasingly being used within remedial programs in the New York State Department of Environmental Conservation (Department).

ISS is a process that involves the mixing of reagents with contaminated soil to create a low permeability mass which encapsulates the contamination in the soil in place. Bucket excavators augers, or other technologies are used to mix the contaminated media and one or more reagents, entrapping the contaminated material within a low permeability mass. This reduces or eliminates non-aqueous phase liquid (NAPL) mobility and contaminant migration into exposure pathways, thus eliminating the treated area as a source of future exposure or contamination of groundwater, surface water, or vapor.

Complete mixing of the contaminated soil and the ISS reagents must be achieved for the process to be effective and protective of human health and the environment. Incomplete mixing can result in a non-homogenous mass, untreated areas, or large fractures within the ISS mass, which may allow mobility of NAPL and groundwater within the treated areas.

1.2 Document Purpose

The purpose of this document is to provide a method of Quality Assurance (QA)/Quality Control (QC) to ensure the effectiveness of ISS after field implementation is complete. This includes coring, and testing for hydraulic conductivity and unconfined compressive strength. The use of coring for QA/QC may not be suitable for all ISS projects and other QA/QC methods such as excavation/visual inspection will be considered an option on a case by case basis.

Failure to meet QA/QC goals, particularly incomplete mixing, is of greatest concern when it occurs along the edges of the solidified mass. The Department has noted a tendency for DNAPL to accumulate in permeable soils and sediments immediately above the bedrock surface, creating a potential pathway for DNAPL migration. Such zones can be quite difficult to mix adequately, whether using augers or bucket mixing. Thus, attention is required to ensure that “top of rock” zones are thoroughly solidified, and that this solidification is adequately documented.

To ensure the integrity of the treated material, the Department has identified QA/QC procedures, specifically coring, which are essential to ensure that ISS treatment processes are protective of the environment. This document has been developed to provide guidance on a coring program to be conducted to ensure confidence regarding complete mixing and ISS installation in the remedial area.

2.0 EQUIPMENT

2.1 Coring Drilling Method

To allow early coring information to be used for adjusting ISS operations, it is recommended that coring operations be conducted prior to complete curing of the ISS material. For high-strength material, a rock core is frequently required. Driven split spoons (typically using Direct Push tools but potentially using augers as well) may be used to collect core samples of the ISS material for lower strength materials. Rotosonic and compressed air drilling methods have not been successful in obtaining representative core samples.

Cores must be no longer than five (5) feet. If less than 60% of the core material is recovered from any of the coring runs, one (1) new core hole must be drilled adjacent to the previous location. If the recovery from the adjacent core hole continues to be less than 60%, the contractor may abandon the location. This is not intended to justify an inadequate sampling program. A representative number of successfully completed cores must be provided. Close communication with the Department's project manager (PM) is strongly encouraged to discuss and reach concurrence on the coring program.

2.2 Trenching

While trenching has not been used to date, there could potentially be instances where trenching would be a viable alternative. A trenching plan would have to be submitted to the Department during the remedial design. In the event trenching is proposed after the remedial design phase, but prior to field implementation of the ISS, a minimum of two weeks' notice should be provided to the Department for review of the trenching design.

2.3 Sample Collection for strength and permeability

Samples of the mixed soil will be collected while wet and formed into cylinders in accordance with the approved testing methods (ASTM D5084 for hydraulic conductivity, ASTM D2166 or D1633 for unconfined compressive strength). Samples should be collected every 500 cubic yards. Additional sampling may be appropriate on a site-specific basis in areas of particular concern.

3.0 EXECUTION

3.1.1 Coring Implementation

- One core borehole shall be completed for every 5,000 square feet of ISS treatment area, but not less than two bore holes per treatment area.
- To allow early coring information to be incorporated in adjusting ISS operations, the first coring location shall be completed when the ISS treatment project area is no more than 25 percent complete.
- Core borehole locations shall be biased towards areas with the greatest soil contamination, areas where contamination is in direct contact with the bedrock surface, and/or locations where difficulties in the ISS process were encountered.

- Core boreholes shall be placed in locations where individual treatment columns or cells overlap, to the extent possible.
- Core boreholes should be advanced to at least a foot below the monolith design or bedrock, if encountered. If coring reveals previously undocumented areas of contamination, delineation (and remediation, as necessary) of that contamination may be required outside the QA/QC program.
- Cores shall be archived following coring activities. Cores may be discarded upon final inspection by the Department. Following initial inspection, the Department may require cores to be retained to compare to future cores or to document issues that will need to be resolved.
- To allow any needed corrective actions to commence before the monolith cures to a point making corrective action difficult or impossible, core inspection by the Department will occur as soon as possible but not later than 48 hours of the core's collection.
- In order to identify potential areas of concern for the coring program, documentation on the volume/shrinkage of grout obtained during ISS installation shall be reviewed. Areas where excessive grout was lost during ISS implementation should be targeted for coring.

3.1.2 Trenching Implementation

- If trenching is used, it will be completed at the perimeter of the ISS treatment area and locations within the ISS treatment area. The minimum depth of excavation should be the design depth of the ISS treatment.
- If the bottom of the ISS treatment cannot be visually inspected, the Department may require cores to be collected.
- To allow inspection information to be incorporated in adjusting ISS operations, trenching shall commence when the ISS treatment project area is no more than 25 percent complete.

3.1.3 Sample analysis

- Typically, multiple cylinders are collected at each location for testing unconfined compressive strength. This allows testing after 3-5 days to get an initial indication of the strength of the mix, while reserving cylinders for compliance testing after they have achieved full strength (28 days).
- Cylinders tested for hydraulic conductivity in accordance with the approved plans. The maximum permeability should generally be 1x10-6 cm/sec, as measured using ASTM D 5084-00.

3.2 Performance Evaluations

3.2.1 Visual Inspection

Core samples and related equipment will be visually inspected for the following criteria, and the results recorded:

- Visible NAPL
- Non-mechanical induced cracking within the core
- Percent of core sample recovered

In addition, indirect indications of unmixed NAPL should be recorded, such as:

- NAPL coating on drilling tools
- NAPL in drill wash tub, if water-based drilling methods are employed

3.2.2 Performance Concerns

Performance testing must be completed early enough to identify problems. Substandard results cannot be ignored with the intention to "average-out" the results over the course of project. The purpose of this guidance is to detect installation of an inadequate remedy in time to correct the problems and avoid costly retreatment or repairs to ensure effectiveness of the ISS remedy, the following conditions will warrant further attention and will be documented during ISS implementation:

- A continuous layer or seam of NAPL is noted within the core.
- NAPL coating is visible on drilling tools
- Visible NAPL is noted in the drill wash tub
- Unconfined compressive strength below 50 psi
- Hydraulic conductivity greater than 1.0 x 10-6 cm/sec or project specific goal.
- Large sections (> 1 cf) of unmixed material.

If one or more of the above conditions are noted, the Department must be notified to discuss the severity of the problem, the degree of concern, and whether any corrective action will be necessary.

A notification, by itself, does not necessarily mean a corrective action or additional borings or testing are warranted. For instance, small NAPL blebs may be present within properly mixed areas of the ISS monolith, and coring through such a bleb, especially before the monolith has achieved its maximum strength, could result in NAPL coating on drilling tools and/or NAPL in the drill wash water. The first step to determining whether corrective action is required will be to complete additional borings around the area of concern and determine if identified NAPL within the ISS mass is encapsulated, thus eliminating NAPL mobility and impact to the surrounding environment. The results of all the samples taken within a given treatment area cannot be averaged to show compliance. While each sample must satisfy the definition on its own, a single test showing slightly elevated hydraulic conductivity would not necessarily require corrective action for that cell/column, but evaluation to ensure that it is not a systemic problem is required.

If NAPL is detected in the additional borings, particularly on the edges of the ISS monolith, or at the bottom of the ISS monolith, corrective actions may be necessary in order to fully encapsulate the source area.

3.2.3 Corrective Actions

If the ISS installation is deemed unsatisfactory after a collaborative evaluation of the coring program, measures will be put in-place to address the deficiencies and ensure that the remedy is protective of human health and the environment. Such measures may include:

- Repair, re-mixing, or isolation of the concerned area using jet grouting or other suitable method
- Excavation and disposal of the concerned area, where feasible and practicable.

3.2.4 Core Hole/Trench Abandonment

When a core has been drilled from the top to the bottom elevation of the targeted ISS treatment zone, and samples collected, it will be considered complete. Following completion of each coring location, the borings will be filled with grout using tremie methods.

If trenching is used for QA/QC activities, backfill material should meet the approved ISS specifications.

3.3 Field Documentation and Approvals

3.3.1 Field Documentation

Documentation of the ISS QA/QC activities shall be included with the Final Engineering Report (FER). Documentation will include (but not be limited to):

- Figure depicting boring/trenching locations
- Photographs of each core boring/trench referenced
- Type of drilling method or excavator used
- Field coring/trench logs

3.3.2 Department Approval

The Department should be notified of the ISS QA/QC activities as soon as possible, with a minimum of 72 hours' notice or two business days. Department personnel will attempt to be on-site, unless the remedial party is informed otherwise, to inspect the QA/QC activities and provide informal approval or recommend corrective actions.

Following on-site Department inspection of the ISS QA/QC, email correspondence should be sent to the Department project manager which summarizes observations of the coring results. The Department project manager will provide an email reply within 48 hours confirming that the ISS QA/QC objectives have been met. If the Department project manager does not feel the ISS

QA/QC objectives have been adequately satisfied, the response email will include any additional corrective actions required.

3.3.3. Resolution of Disagreements

In the event there is a disagreement regarding the ISS QA/QC program the remedial party will submit a written request for resolution to the project manager's supervisor. The correspondence shall include the ISS QA/QC activities, relevant documentation, and the nature of the dispute. The project manager's supervisor will meet with the Project Manager, Construction Inspector (if applicable) and the Bureau Director to discuss the request. If necessary, a meeting will be arranged which will include the remedial party, Department project manager, supervisor, and the Bureau Director to discuss the matter.

Following the meeting, the supervisor will send correspondence to the remedial party outlining the Department final decision.

APPENDIX D






ENTACT
BIG R
FARM & HOME

APPENDIX E



LEGEND:

- EXISTING STRUCTURE
- WATER
- TREE
- HISTORICAL MGP STRUCTURE
- RI MONITORING WELL
- RI SOIL BORING SEDIMENT SAMPLE
- RI SEDIMENT SAMPLE
- TP–2 RI TEST PIT
- ABANDONED MONITORING WELL
- 5.0' UPDATED LIMITS AND DEPTHS OF SOIL EXCAVATION
- 16' UPDATED LIMITS AND DEPTHS OF ISS TREATMENT
- PLANNED NAPL RECOVERY WELL
- B-1 SESI PHASE II BORING LOCATIONS AND RESULTS
- GEO-1 GEOTECHNICAL BORINGS WITH EVIDENCE OF COAL TAR
- 20' ADDITIONAL ISS TREATMENT AREA AND DEPTH
- ADDITIONAL ISS TREATMENT FOR GROUND IMPROVEMENT
- 5 FT. BUILDING OFFSET/LIMIT OF SOIL MIXING

ESTIMATED ISS TOTALS

AREA LABEL	TOTAL AREA (sq. ft.)	DEPTH (ft.) (FROM EXISTING GRADE)	DEPTH (ft.) (AFTER 5 FT CUT)	TOTAL VOLUME (CY)	AREA INSIDE SOUTH BUILDING (SQ. FT)	VOLUME INSIDE SOUTH BUILDING (CY)
ISS-B	832	13	8	246	0	0
ISS-B1	920	24	19	1004	0	0
ISS-C	1368	11.5	6.5	334	849	204
ISS-D	1633	16	11	665	830	338
ISS-E	1347	20	15	748	607	337
ISS-F	1931	16	11	787	1931	787
ISS-G	1189	25	20	881	1189	881
ISS-H	640	16	11	261	640	261
ISS-I	1870	12	7	485	631	164
ISS-J	3469	16	11	1413	832	339
ISS-J1	1159	27	22	945	1159	945
ISS-K	1612	22	17	1015	494	305
ISS-L	1337	27	22	1089	35	28

NON ISS AREAS (EXCAVATION ONLY)

AREA LABEL	TOTAL AREA (sq. ft.)	DEPTH (ft.)	AREA INSIDE SOUTH BUILDING (SQ. FT)
ISS-A	603	4	0
ISS-M	594	5	594
ISS-E1	1496	5	1496

SOUTH BUILDING GROUND IMPROVEMENT

Remaining Area	Area (SF)	Depth (FT)*	El + of Bearing Layer	Volume (CY)
Area 1	5,279	20	-6	3,910
Area 2	3,837	15	1	2,132
ISS-E1	1,496	20	-6	1,108

*The depth of ground improvement is an estimated average depth based on the top of rock elevations which vary. Depth assumes the top 5 feet of existing material is removed during the pre-iss excavation.

The volumes calculated in the remaining areas include a five foot offset from the building line

North Building

Section	Area (SF)	Depth (FT)	EL + of Bearing Layer	Volume (CY)
Area 3	6,387	20.0	-6.0	4,731
Area 4	7,511	25.0	-11.0	6,955
Area 5	4,181	15.0	-1.0	2,323

The areas calculated in the north building include a five foot offset from the building line to the east, west ind south

NOTE:
CONTRACTOR SHOULD ESTIMATE ±20% MORE VOLUME FOR SOIL OVER MIXING

REFERENCE:
1. SITE AND PROPOSED BUILDING LAYOUT TAKEN FROM "ALTERNATIVE ANALYSIS REPORT" PREPARED BY ARCADIC DESIGN AND CONSULTANCY.
2. BASE MAP IS A COMPOSITE PROVIDED BY THE CLIENT AND PREPARED BY CMX, MANALPAN, NJ DATED 2009.
3. SESI DRAFT REMEDIAL ACTION WORK PLAN DATED JULY 2024

NOT FOR CONSTRUCTION - FOR PRELIMINARY BID PURPOSES ONLY

SCALE: 1"=80'
0 80 160

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.

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS

dwg by: AW
chk by: JR
scale: AS NOTED
date: 09/06/2024

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
333 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.8999

project: PROPOSED RESIDENTIAL DEVELOPMENT
OSSINING DPW SITE
OSSINING, NY

title: PROPOSED ISS AND SOIL MIXING PLAN (FOR PRICING)

job no: 11498
drawing no:

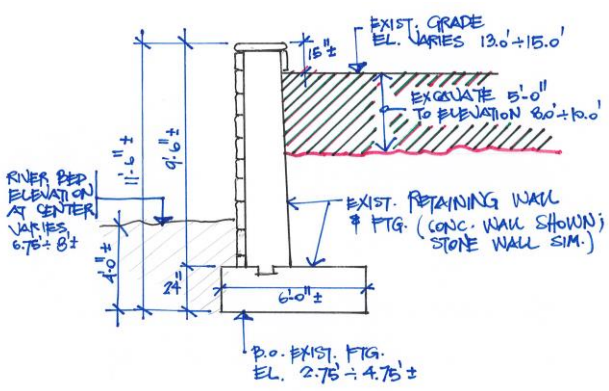
GIP-1

1 of 1

N:\ACAD\11498\CAD\11498 – PROPOSED ISS AND MIXING PLAN FOR PRICING.8.7.24.DWG 09/06/24 02:47:13PM, dan.ward, LAYOUT:PRO ISS

GRIFFON CONSTRUCTION LLC
480 Bedford Road, Chappaqua, NY 10514

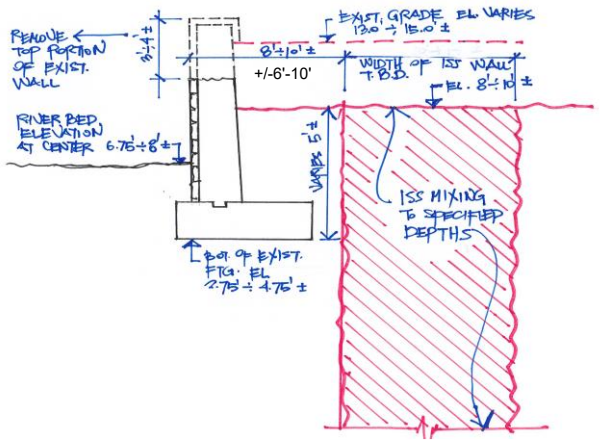
Date: **10.08.2024**
Job: **30 Water Street, Ossining, NY**
Subject: **ISS & SOUTH RECON WALLS - CONSTRUCTION SEQUENCE**



STEP 1

A. Install a temporary stream diversion system, consisting of (2) 60" diamater pipes tied down using cables and thrust blocks, or other means, as selected by contractor. (Not shown)

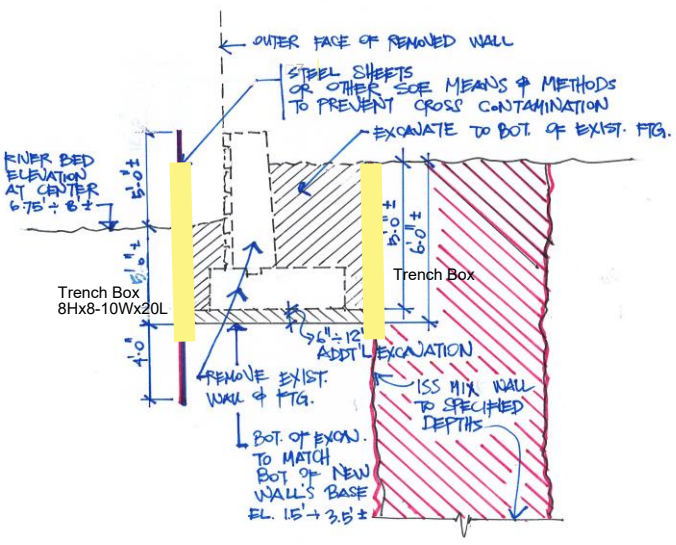
B. Excavate 5' from existing grade *immediately before a cell is going to be mixed* in the entire South area. Load and remove off site all excavated material. *This will allow the crew to work on top of clean material* Remove any existing foundations and obstructions located within the 5' depth. Site will be brought down to elevation 8.0' to 10.0'. All excavated material will be shipped to permitted facilities.



STEP 2

A. Remove the top 3' to 4' portion of the existing wall. *(We may opt to leave the wall intact until the adjacent cell is going to be mixed)*

B. ISS a strip parallel to the existing wall, starting approx 6 to 10' away from the river side face of wall, clearing the existing wall footing. *The cell adjacent to the river may be moed laterally in order to allow for a level work platform.* ISS shall be performed using bucket mixing to the full remediation depth as specified in the approved RAWP.



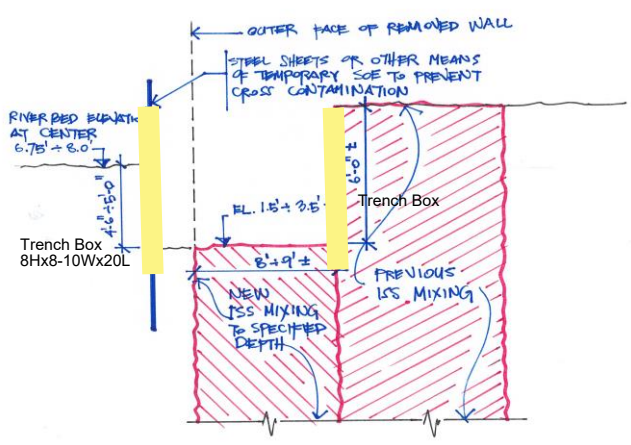
STEP 3

A. Install temporary steel *trench box 8Hx8-10Wx20L with plates on the open ends* on the river side of existing wall to retain existing soil while removing the wall and prevent any cross contamination onto the river bed.

B. Excavate the portion of existing soil between the ISS and the wall and remove for disposal.

C. Remove existing wall and footing and provide additional excavation as needed to the bottom elevation of the new wall footing base. This elevation varies from 1.5' to 3.5'.

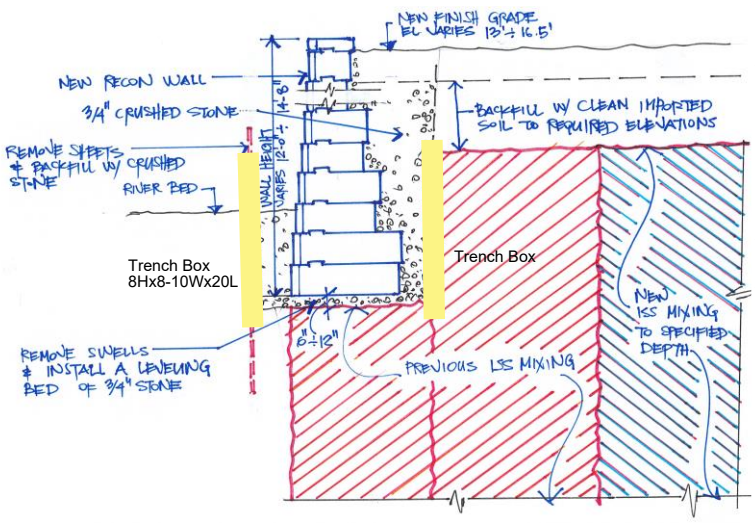
D. Coordinate temp SOE installation, excavation & removal of wall with the ISS remediation explained in Step 4. These tasks can be performed in sections along the length of the wall, in order to have a better control of dewatering of both groundwater and rainwater.



STEP 4

A. Upon removal of existing wall footing perform ISS mixing from the bottom elevation of the new wall base (elevation 1.5' to 3.5') to the remediation depth, as specified in the approved RAWP. The sequencing of this work to be coordinated with the work described in Steps 3 and 5.

B. Observe the exposed monolith after excavation and prior to Retaining Wall installation and grout/patch where necessary.



STEP 5

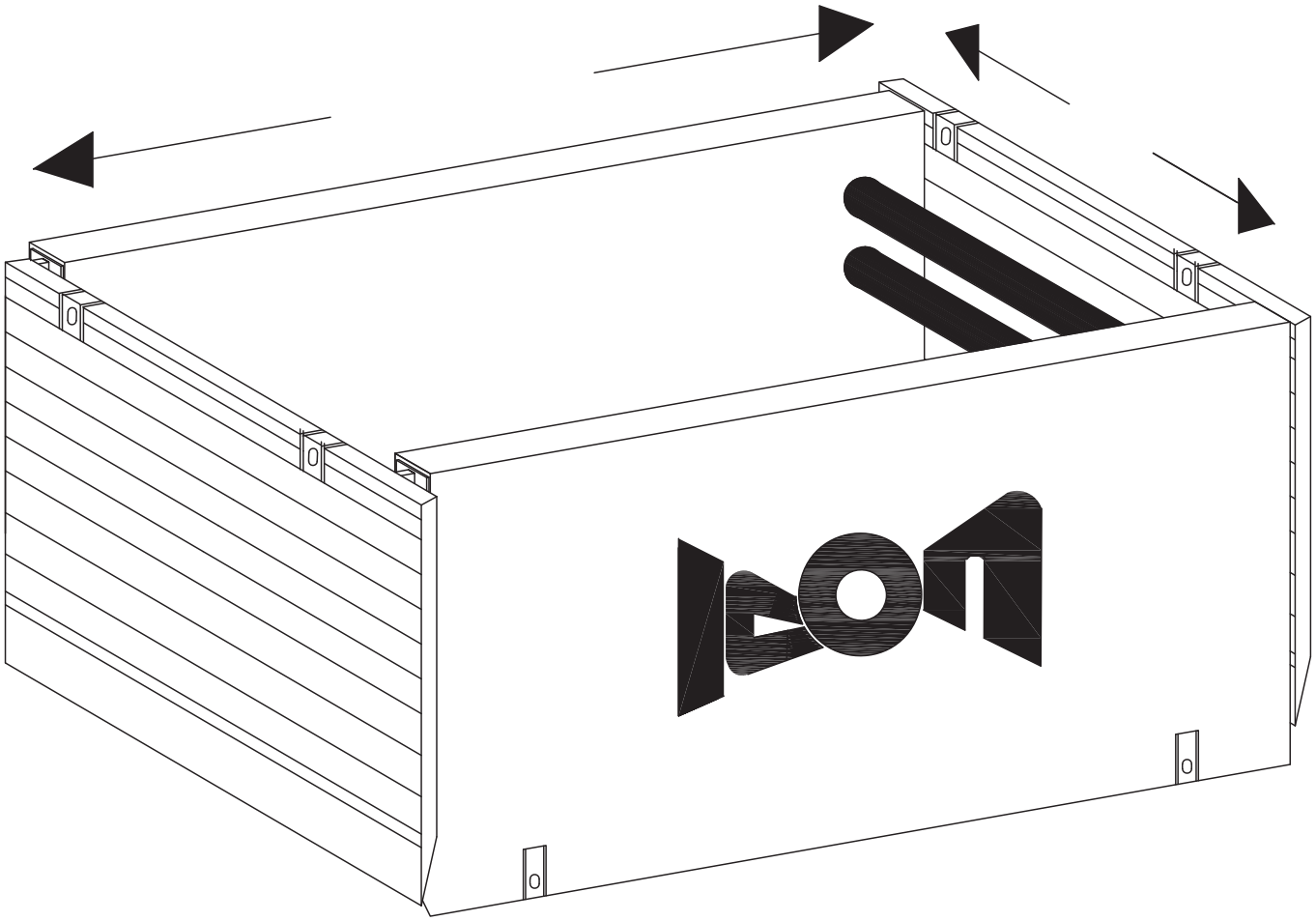
A. Remove ISS swells and install a 6" to 12" thick leveling layer of 3/4" compacted crushed stone below new retaining wall base block.

B. Install new Recon Wall blocks per heights and elevations specified on the Retaining Wall drawings. This can accur upon curing of the ISS to a compressive strength and swell stabilization acceptable to the geo-structural engineer. Cylinders will be collected for compressive strength to confirm an acceptable minimum PSI is obtained prior to base block installation. Wall installation shall be performed in altered sections and in such way that the ISS cells extend beyond the limits of the new retaining wall construction. Wall construction shall not start until at least 3 ISS cells are complete. Top of new wall elevation varies from 14.33' to 16.99' for the Wall Type #1.

C. Install a continuous drain tile and 3/4" crushed stone drainage fill full height behind the wall and in the front up to the river bed elevation and remove the steel sheets or other temporary SOE material.

D. Perform ISS remediation on the rest of the areas to the depth specified on approved RAWP and remove swells after swelling has stopped.

E. Install a layer of compacted clean fill followed by a 12" thick layer of crushed stone within building footprint to the required elevations. Install a cap over the MGP areas outside the building footprint, consisting of a 24" thick minimum layer of clean soil over a demarcation sheet. Depth of fill shall be in accordance with the finish grades and thickness of paving assemblies.



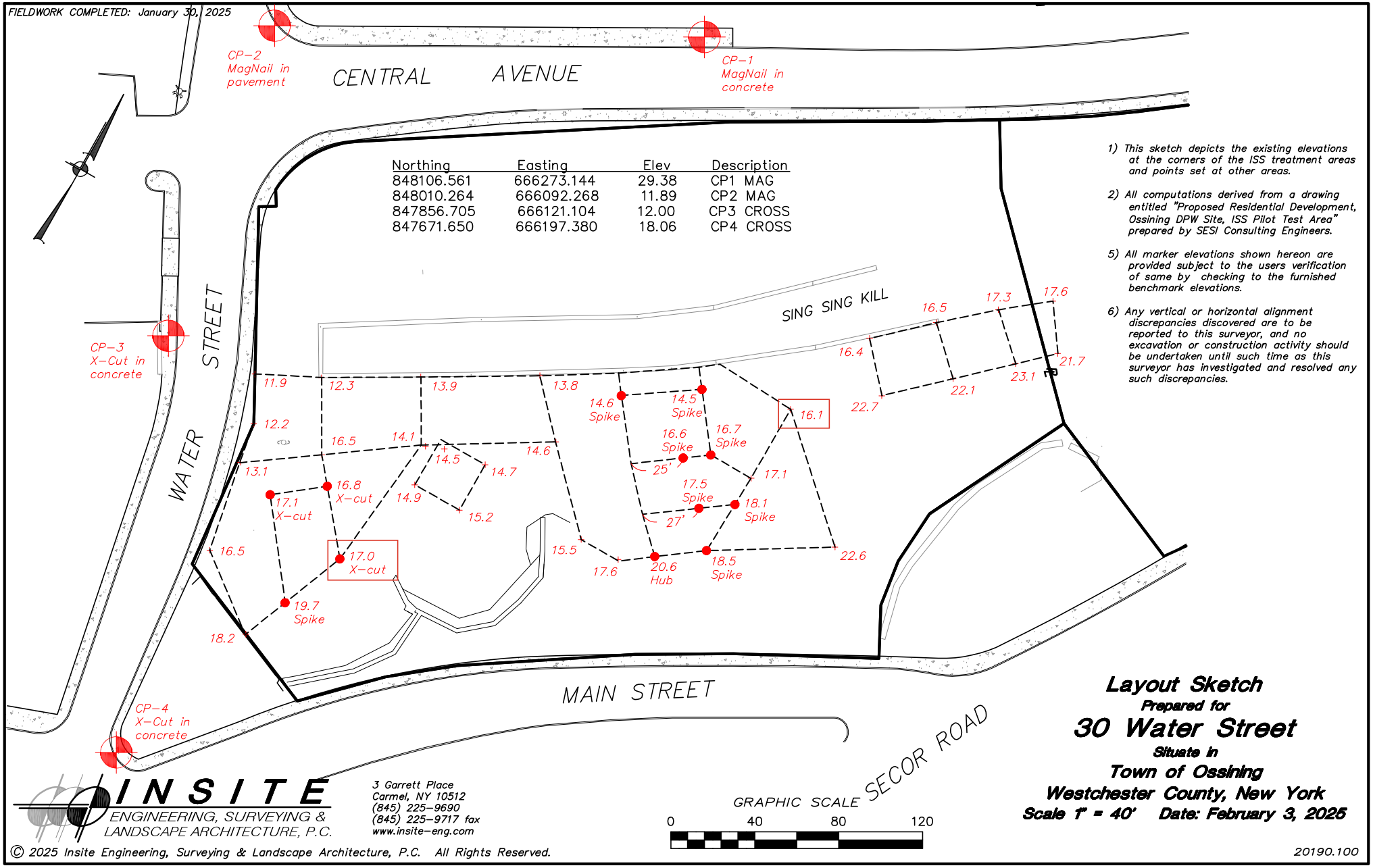
8' H Trench Box, Both Ends Closed w/SR Panels

ICON EQUIPMENT DISTRIBUTORS INC.
300 RYDERS LANE, EAST BRUNSWICK, NJ 08816
Ph: (800) 836-5011, Fax: (732) 254-0101

Appendix H:

Existing Grade Survey (InSite)

FIELDWORK COMPLETED: January 30, 2025



Northing	Easting	Elev	Description
848106.561	666273.144	29.38	CP1 MAG
848010.264	666092.268	11.89	CP2 MAG
847856.705	666121.104	12.00	CP3 CROSS
847671.650	666197.380	18.06	CP4 CROSS

1) This sketch depicts the existing elevations at the corners of the ISS treatment areas and points set at other areas.

2) All computations derived from a drawing entitled "Proposed Residential Development, Ossining DPW Site, ISS Pilot Test Area" prepared by SESI Consulting Engineers.

5) All marker elevations shown hereon are provided subject to the users verification of same by checking to the furnished benchmark elevations.

6) Any vertical or horizontal alignment discrepancies discovered are to be reported to this surveyor, and no excavation or construction activity should be undertaken until such time as this surveyor has investigated and resolved any such discrepancies.

GRAPHIC SCALE
0 40 80 120

Layout Sketch
Prepared for
30 Water Street
Situate in
Town of Ossining
Westchester County, New York
Scale 1" = 40' Date: February 3, 2025

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place
Carmel, NY 10512
(845) 225-9690
(845) 225-9717 fax
www.insite-eng.com

© 2025 Insite Engineering, Surveying & Landscape Architecture, P.C. All Rights Reserved.

20190.100