

July 2022 Cedar Street Works Former MGP Site



Pre-Design Investigation Work Plan

Prepared for Consolidated Edison of New York, Inc.

July 2022 Cedar Street Works Former MGP Site

Pre-Design Investigation Work Plan

Prepared for

Consolidated Edison Company of New York, Inc. 3101 20th Avenue, Building 136, 2nd Floor Long Island City, New York 11105

Prepared by

Anchor QEA Engineering, PLLC 290 Elwood Davis Road, Suite 340 Liverpool, NY 13088

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ABBREVIATIONS

Anchor QEA Anchor QEA Engineering, PLLC

BTEX benzene, toluene, ethylbenzene, and xylene

Con Edison Consolidated Edison Company of New York, Inc.

Decision Document Decision Document: CE-Cedar St MGP New Rochelle State Superfund Project

New Rochelle, Westchester County; Site No. 360173

DER-10: Technical Guidance for Site Investigation and Remediation

DNAPL dense nonaqueous phase liquid
DOT U.S. Department of Transportation

EC Electrical Conductivity Tool

bgs below ground surface
HPT Hydraulic Profiling Tool
MGP manufactured gas plant
NAPL nonaqueous phase liquid

NYSDEC New York State Department of Environmental Conservation

OIP-G Optical Image Profiler

PAH polycyclic aromatic hydrocarbon

PD pre-design

PDI pre-design investigation

PDI Report Pre-Design Investigation Report
PDI Work Plan Pre-Design Investigation Work Plan
PPE personal protective equipment

Property New Rochelle Toyota Dealership Property at 47 Cedar Street

RI Remedial Investigation

RI Report Remedial Investigation of the Cedar Street Works Former MGP Site

Site Cedar Street Works former manufactured gas plant

SOP Standard Operating Procedure

1 Introduction

On behalf of the Consolidated Edison Company of New York, Inc. (Con Edison), Anchor QEA Engineering, PLLC (Anchor QEA) has prepared this *Pre-Design Investigation Work Plan* (PDI Work Plan) outlining investigations to be conducted at the Cedar Street Works former manufactured gas plant (MGP) (Site) located in New Rochelle, New York (Figure 1-1). This PDI Work Plan was prepared as a follow-up to the October 2020 *Decision Document: CE-Cedar St MGP New Rochelle State Superfund Project New Rochelle, Westchester County; Site No. 360173* (Decision Document; NYSDEC 2020), which presented the selected remedy for the Site.

1.1 Purpose

The July 2017 Remedial Investigation of the Cedar Street Works Former MGP Site (RI Report; URS 2017) documented the extent of impacts related to past operations at the Site. Field investigation activities were conducted on and around the Site from October 2013 through April 2014 pursuant to Voluntary Cleanup Agreement Index No. D2-0003-0208 (VCA) between the New York State Department of Environmental Conservation (NYSDEC) and Con Edison.

NYSDEC terminated its Voluntary Cleanup Program in March 2018 and on July 25, 2018, Multi-Site VCP Transition Order on Consent and Administrative Settlement Index No. CO 0-20180516-519 (Order) referencing Con Edison as the Respondent was issued by NYSDEC. The Order governs (among other things) the completion of investigation and remediation of by-products, residuals or wastes associated with past MGP operations at several sites listed in the Order, including the Cedar Street MGP Site.

This PDI Work Plan was prepared to confirm whether conditions have changed since completion of the Remedial Investigation (RI) fieldwork and to inform the remedial design following guidelines outlined in NYSDEC's *DER-10*: *Technical Guidance for Site Investigation and Remediation* (DER-10; NYSDEC 2010). The pre-design investigation (PDI) objectives are as follows:

- Confirm the areas containing recoverable nonagueous phase liquid (NAPL).
- Verify the current condition of existing on-site monitoring wells.
- Identify locations for the placement of new NAPL recovery wells to optimize the removal of coal tar NAPL from the subsurface.

1.2 Site Background

The Site is in a mixed-use area of New Rochelle, New York. The location of the former MGP is situated within Cedar Street and the parcel designated as Section 1, Block 247, Lot 15 (hereafter referred to as the "Property") on the Tax Map of the City of New Rochelle, County of Westchester (Figure 1-1). Figure 1-2 shows the locations of the former coal gas manufacturing facilities.

The Property has a street address of 47 Cedar Street¹ and is located on the west side of Cedar Street, with Radisson Plaza to the south, River Street to the east, and Spring Street to the north. The Property is currently owned by the Donnybrook Realty Corporation and includes a three-story showroom/office space with an attached one-story automotive service area. The footprint of the building is approximately 24,000 square feet. The automotive service area is situated in the northeast portion of the Property. Figure 1-2 illustrates the buildings that presently occupy the Property and the approximate locations of the former MGP structures located on it and adjacent areas. The locations of samples collected during previous investigations at the Site are shown on Figure 1-3.

Most of the Property is paved and is used for vehicle inventory and maintenance activities. There are grass-covered areas along the sidewalk perimeter surrounding the Property, which are maintained as lawn and landscaped areas. The surface of the paved areas is generally sloped toward the southeast. A retaining wall is located along the perimeter of the Property (along Spring Street and River Street).

1.3 Site History

Historical operations at the Site are summarized in Table 1-1, which provides an overview of Site history, operations, and ownership, based on information presented in the RI Report (URS 2017), unless noted otherwise.

Table 1-1
Site History and Operations

Years	Property Owner	Property Use
1863–1888	New Rochelle Gas Light Company	MGP-Coal Carbonization
1888–1895	New Rochelle Gas Light Co.	MGP–Carbureted Water Gas (beginning in 1890)
1896–1899	New Rochelle Gas and Fuel Company (operated by the American Gas Company of Philadelphia) ¹	MGP–Carbureted Water Gas
1899–1900	NY Suburban Gas Co.	MGP–Carbureted Water Gas
1900–1911	Westchester Lighting Co.	MGP–Carbureted Water Gas
1911–1951	Westchester Lighting Co.	Gas Storage
1951–1953	Con Edison	Gas Storage
1953–1992	R.E.C. Realty Corporation	Transportation (PS Trucking Company); Automotive Sales; and Repair
1992-present	Donnybrook Realty Corp.	Automotive Sales and Repair

Note

1. Based on review of Sanborn Fire Insurance Maps provided in the RI Report (URS 2017) and based on the February 11, 1895 edition of The American Gas Light Journal, in 1895, the gas works was noted as owned and operated by the American Gas Works of Philadelphia.

¹ According to the May 2018 New Rochelle Tax Database (New Rochelle 2018), the Property address is listed as 2 Radisson Plaza.

The actual start of gas production at the Site is unknown but likely started after the incorporation of the New Rochelle Gas Light Company in 1863. By 1867, the gas works appeared on a New Rochelle Atlas map (Beers 1867). Gas production at the Site ceased in approximately 1911, at which point the Site was converted to a gas storage and distribution facility.

Detailed information regarding the decommissioning and/or removal of former MGP subsurface structures is not available. Based on review of the Sanborn maps included in the RI Report (URS 2017), most of the MGP-related structures had been removed by 1951, with only the former repair shop and a portion of the purifier building remaining.

1.4 Site Geology

The overburden materials beneath the Site are heterogeneous, resulting from anthropogenic and geologic processes. Overburden strata, in descending order from the ground surface, consist of historic fill material² and glacial deposits, which are underlain by weathered and competent bedrock. The character and depositional history of these strata are briefly described as follows.

Historic fill materials are present at the ground surface or immediately beneath a thin layer of topsoil, concrete, or asphalt. The historic fill unit is generally 5 to 10 feet thick but increases within former gas holder foundations, where it reaches a maximum depth of 25 feet. The historic fill consists of sand, gravel, rock, and brick fragments and other anthropogenic materials.

Glacial deposits comprising stratified layers of sands and silt of varying textures are present beneath the fill unit throughout the investigation area, except for within the former gas holders, where fill extends to the underlying weathered bedrock. This unit of glacial deposits is generally 5 to 15 feet thick, with a maximum thickness of approximately 20 feet. A laterally isolated sand and gravel unit was also identified overlying a thin layer of silt and clay immediately above bedrock. These units were less than 8 feet thick, laterally discontinuous, and only observed near the former south gas holder.

Weathered bedrock described in the RI Report (URS 2017) as decomposed schist containing micas, hornblende, quartz, and feldspars was identified beneath the overburden or was interpreted based on sampling refusal at depths interpreted between 7 feet and 25 feet below ground surface (bgs). The weathered bedrock zone contains interbedded silt and sand and is interpreted to range from less than 1 foot thick to approximately 7 feet thick across the investigation area. Some of the

² "Historic fill material" is defined in DER-10 (NYSDEC 2010) as "non-indigenous or non-native material, historically deposited or disposed in the general area of, or on, a site to create useable land by filling water bodies, wetlands, or topographic depressions, which is in no way connected with the subsequent operations at the location of the emplacement, and which was contaminated prior to emplacement. Historic fill may be solid waste, including, but not limited to, coal ash, wood ash, municipal solid waste incinerator ash, construction and demolition debris, dredged sediments, railroad ballast, and refuse and land clearing debris, which was used prior to October 10, 1962."

weathered bedrock may have been excavated to achieve required depths during gas holder construction.

The underlying bedrock in the region is mapped as the Cambrian to Ordovician age Hartland Formation, which is described as a basal amphibolite overlain by Pelitic schists (Fisher et al. 1970). Mineralogical composition of the bedrock on the Site is similar to the weathered bedrock zone. The bedrock was characterized as interlayered and generally banded schist and gneiss and had occasional granitic gneiss sequences across the investigation area. Fractures were commonly observed within the bedrock unit from near horizontal orientation to very high angle orientations.

An estimated top of bedrock elevation contour map is provided on Figure 1-4. As shown on that figure, a bedrock ridge appears to transect the Site and trends generally north—south in the east-central portion of the Property. From that area, the bedrock surface slopes toward the east and southeast toward River Street. Relative bedrock lows were identified near the former north and south gas holders.

1.5 Site Hydrogeology

The primary hydrogeologic unit identified beneath the Site is the upper glacial aquifer that is hydraulically connected to the underlying bedrock aquifer. Groundwater within the bedrock does not appear to be representative of a confined condition to the depths that have been investigated. Although the NYSDEC classification of groundwater at the Site is "GA," which is compared to standards for protection of groundwater drinking water sources (NYSDEC 1998), the groundwater within the overburden is present in unconfined conditions and is not used for potable purposes in the New Rochelle Metropolitan area.

The water table surface is present at depths between approximately 4.5 and 14.5 feet bgs, depending on the well location and seasonal fluctuations. In general, groundwater flow appears to be in an easterly to northeasterly direction; however, groundwater flow across the Site is also influenced by the bedrock ridge running north/south in the northeast portion of the Site. The saturated thickness of the overburden across most of the Site is around 10 feet; however, the bedrock surface rises above the water table in some portions of the property. The retaining wall located along the perimeter of the property (along Spring Street and River Street) may also be locally influencing groundwater flow; however, the retaining wall's depth and extent of influence is unknown.

There are no surface water features running through or adjacent to the Site. The nearest surface waterbody to the Site is Echo Bay on Long Island Sound, which, at its nearest point, is approximately 1,700 feet southeast of the Site. Surface water at the Site runs off the Site to the southeast via sheet flow.

1.6 Nature and Extent of Impacted Media

In general, the primary MGP-related byproduct responsible for most of the impacts at a former MGP site is coal tar, which generally appears as a dense nonaqueous phase liquid (DNAPL). DNAPL is heavier than water and tends to sink below the water table if released in sufficient quantities. Depending on the type of gas manufacturing processes employed, coal tar DNAPL may be only slightly denser (and slightly more viscous) than water or may appear more solid when exposed to ambient air and highly viscous (USEPA 1998). Because the former MGP operations at this Site included both coal carbonization as well as carbureted water gas methods, the coal tar physical characteristics appear to vary across the Site.

Coal tar comprises many organic compounds that are regulated by NYSDEC. Based on historical observations, the subsurface soil and groundwater contain concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs) and cyanide. PAHs are a subgroup of semivolatile organic compounds that consists of approximately 17 commonly recognized multi-ringed, aromatic compounds. These compounds are typically associated with coal tar NAPL from former MGP operations (USEPA 1998). These compounds, in addition to NAPLs, are useful in characterizing the nature and extent of MGP-related impacts. Therefore, soils containing visual indications of coal tar as well as groundwater and subsurface soils containing BTEX and PAHs above NYSDEC standards, criteria, and guidelines have been identified as the constituents of concern for the Site.

NAPL observed in the ground beneath the Site is primarily coal tar DNAPL. In addition, petroleum-related NAPLs (predominately light NAPL) are present at the Site and in conjunction with the automotive repair shop operations. As indicated on Figure 1-5, DNAPL has generally been observed in disconnected locations within overburden materials at depths between 17 and 35 feet bgs. Coal tar DNAPL was primarily observed adjacent to or downgradient of the former north and south gas holders.

In general, the distribution of NAPL appears to be limited in extent and quantity across the Site and the NAPL associated with the former MGP operations is presumed to be predominately a DNAPL. DNAPL was not observed to be accumulating in any monitoring wells during the RI groundwater level gauging events.

1.7 Work Plan Organization

This PDI Work Plan is organized as detailed in Table 1-2.

Table 1-2 Work Plan Organization

Section	Description
1: Introduction	Presents the purpose and objectives of the PDI Work Plan and summarizes the Site background and history, including the nature and extent of contamination observed to date
2: Pre-Design Investigation Scope of Work	Summarizes the proposed investigation activities
3: Reporting	Describes the anticipated content and format of the PDI Report
4: Project Schedule	Provides a proposed schedule for PDI Work Plan implementation
5: References	Identifies the references, including reports, guidance documents, and other literature, used in preparation of this PDI Work Plan

This PDI Work Plan is supported by attached figures and in-text and attached tables, as detailed in the table of contents, and by the following appendices:

- Appendix A: Quality Assurance Project Plan
- Appendix B: Health and Safety Plan
- Appendix C: Community Air Monitoring Plan
- Appendix D: Standard Operating Procedures

2 Pre-Design Investigation Scope of Work

The objective of this PDI Work Plan is to collect the data necessary to further inform the remedy selected in the October 2020 Decision Document (NYSDEC 2020). The activities described in this work plan will inform the remedial design and provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the selected remedy. All field investigations will be performed and documented following procedures outlined in Anchor QEA's project-specific Quality Assurance Project Plan (QAPP; see Appendix A), Health and Safety Plan (HASP; see Appendix B), Community Air Monitoring Plan (CAMP; see Appendix C) and Standard Operating Procedures (SOPs) provided in Appendix D.

2.1 Evaluation of Existing Monitoring Wells

A total of 21 monitoring wells have been installed at the Site during prior field investigations, including the following:

- Three temporary monitoring wells (MW-T1 through MW-T3) were installed as part of an initial groundwater investigation conducted in 1992. These monitoring wells are no longer believed to be present at the Site.
- Eight monitoring wells (MW-01 through MW-06 and overburden/bedrock well pair MW-07A and MW-07B) were installed during a site characterization field program conducted in 2008 and 2009.
- Ten monitoring wells were installed during the remedial field investigation that was conducted in 2013 and 2014. Five of these monitoring wells (MW-08A, MW-09, MW-10, MW-11A, and MW-12A) were shallow overburden monitoring wells, and the remaining five monitoring wells (MW-02B, MW-03B, MW-08B, MW-11B, and MW-12B) were installed in bedrock adjacent to new or existing overburden monitoring wells.

The construction specifications for the 18 monitoring wells that are currently believed to be present at the Site are presented in Table 2-1. These wells, last utilized in July 2014, will be inspected and repaired (if needed for future monitoring or NAPL recovery purposes) as described in Sections 2.1.1 and 2.1.2.

2.1.1 Monitoring Well Inspection

Each of the existing monitoring wells will be inventoried and evaluated in accordance with the procedures discussed in SOP 002: Monitoring Well Assessment (Appendix D). The condition of each well will be examined to confirm its integrity and usability. Well depths measured in the field will be compared to well construction depths listed in Table 2-1 to determine if any sediment accumulation has occurred to a degree that could limit the usability of the well.

All monitoring wells will also be checked using an oil/water interface probe. The depth to groundwater, along with the presence and any measurable thickness of NAPL, will be recorded. Any NAPL measured during the well inspections greater than 0.5 feet in thickness will be manually removed. The wells will then be rechecked during the subsequent well maintenance and soil boring activities to determine if sufficient NAPL has returned to the well to perform NAPL recovery (discussed in Section 2.3).

2.1.2 Monitoring Well Maintenance

After all monitoring wells have been inspected and the field measurement compared to the construction specifications, it will be determined if any maintenance is needed. Minor monitoring well repairs may include repairs or replacement of well caps and/or lids, bolts, and/or locks. Monitoring wells may be recommended for re-survey if a significant discrepancy (i.e., greater than 1 inch) between the listed and measured distance from the ground surface to the measuring point is observed. If significant sediment accumulation is found in any of the wells (i.e., to the point that more than 1 foot of the screen interval is blocked), the monitoring well will be redeveloped as outlined in SOP 009: Monitoring Well Installation and Development (Appendix D).

Monitoring wells that are found to be damaged to the point that they are unusable will be recommended for decommissioning and/or replacement as part of the remedial action. These locations will also be considered as potential locations for contingency soil borings as discussed in Section 2.2.

2.2 Subsurface Soil Investigation

Up to ten soil borings will be advanced, including nine proposed soil borings at locations selected based on observations made during past investigations or to assess potential data gaps at low points in the bedrock surface where DNAPL could accumulate. These locations are illustrated on Figure 2-1. Additional contingency borings may also be installed to evaluate any NAPL observations that may be made during the well inspections or soil boring investigations. These contingency boring locations, if drilled, would be selected during the proposed investigations and discussed with the NYSDEC project manager or field representative prior to installation. All borings will extend approximately 1 to 2 feet into the weathered top of bedrock.

Borings will be installed utilizing sonic drilling methods, as described in SOP 007: Sonic Drilling and Soil Sampling (Appendix D). This drilling method will ensure that borings will be able to extend past the cobbly fill noted in the subsurface on portions of the Site and will also allow penetration into the weathered top of bedrock. Borings are planned to terminate within the weathered bedrock unless monitoring wells installed in bedrock are found to require replacement or if NAPL observations made at the top of bedrock indicate the need to delineate deeper into bedrock. In those situations, bedrock coring will be performed as outlined in SOP 008: Bedrock Core Drilling and Sampling

(Appendix D). All completed boreholes, if not used for installation of replacement or temporary monitoring wells, will be backfilled with a cement/bentonite grout.

Target penetration for field screening locations is the top of bedrock. Locations that encounter refusal that are not believed to be associated with bedrock will be grouted and re-attempted by shifting the drill rig. If refusal is encountered again at a depth shallower than bedrock, the deeper of the two attempts will be used for decision making, and/or direct imaging will not be utilized for that boring location.

2.2.1 Temporary Monitoring Wells

Temporary monitoring wells may be installed at any of the new soil boring locations if NAPL is observed in sufficient quantities such that NAPL recovery may be possible. These wells will be utilized to evaluate the feasibility of NAPL recovery.

Temporary monitoring wells will be installed utilizing similar procedures to standard monitoring wells as outlined in SOP 009: Monitoring Well Installation and Development (Appendix D). The wells will be constructed of two- or four-inch inside diameter Schedule 40 PVC, including a one-foot DNAPL accumulation sump, ten feet of 0.010 slot screen, and solid well casing extending to the ground surface. The annulus around the well screen will be filled with #O filter sand to two feet above the screened interval. A two-foot bentonite seal will be placed above the filter pack and the remaining annulus will be filled with a Portland cement/bentonite grout to the land surface. The wells will be completed at the surface with either a flushmount cover or a "stick-up" protective casing, depending on field conditions. Well construction information will be recorded in the field logbook and included on the boring logs. Any installed temporary monitoring well will be surveyed by a licensed New York surveyor to record horizontal and vertical position.

2.3 NAPL Recovery Testing

NAPL recovery testing will be performed to determine whether NAPL is entering wells and the rate at which it is occurring. This information will aid in later remedial design of NAPL recovery wells as part of the remedial program for the Site. NAPL recovery testing will be performed in any existing monitoring well where sufficient NAPL is present to conduct such testing (i.e., any NAPL that has a measurable thickness of 0.5 feet or greater with the potential to be removed by peristaltic pump or manual bailer) and temporary wells installed during this PDI. Trace amounts of NAPL in the form of sheens, blebs, or less than 0.5 feet in thickness will be considered for removal via absorbent material suspended within the monitoring well.

NAPL baildown testing will be performed as outlined in SOP 003: NAPL Recovery Testing (Appendix D). The duration of testing will last no more than 3 days per location, with NAPL initially monitored and removed at the following intervals:

- Day One: NAPL monitoring/removal intervals hourly
- Day Two: NAPL monitoring/removal every 2 hours
- Day Three: NAPL monitoring/removal every 4 hours

The time intervals of NAPL removal and recovery may be increased or decreased based on field observations. The recovery testing will also incorporate extended overnight recovery periods between days. NAPL baildown testing may be terminated in less than 3 days if data obtained supports calculation of a NAPL recovery rate for a given location.

Following completion of the NAPL recovery testing, a short-term NAPL monitoring and recovery evaluation will be performed utilizing existing wells found to contain NAPL and any new temporary monitoring wells installed as part of the subsurface soil investigation (all newly installed temporary monitoring wells will be monitored, regardless of prior NAPL observations, to assess potential delay in NAPL entering the wells). NAPL monitoring will be performed on a weekly basis for 1 month to identify locations where a continual source of NAPL is present. NAPL will be manually removed from any wells that are found to have a NAPL thickness greater than 1 foot following the procedures outlined in SOP 004: NAPL Monitoring and Removal (Appendix D). At locations with less than 1 foot of NAPL accumulation, manual removal will be attempted during the initial event followed by removal via sorbent material to be checked on the same frequency.

All NAPL and groundwater removed as well as personal protective equipment (PPE) generated will be containerized, as discussed in Section 2.6. Prior to waste disposal, waste characterization sampling will be conducted to determine the proper shipping and disposal requirements.

2.4 Survey

Following the completion of the soil borings and installation of any temporary monitoring wells and/or replacement monitoring wells, locations will be marked with flagging and/or paint to identify as a completed investigation location. Once all field activities have been completed, a licensed surveyor will survey the as-built locations for all completed soil borings and installed monitoring wells. At each as-built location, the surveyor will record the latitude, longitude, and ground surface elevation in the project datum. For existing monitoring wells, the reference elevation on the well casing may also be resurveyed if a potential discrepancy is noted during the monitoring well inspections.

2.5 Investigation-Derived Wastes

Liquid and solid wastes will be generated as part of the Site investigation. Liquid waste will be containerized in steel, 55-gallon, open-top, U.S. Department of Transportation (DOT)-approved drums. Liquid waste will generally consist of purged groundwater and decontamination water, as well as NAPL removed during recovery testing or routine monitoring events. The liquid waste will be separated into aqueous and nonaqueous containers to the extent practicable. All liquid waste drums will be properly sealed and labeled to identify their contents.

Solid waste will consist of excess soil generated during soil boring activities and used PPE such as gloves and plastic bags that were utilized during investigative activities. The solid waste will be separated into soil and PPE wastes; both will be containerized in steel, 55-gallon, open-top, DOT-approved drums. The drums will be properly sealed and labeled to identify their contents.

As drums are generated on the Site during these investigations, waste characterization samples will be collected. The results of the waste characterization will be used to properly profile and manifest the waste for disposal. While awaiting disposal, drums will be properly stored on the Site. SOP 011: Investigation-Derived Waste (Appendix D) provides additional details on management of investigation-derived wastes.

3 Reporting

During PDI fieldwork, CAMP data including a Site Figure depicting daily work zones and locations of CAMP monitoring stations will be provided via email to the NYSDEC and the DOH Project Managers on a daily basis. CAMP exceedances and corrective measures taken will be reported to the NYSDEC and NYSDOH Project Managers within one business day.

Following completion of the PDI fieldwork, a Pre-Design Investigation Report (PDI Report) will be prepared. The PDI Report will present the following information:

- A description of the PDI field activities conducted, including any modifications to or deviations from the planned activities described in this PDI Work Plan
- A summary of the results of existing monitoring well inventory and any well maintenance activities performed
- Observations recorded during the soil boring activities
- NAPL recovery test results
- Groundwater elevation and NAPL monitoring/recovery data
- Conclusions and recommendations for additional activities to be performed as part of the remedial design
- Updated project schedule

4 Project Schedule

Con Edison is prepared to initiate the fieldwork outlined in this PDI Work Plan following receipt of NYSDEC approval. It is anticipated that it will take up to 8 weeks to complete all fieldwork and monitoring activities and an additional 4 to 6 weeks to review the data obtained and prepare a summary report. The anticipated schedule for completing the pre-design activities identified in this PDI Work Plan is presented in Table 4-1, with the actual project starting date subject to NYSDEC review and approval of this PDI Work Plan.

Table 4-1
Project Schedule

Work Activity	Date	Duration
Receive NYSDEC approval of PDI Work Plan	April 2022 (estimated)	_
Monitoring well inspections/repairs	June 2022	1 week
Finalize soil boring/well replacement plan	June 2022	1 week
Soil borings/monitoring well installation	July 2022	1 week
NAPL recovery testing	July 2022	1 week
NAPL monitoring/recovery evaluation	August 2022	1 month
Data analysis and reporting	September 2022	4 weeks
Submit PDI Report	October 2022	_

It should be noted that this schedule assumes Con Edison and its contractors will be allowed to access the property (which is not owned by Con Edison) immediately following NYSDEC approval of this PDI Work Plan. If that is not the case, the start of field activities would be postponed until permission to enter the property to perform the field investigations is obtained, and the dates of completion shown above would be modified accordingly.

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Table

Figures

Appendix A Quality Assurance Project Plan

March 2022 Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570



Appendix A Quality Assurance Project Plan

Prepared for

Consolidated Edison Company of New York, Inc. 3101 20th Avenue, Building 136, 2nd Floor Long Island City, New York 11105

Prepared by

Anchor QEA Engineering, PLLC 290 Elwood Davis Road, Suite 340 Liverpool, New York 13088

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ABBREVIATIONS

Anchor QEA Anchor QEA Engineering, PLLC

ASTM ASTM International

CCV continuing calibration verification

CoC chain-of-custody
DQO data quality objective

EPA U.S. Environmental Protection Agency

FC Field Coordinator
GC gas chromatography
HASP Health and Safety Plan
MDL method detection limit
MRL method reporting limit

MS matrix spike

MSD matrix spike duplicate

NAD83 North American Datum of 1983

NAPL nonaqueous phase liquid

NAVD88 North American Vertical Datum of 1988

NIST National Institute of Standards and Technology

NYSDEC New York State Department of Environmental Conservation

PM Project Manager
QA quality assurance

QAPP Quality Assurance Project Plan

QC quality control RL reporting limit

RPD relative percent difference SDG sample delivery group

Site Cedar Street Works former manufactured gas plant

SOP Standard Operating Procedure VOC volatile organic compound

1 Introduction

1.1 Purpose

This *Quality Assurance Project Plan* (QAPP) has been prepared to specify recommended quality assurance (QA) procedures to be followed during pre-design investigation fieldwork performed at Con Edison's Cedar Street former manufactured gas plant (MGP) within Cedar Street and the parcel designated as Section 1, Block 247, Lot 15 (the parcel) on the Tax Map of the City of New Rochelle, County of Westchester (hereinafter referred to as the "Site").

1.2 Project Organization

This QAPP has been prepared by Anchor QEA Engineering, PLLC (Anchor QEA), on behalf of the Consolidated Edison Company of New York, Inc. (Con Edison). Anchor QEA is fully committed to implementing an effective QAPP program. The success of this program is based on the concept that implementation of this program is the responsibility of all project participants. Specific responsibilities have also been assigned to key project personnel for the implementation of this QAPP program.

Margaret Carrillo-Sheridan, PE, will serve as the Project Principal and engineer of record. She will be responsible for the overall technical direction and management of the project. Nicholas Smith, PG, will serve as the Project Manager (PM) responsible for allocation of technical and human resources and schedule management. The PM will provide the overall programmatic guidance to support staff and will verify that all documents, procedures, and project activities meet the objectives contained within this QAPP. The PM will also be responsible for resolving project concerns or conflicts related to technical matters with the Project Principal.

Scott Andrews will be the Field Coordinator (FC) and will be responsible for day-to-day technical and QA/quality control (QC) oversight for sample collection activities. Mr. Andrews will verify that appropriate protocols for sample collection, preservation, and holding times are observed and will submit environmental samples to the designated laboratories for chemical and physical analyses.

Jennifer Marsalla will act as the QA Manager and will provide QA oversight for both the field sampling and laboratory programs, verify that samples are documented appropriately, coordinate with the analytical laboratories, verify data quality, oversee data validation, and supervise project QA coordination and data validation. Ms. Marsalla will work with the Laboratory PM to resolve QC issues as they affect the viability of the project data, and she will work with the assigned data validators to verify that all analytical data are in conformance with the requirements of this QAPP.

Brooke Arena will serve as the Data Manager and will compile field observations and analytical data into a database, review the data for completeness and consistency, append the database with qualifiers assigned by the data validator, and verify that the data obtained are in a format suitable for inclusion in the appropriate databases.

Janice Jaeger is the Laboratory PM with ALS, which is a National Environmental Laboratory Association Program-certified laboratory. Ms. Jaeger will oversee all laboratory operations associated with the receipt of the environmental samples, chemical/physical analyses, and laboratory report preparation for this project. The Laboratory PM will review all laboratory reports and prepare case narratives describing any anomalies and exceptions that occurred during analyses.

2 Investigation and Sampling Procedures

The scope of investigations presented in this QAPP include the following:

- Subsurface utility locating and surveying
- Evaluation of existing monitoring wells, including well development
- Subsurface soil investigation
- Installation of temporary monitoring wells
- Groundwater elevation/nonaqueous phase liquid (NAPL) monitoring and NAPL recovery testing

Investigations will be conducted in accordance with the project *Health and Safety Plan* (HASP; Appendix B of the *Pre-Design Investigation Work Plan*). Samples will be analyzed according to the U.S. Environmental Protection Agency (EPA) promulgated Standard Method or ASTM International (ASTM) methods. Regardless of the method used, all preparation and analytical holding times must meet the requirements for that analytical group and as outlined in Table 1. Holding times will be calculated from the sample collection date and time. The method detection limits (MDLs) and method reporting limits (MRLs) for the analytes are laboratory specified for the project based on its most recent MDL studies. Analyte lists for soil, groundwater, and waste characterization samples are listed in Tables 2 to 4, respectively.

2.1 Utility Locating and Surveying

Pre-design investigations will be performed on the Site, primarily on paved or landscaped surfaces. Prior to any subsurface intrusive work investigation, target locations will be marked, and private and public utilities will be located to identify potential conflicts. When fieldwork has been completed, the actual locations completed will be surveyed.

2.1.1 Utility Locating

Prior to any intrusive fieldwork, utility location work will be completed to identify potential obstructions or conflicts with target locations. Site characterization target locations will be marked using white paint or flags using a handheld GPS or measured from visible landmarks. These markings will be visible to assist utility locators for public utilities who will be notified as part of the New York Dig Safe program (811). Responses from the Dig Safe notification will be documented to ensure all public utilities have been marked.

Following public utility marking, a private utility location subcontractor may mobilize to the Site to complete a geophysical survey for additional buried utilities. Tools such as ground penetrating radar, magnetometer, and pipe and cable locators will be used. The firm will focus on the proposed locations and investigate to "clear" a 5-foot radius around each proposed subsurface investigation

location, allowing for adjustments by the drilling firm in the field to ensure the drill is advanced in an area clear of subsurface utilities. Con Edison engineering groups can also conduct utility surveys using an "MScope" on a case-by-case basis and will be limited to the engineering group's availability. This tool uses the magnetic susceptibility of subsurface features such as electrical conduits, electric cables, pipes, etc.

After clearance of sample locations for public and private utilities, a confirmatory test pit or soft dig will be excavated to a minimum of 5 feet below ground surface using non-mechanical methods, such as hand auger, post-hole digger, and/or vacuum truck. The diameter of the test pit will be at least 2 inches wider than the outer diameter of the mechanized downhole drilling equipment.

Additional details regarding utility clearance procedures are provided in the project Standard Operating Procedures (SOPs) included in Appendix D of the *Pre-Design Investigation Work Plan*.

2.1.2 Surveying

Locating and mapping the investigation locations in the field prior to the start of intrusive activities will be completed using GPS methods. GPS survey tools are a standard means to identify target locations that may later be adjusted for various reasons. Minimum procedures for data acquisition, analysis, and QA to establish survey/positioning of field investigation locations will include the following:

- Proposed location coordinates will be determined in the field using GPS equipment accurate to ± 1 meter at a minimum.
- Changes in location will be reviewed with the FC and PM prior to any move/adjustment.
- Coordinates for proposed investigation locations will be identified prior to mobilization and reviewed with Con Edison and the New York State Department of Environmental Conservation (NYSDEC).
- All elevation data recorded will be in North American Vertical Datum of 1988 (NAVD88), and all horizontal coordinates will be relative to North American Datum of 1983 (NAD83), State Plane New York East.

Following completion of all site characterization fieldwork, a licensed New York surveyor will mobilize to the Site to collect position and elevation data for all investigation locations. A licensed surveyor will be used because a higher degree of horizontal and vertical control is needed for final, as-built locations. Standard land-based survey techniques will be used and minimum procedures for data acquisition will include the following:

- All elevation data recorded will be in NAVD88, and all horizontal coordinates will be relative to NAD83, State Plane New York West.
- The survey is to be performed at a horizontal accuracy of less than 1 foot.

2.2 Evaluation of Existing Monitoring Wells and Development

Each of the existing monitoring wells will be inventoried and evaluated in accordance with the procedures discussed in SOP 002: Monitoring Well Assessment (Appendix D to the *Pre-Design Investigation Work Plan*). The condition of each well will be examined to confirm its integrity and usability. Well depths measured in the field will be compared to well construction specifications to determine if any sediment accumulation has occurred, especially in relation to the well screen interval. All monitoring wells will also be checked using an oil/water interface probe. The depth to groundwater, along with the presence and any measurable thickness of NAPL, will be recorded. Any NAPL measured during the well inspections greater than 0.5 feet in thickness will be manually removed.

After all monitoring wells have been inspected and the field measurement compared to the construction specifications, it will be determined if any maintenance is needed. Minor monitoring well repairs may include repairs or replacement of well caps and/or lids, bolts, and/or locks. Monitoring wells may be recommended for re-survey if a significant discrepancy (i.e., greater than 1 inch) between the listed and measured distance from the ground surface to the measuring point is observed. If significant sediment accumulation is found in any of the wells (i.e., to the point that more than 1 foot of the screen interval is blocked), the monitoring well will be redeveloped as outlined in SOP 009: Monitoring Well Installation and Development (Appendix D to the *Pre-Design Investigation Work Plan*). Monitoring wells that are found to be damaged to the point that they are unusable will be recommended for decommissioning and/or replacement.

2.3 Subsurface Soil Investigations

Exploratory soil borings will be advanced to verify observations made during past investigations or to assess additional areas where dense nonaqueous phase liquid could accumulate. Prior to any subsurface intrusive work investigation, private and public utilities will be located to identify potential conflicts. When fieldwork has been completed, the actual locations drilled will be surveyed.

All borings will be installed by a licensed drilling contractor utilizing sonic drilling methods and will extend approximately 1 to 2 feet into the weathered top of bedrock. At each location, soil samples will be collected for visual inspection only, no analytical sampling is planned to be conducted. Upon reaching the targeted depth within the weathered bedrock zone, borings will be terminated or selected for installation of a replacement or temporary monitoring well.

All completed boreholes, if not used for installation of replacement or temporary monitoring wells, will be backfilled with a cement/bentonite grout. Soil cuttings and any disposable equipment will be containerized in 55-gallon drums for profiling and disposal.

2.3.1 Soil Investigation Equipment

The following is a general list of equipment that may be necessary for soil investigations:

- Logbook, field sampling records, and indelible ink markers
- Laboratory-grade decontamination detergents (such as Alconox or Liquinox), reagent-grade solvents, and deionized organic-free water to be used for decontaminating equipment between sampling intervals
- Squirt bottles
- Ruler and measuring tape
- Garbage bags and plastic sheeting
- Paper towels and/or wipes
- Sonic drill rig and associated equipment
- Buckets, wash basins, and scrub brushes to be used for decontaminating equipment
- Steam cleaner or hot water wash and containment pad
- Camera
- White board to include in photographs to label samples/photographs
- Knife
- Portable field instruments, including photoionization detector and GPS

Other materials and equipment may be utilized as warranted by field conditions encountered or if additional sampling activities are performed. Appropriate health and safety equipment and personal protective equipment, per the HASP, will be used.

2.4 Temporary Monitoring Well Installations and Development

Temporary monitoring wells may be installed to replace any existing wells found to be unusable during the monitoring well inspections or at new soil boring locations if field observations indicate the need for such a well.

As required, a licensed drilling contractor will install temporary monitoring wells within boreholes advanced via sonic drilling. Each well will be constructed of stainless-steel and consist of a 2-foot sump placed below the well screen and well riser pipe connected above to the ground surface. All of the well screen and riser pipe will be connected with flush-joint threads.

Following installation, each temporary monitoring well will be developed to remove any soil that settled within the recovery well during installation and fine-grained soils from the well screen filter pack. Soil cuttings and development water will be containerized in 55-gallon drums for profiling and disposal.

2.5 Groundwater Elevation/NAPL Monitoring and NAPL Recovery Testing

NAPL recovery testing will be performed as outlined in SOP 003: NAPL Recovery Testing (Appendix D to the *Pre-Design Investigation Work Plan*) to determine whether NAPL is entering wells and the rate at which it is occurring. Following completion of the NAPL recovery testing, a NAPL monitoring program will be implemented utilizing existing wells found to contain NAPL and any new temporary monitoring wells installed as part of the subsurface soil investigation (all newly installed temporary monitoring wells will be monitored, regardless of prior NAPL observations, to assess potential delay in NAPL entering the wells). NAPL monitoring will be performed on a weekly basis for 1 month.

NAPL will be manually removed from any wells that are found to have a NAPL thickness greater than 1 foot following the procedures outlined in SOP 004: NAPL Monitoring and Removal (Appendix D to the *Pre-Design Investigation Work Plan*). At locations with less than 1 foot of NAPL accumulation, manual removal will be attempted during the initial event followed by removal via sorbent material to be checked on the same frequency.

All NAPL and groundwater removed as well as personal protective equipment (PPE) generated will be containerized in 55-gallon drums for profiling and disposal. Prior to waste disposal, waste characterization sampling will be conducted to determine the proper shipping and disposal requirements.

2.6 Equipment Decontamination

Between investigation locations and prior to sample collection, all non-dedicated/non-disposable equipment (e.g., sampler barrels and field measurement equipment that contacts soil and/or groundwater) will be washed with potable water and a laboratory-grade, phosphate-free, detergent (such as Alconox). Equipment will be given a final rinse of distilled or deionized water. Larger equipment (e.g., drill-rig, drilling rods and downhole casing) may be decontaminated with a hotwater wash.

Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, 55-gallon drums, or similar containers. Equipment impacted by NAPL may be cleaned with a cleanser such as CitraSolv. Between rinses, equipment will be placed on polyethylene sheeting or aluminum foil. At no time will decontaminated equipment be placed directly on the ground. Equipment will be wrapped in polyethylene plastic or aluminum foil and stored. Waste materials generated during sampling activities will be disposed of as required.

2.7 Field Records

Field logbooks and entries will be maintained by field staff to provide a daily record of significant events, observations, and measurements during the field investigation. All entries will be signed and dated at the bottom of each page.

Information pertinent to the field investigation activities will be recorded in the logbooks. The logbooks will be bound with consecutively numbered pages. Entries in the logbook will include, at a minimum, the following information:

- Name and title of author, date and time of entry, and physical/environmental/weather conditions during field activity
- Location and purpose of activity
- Name of field contact
- Name of field crew members
- Name and organization of any site visitors
- Field observations
- Any field measurements made (e.g., water level elevation)
- References for all maps and photographs of the sampling site(s)
- Information pertaining to sample documentation, such as dates and method of sample shipments, chain-of-custody (CoC) record numbers, and overnight shipping air bill number

All original data recorded in field logbooks, sample tags, and CoC records will be written with waterproof ink. None of these accountable, serialized documents will be destroyed.

If an error is made on an accountable document assigned to one individual, that individual will make all corrections simply by crossing a single line through the error, placing the initials of the individual making the correction and date next to the crossed-out information, and entering the correct information. The erroneous information will not be erased. All field personnel will be instructed as to the proper field logging techniques for maintaining the integrity of the documentation.

2.8 General Sample Collection and Processing Procedures

Waste characterization sample collection will be conducted following these general procedures:

- Collect a grab sample of liquid or of solid waste from the approximate center of the drum.
- Place collected soil into a clean stainless-steel bowl and homogenize. If liquid, place into laboratory provided containers.
- Place the soil sample into laboratory-provided sample containers.

At a minimum, the following will be recorded in the field logbook:

Site

- Station identifications
- Date and time
- Initials of sampling personnel
- Drilling contractor company's name
- Time associated with sample collection

Soil and groundwater samples may be collected based on field observations. Any such sampling, if performed, will follow procedures described in the SOPs included in Appendix D of the *Pre-Design Investigation Work Plan*. QA samples will be collected along with any environmental samples (excluding waste characterization samples) at the frequencies summarized in Table 5 and as discussed in Section 4.1.

3 Sample Handling Procedures/Sample Custody

Sample custody procedures will be followed to verify that samples are always in the custody of a responsible person and to provide a record of those responsible for the samples. CoC begins at the time of preparation for the field activity, and the procedures apply to field sampling activities, sample shipping, laboratory analytical procedures, and data reporting. Samples are considered to be in one's custody if they are in the custodian's possession or view, in a secured location (under lock) with restricted access, or in a container that is secured with official seals such that the sample cannot be reached without breaking the seals.

3.1 Sample Custody and Shipping Requirements

CoC procedures will be followed for all samples throughout the collection, handling, and analysis process. The principal document used to track possession and transfer of samples is the CoC form. Each sample identification will be listed on an electronic or hand-written CoC form the day it is collected. All data entries will be made using indelible ink pen. Corrections will be made by drawing a single line through the error, writing in the correct information, and then dating and initialing the change. Blank lines and spaces on the CoC form will be lined-out, dated, and initialed by the individual maintaining custody.

A CoC form will accompany each shipment of samples to the analytical laboratories. Each person who has custody of the samples will verify that the samples are not left unattended unless properly secured. Copies of all CoC forms will be retained in the project files.

All samples will be shipped, couriered, or hand delivered to the analytical laboratory in a timely manner so holding times are not compromised. Samples collected on a Friday may be held until the following Monday for shipment, provided that this does not jeopardize any hold time requirements. Specific sample shipping procedures are as follows:

- Each cooler or container with the samples for analyses will be hand delivered the day of sample collection, couriered, or shipped via overnight delivery to the appropriate analytical laboratory. In the event that Saturday delivery is required, the FC will contact the analytical laboratory before 3 p.m. on Friday to verify that the laboratory is aware of the number of containers shipped and the airbill tracking numbers for those containers.
- Coolant ice will be sealed in separate plastic bags and placed in the shipping containers.
- Individual samples will be placed in a sealable plastic bag, packed to prevent breakage, and transported in a sealed ice chest or other suitable container.
- Glass jars will be separated in the shipping container by shock-absorbent material (e.g., bubble wrap) to prevent breakage.

- If the samples are transferred using a commercial shipping company, the following procedures will be followed:
 - The shipping containers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the container, and consultant's office name and address) to enable positive identification.
 - The shipping waybill number will be documented on all CoC forms accompanying the samples.
 - CoC forms will be enclosed in a plastic bag and placed inside the cooler.
 - A minimum of two signed and dated CoC seals will be placed on adjacent sides of each cooler prior to shipping.
 - Each cooler will be wrapped securely with strapping tape, labeled "Glass Fragile" and
 "This End Up," and clearly labeled with the laboratory's shipping address and the consultant's return address.

Upon transfer of sample possession to the analytical laboratory, the person transferring custody of the sample container will sign the CoC form. Upon receipt of samples at the laboratory, the person receiving the sample will sign the CoC form. The shipping container seals will be broken (if applicable), and the receiver will record the condition of the samples on a sample receipt form. CoC forms will be used internally in the laboratory to track sample handling and final disposition.

4 Quality Assurance/Quality Control

Field and laboratory activities will be conducted in such a manner that the results meet specified quality objectives and are fully defensible. Guidance for QA/QC is derived from the protocols developed for EPA SW-846, the EPA Contract Laboratory Programs (EPA 2020a, 2020b), and the cited methods.

4.1 Field Quality Control

Anchor QEA personnel will identify and label samples in a consistent manner to verify that field samples are traceable. Labels should be used in conjunction with the CoCs and this QAPP to provide all information necessary for the laboratory to conduct required analyses properly. QA samples will be collected in the field to verify project data quality objectives (DQOs) are met. Samples will be placed in appropriate containers and preserved for shipment to the laboratory in accordance with the requirements presented in Table 1.

4.1.1 Field Quality Assurance Sampling

Field QA procedures will consist of following procedures for acceptable practices for sample collection and handling. This also includes periodic and routine equipment inspection.

Field QA samples will be collected along with the environmental samples. Field QA samples are useful in identifying possible problems resulting from sample collection or sample processing in the field. The collection of QA samples includes equipment rinsate blanks, trip blanks, and field duplicates. Equipment blanks will be collected at a frequency of one per collection method per event. Trip blanks will be prepared by the laboratory and sent with the sample containers for water and soil analyses. Trip blanks are 40-mL VOA vial containing VOC-free water and they accompany sample bottles into the field and collected samples back to the laboratory. If target analytes are detected in the equipment or trip blank at levels above the reporting limits (RLs), blank results will be compared to the sample results, and results within five times the concentration of the blank may be qualified. Field duplicates will be collected at a frequency of one per sampling event or 1 in 20 sample locations processed per matrix (whichever is more frequent), provided sufficient sample mass/volume can be collected.

QA samples will also include the collection of additional sample mass or volume as required to verify that the laboratory has sufficient sample mass or volume to run the matrix-specified analytical QA/QC (matrix spike [MS]/matrix spike duplicate [MSD]) samples for analyses as specified in Table 5. Additional sample mass or volume to meet this requirement will be collected at a frequency of one per matrix per sampling event or 1 in 20 samples processed, whichever is more frequent. The samples designated for MS/MSD analyses should be clearly marked on the CoC.

All field QA samples will be documented on the field forms and verified by the QA Manager or designee.

4.1.2 Sample Containers

Sample containers and preservatives will be provided by the laboratory. The laboratory will maintain documentation certifying the cleanliness of bottles and the purity of preservatives provided. Container requirements are listed in Table 1.

4.1.3 Sample Identification and Labels

Each sample collected as part of this investigation will be given a unique identification. With this type of identification, no two samples will have the same label. Labels or tags that include the sample number will be attached to each sample container.

Each sample will have an adhesive plastic or waterproof paper label affixed to the container and will be labeled at the time of collection. If the label is not waterproof, it will be covered with clear packing tape to render it waterproof. The following information will be recorded on the container label at the time of collection:

- Project name
- Sample identification
- Date and time of sample collection
- Preservative type (if applicable)
- Analysis to be performed

4.2 Data Quality Objectives and Criteria

The QA objective for the project is to develop and implement procedures that will provide data of known, documented quality. Field and laboratory quality QA/QC requirements ensure that acceptable levels of data quality will be maintained throughout the sampling and analysis program. The criteria commonly used to specify QA goals include precision, accuracy, representativeness, comparability, completeness, and sensitivity. These criteria are described in more detail in the following sections and project quantitative goals are listed in Table 6.

4.2.1 Precision

Precision is the ability of an analytical method or instrument to reproduce its own measurement. It is a measure of the variability, or random error, in sampling, sample handling, and laboratory analyses. ASTM recognizes two levels of precision (ASTM 2002):

- Repeatability: the random error associated with measurements made by a single test operator
 on identical aliquots of test material in a given laboratory with the same apparatus under
 constant operating conditions
- 2. **Reproducibility:** the random error associated with measurements made by different test operators in different laboratories using the same method but different equipment to analyze identical samples of test material

In the laboratory, "within-batch" precision is measured using duplicate sample or QC analyses and is expressed as the relative percent difference (RPD) between the measurements. The "batch-to-batch" precision is determined from the variance observed in the analyses of standard solutions or laboratory control samples from multiple analytical batches.

Field precision will be evaluated by the collection of field duplicates for chemistry samples at a frequency of 1 in 20 samples. Field chemistry duplicate precision will be screened against an RPD of 50%. However, no data will be qualified based solely on field homogenization duplicate precision.

Precision measurements can be affected by the nearness of a chemical concentration to the MDL, where the percent error (expressed as RPD) increases. The equation used to express precision is as follows:

Equation 4-1

$$RPD = \frac{(C_1 - C_2)x \, 100\%}{(C_1 + C_2)/2}$$

where:

RPD = relative percent difference

 C_1 = larger of the two observed values C_2 = smaller of the two observed values

4.2.2 Accuracy

Accuracy is a measure of the closeness of an individual measurement (or an average of multiple measurements) to the true or expected value. Accuracy is determined by calculating the value of

results from analyses of laboratory control samples, standard reference materials, and standard solutions. In addition, MS samples are also measured, which indicate the accuracy or bias in the actual sample matrix. Accuracy is expressed as percent recovery of the measured value, relative to the true or expected value. If a measurement process produces results that are not the true or expected values, the process is said to be biased. Bias is the systematic error either inherent in a method of analysis (e.g., extraction efficiencies) or caused by an artifact of the measurement system (e.g., contamination). Analytical laboratories utilize several QC measures to eliminate analytical bias, including systematic analysis of method blanks, laboratory control samples, and independent calibration verification standards. Because bias can be positive or negative, and because several types of bias can occur simultaneously, only the net (or total) bias can be evaluated in a measurement.

Laboratory accuracy will be evaluated using quantitative laboratory control sample, MS, surrogate spike, and calibration standard recoveries compared with method-specified performance criteria or criteria listed in Table 6. Accuracy can be expressed as a concentration compared to the true or reference value or as a percent recovery in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follows:

Equation 4-2

%R = 100% x (S - U)/Csa

where:

%R = percent recovery

S = measured concentration in the spiked aliquotU = measured concentration in the unspiked aliquot

Csa = actual concentration of spike added

Field accuracy will be controlled by adherence to sample collection procedures outlined in this QAPP.

4.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent an environmental condition.

4.2.4 Comparability

Comparability expresses the confidence with which one dataset can be evaluated in relation to another dataset. For this program, comparability of data will be established through the use of

standard analytical methodologies and reporting formats and through common traceable calibration standards and reference materials.

4.2.5 Completeness

Completeness is a measure of the amount of data that are determined to be valid in proportion to the amount of data collected. Completeness will be calculated as follows:

$$C = \frac{(Number\ of\ acceptable\ data\ points)\ x\ 100}{Total\ number\ of\ data\ points}$$

The DQO for completeness for all components of this project is 95%. Data that have been qualified as estimated because the QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that have been rejected will not be considered valid for the purpose of assessing completeness.

4.2.6 Sensitivity

Sensitivity is a measure of analytical detection and RLs. In general, the lowest technologically achievable MDLs and RLs will be targeted for this project.

The MDL is defined as the minimum concentration at which a given target analyte can be measured and reported with 99% confidence that the analyte concentration is greater than zero. Laboratory RLs are defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. Laboratory MDLs and RLs will be used to evaluate the method sensitivity and/or applicability prior to the acceptance of a method for this program.

The sample-specific MDLs and RLs will be reported by the laboratory and will take into account any factors relating to the sample analysis that might decrease or increase these limits (e.g., dilution factor, percent moisture, and analytical mass/volume). In the event that MDLs and RLs are elevated due to matrix interferences and subsequent dilutions or reductions in sample aliquots, the data will be evaluated by Anchor QEA and the laboratory to determine if an alternative course of action is required or possible. If this situation cannot be resolved readily (i.e., detection limits less than criteria are achieved), NYSDEC will be contacted to discuss an acceptable resolution. The sample-specific RL will be the value provided in the project database.

4.3 Laboratory Quality Control

Laboratory QC procedures, where applicable, include initial and continuing instrument calibrations, standard reference materials, laboratory control samples, matrix replicates, MSs, surrogate spikes (for

organic analyses), and method blanks. A summary of the DQOs is provided in Table 6. QA/QC sample analytical frequencies are provided in Table 5.

The analyst will review the results of the QC samples from each sample group immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine if control limits have been exceeded. If control limits are exceeded in the sample group, the QA Manager will be contacted immediately, and corrective action (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples.

4.3.1 Laboratory Instrument Calibration and Frequency

An initial calibration will be performed on each laboratory instrument to be used prior to the start of the project, after each major interruption to the analytical instrument, and when any ongoing calibration does not meet method control criteria. Calibration verification will be analyzed following each initial calibration and will meet method criteria prior to analyses of samples. Continuing calibration verifications (CCVs) will be analyzed at method-required frequencies to track instrument performance. The frequency of CCVs varies with method. For gas chromatography (GC)/mass spectrometer method (VOCs), one CCV will be analyzed every 12 hours. For inorganic methods that utilize instrumentation, 1 will be analyzed for every 10 samples analyzed and at the end of each run. If the continuing calibration is out of control, the analysis will be terminated until the source of the control failure is eliminated or reduced to meet control specifications, which may include analyzing a new initial calibration. Any project samples analyzed while the instrument calibration was out of control will be re-analyzed.

Instrument blanks or continuing calibration blanks provide information on the stability of the baseline established. Continuing calibration blanks will be analyzed immediately prior to or immediately following a CCV at the instrument for each type of applicable analysis.

4.3.2 Laboratory Duplicates/Replicates

Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Analytical duplicates and replicates are subsamples of the original sample that are prepared and analyzed as a separate sample.

4.3.3 Matrix Spikes and Matrix Spike Duplicates

Analyses of MS samples provide information on the extraction efficiency of the method on the sample matrix, as well as any interferences introduced by the sample matrix. By analyzing MS samples in duplicate, information on the precision of the method is also provided.

4.3.4 Method Blanks

Method blanks are prepared and analyzed in the same manner as project samples to assess possible laboratory contamination at all stages of sample preparation and analysis. The method blank for all analyses must be less than the MRL of any single target analyte. If a laboratory method blank exceeds this criterion for any analyte, and the concentration of the analyte in any of the samples is less than five times the concentration found in the blank (ten times for common contaminants), analyses must stop and the source of contamination must be eliminated or reduced. Affected samples should be re-prepared and re-analyzed, if possible.

4.3.5 Laboratory Control Samples

Laboratory control samples are analyzed to assess possible laboratory bias at all stages of sample preparation and analyses. The laboratory control sample is a matrix-dependent spiked sample prepared at the time of sample extraction along with the preparation of the sample, MS, and method blank. The laboratory control sample will provide information on the precision of the analytical process and, when analyzed in duplicate, will provide accuracy information as well.

4.3.6 Laboratory Deliverables

Data packages will be checked for completeness immediately upon receipt from the laboratory to verify that data and QA/QC information requested are present. The analytical laboratory will be required, where applicable, to report the following:

- Project Narrative. This summary, in the form of a cover letter, will include a discussion of any
 problems encountered during analyses. This summary should include (but not be limited to)
 QA/QC, sample shipment, sample storage, and analytical difficulties. Any problems
 encountered, actual or perceived, and their resolutions will be documented in as much detail
 as appropriate.
- **CoC Records.** Legible copies of the CoC forms will be provided as part of the data package. This documentation will include the time of receipt and condition of the samples received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented on a sample receipt form. The form must include sample shipping container temperatures measured at the time of sample receipt.
- **Sample Results.** The data package will summarize the results for each sample analyzed. The summary will include the following information when applicable:
 - Field sample identification code and the corresponding laboratory identification code
 - Sample matrix
 - Date of sample preparation/extraction
 - Date and time of analysis
 - Mass and/or volume used for preparation and analysis

- Final dilution or concentration factors for the sample
- Identification of the instrument used for analysis
- MDLs and MRLs accounting for sample-specific factors (e.g., dilution and total solids)
- Analytical results with reporting units identified
- Data qualifiers and their definitions
- An electronic data deliverable with data in a format specified in advance by Anchor QEA
- **QA/QC Summaries.** These sections will contain the results of the laboratory QA/QC procedures. Each QA/QC sample analysis will be documented with the same information required for the sample results. No recovery or blank corrections will be made by the laboratory. The required summaries are as follows (additional information may be requested):
 - Instrument Performance Checks. Injection times and percent relative ion abundances will be reported and compared to method criteria. Associated samples and analysis times will also be reported.
 - Calibration Blank Analysis. The calibration blank analysis associated with establishing the analytical curve the concentration of all target analytes identified in these blanks will be reported.
 - Calibration Data Summary. These summaries will report the concentrations of the
 initial calibration and continuing calibration standards and the date and time of
 analyses. The response factor, percent relative standard deviation, percent
 drift/difference, percent recovery, and retention time for each analyte will be listed, as
 appropriate. Calibration results for standards will be documented to indicate instrument
 sensitivity.
 - Laboratory fortified blank analysis. For mercury analyses, a laboratory fortified method blank >10× the MDL, but less than the midpoint concentration of the calibration.
 - Method Blank Analysis. The method blank analysis associated with each sample and the concentration of all target analytes identified in these blanks will be reported.
 - MS Recovery. MS recovery data for all applicable analyses will be reported. The names
 and concentrations of compounds added, percent recoveries, and range of acceptable
 recoveries will be listed. The percent recoveries and RPD values for MSD analyses will be
 reported.
 - Laboratory Control Sample. Laboratory control sample recovery data will be reported.
 The names and concentrations of compounds added, percent recoveries, and range of acceptable recoveries will be included. The percent recoveries and RPD values for laboratory control sample duplicate analyses will be included.

- **Original Data.** Legible copies of the original data generated by the laboratory will include the following information:
 - Sample extraction, preparation, and cleanup logs including methods used
 - Instrument analysis logs for all instruments used on days of calibration and sample analyses
 - Calculation worksheets as applicable
 - Ion chromatograms for all samples, standards, blanks, calibrations, spikes, replicates, and reference materials as applicable
 - Copies of full scan chromatograms and quantitation reports for GC/mass spectrometer analyses of samples, standards, blanks, calibrations, spikes, replicates, and reference materials
 - Enhanced spectra of detected compounds with associated best-match spectra for each sample

4.4 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

This section describes procedures for testing, inspection, and maintenance of field and laboratory equipment.

4.4.1 Field Instruments/Equipment

In accordance with the QA program, Anchor QEA will maintain an inventory of field instruments and equipment. The frequency and types of maintenance will be based on the manufacturer's recommendations and/or previous experience with the equipment.

The Anchor QEA FC will be responsible for the preparation, documentation, and implementation of the preventive maintenance program. The equipment maintenance information will be documented in the instrument's calibration log. The frequency of maintenance is dependent on the type and stability of the equipment, methods used, intended use of the equipment, and manufacturer's recommendations. Detailed information regarding the calibration and frequency of equipment calibration is provided in each specific manufacturer's instruction manuals.

All maintenance records will be verified prior to each sampling event. The FC will be responsible for verifying that required maintenance has been performed prior to using the equipment in the field. For this project, maintenance inspections will include the following activities:

 The drilling subcontractor will be responsible for confirming proper operation of the drilling equipment daily. This verification may consist of internal diagnostics on field screening instruments as well as function of direct-push drilling equipment. The licensed surveyor will be responsible for confirming proper operation of all survey
equipment utilized to locate actual sampling locations both horizontally and vertically. This
verification may consist of internal diagnostics on instruments or visiting a location with
known coordinates.

Any problems will be noted in the field logbook and corrected prior to continuing sampling operations.

4.4.2 Laboratory Instruments/Equipment

In accordance with the QA program, the laboratory will maintain an inventory of instruments and equipment, and the frequency of maintenance will be based on the manufacturer's recommendations and/or previous experience with the equipment.

The laboratory preventative maintenance program, as detailed in the laboratory QA Plan, is organized to maintain proper instrument and equipment performance and to prevent instrument and equipment failure during use. The program considers instrumentation, equipment, and parts that are subject to wear; deterioration or other changes in operational characteristics; the availability of spare parts; and the frequency at which maintenance is required. Any equipment that has been overloaded, has been mishandled, gives suspect results, or has been determined to be defective will be taken out of service, tagged with the discrepancy noted, and stored in a designated area until the equipment has been repaired. After repair, the equipment will be tested to verify that it is in proper operational condition. The client will be promptly notified in writing if defective equipment casts doubt on the validity of analytical data. The client will also be notified immediately regarding any delays due to instrument malfunctions that could impact holding times.

Laboratories will be responsible for the preparation, documentation, and implementation of the preventative maintenance program. Maintenance records will be checked according to the schedule on an annual basis and recorded by laboratory personnel. The Laboratory QA Manager or designee will be responsible for verifying compliance.

4.4.2.1 Laboratory Instrument/Equipment Calibration

As part of their QC programs, laboratories perform two types of calibrations. A periodic calibration is performed at prescribed intervals (e.g., balances, drying ovens, refrigerators, and thermometers), and operational calibrations are performed daily at a specified frequency or prior to analysis (i.e., initial calibrations) according to method requirements. Calibration procedures and frequency are discussed in the laboratory QA Plan. Calibrations are discussed in the laboratory SOPs for analyses.

The Laboratory QA Manager will be responsible for ensuring that the laboratory instrumentation is calibrated in accordance with specifications. Implementation of the calibration program will be the

responsibility of the respective laboratory Group Supervisors. Recognized procedures (EPA, ASTM, or manufacturer's instructions) will be used when available.

Physical standards (i.e., weights or certified thermometers) will be traceable to nationally recognized standards such as the National Institute of Standards and Technology (NIST). Chemical reference standards will be NIST standard reference materials or vendor-certified materials traceable to these standards.

The calibration requirements for each method and respective corrective actions will be accessible, either in the laboratory SOPs or in the laboratory's QA Plan for each instrument or analytical method in use. All calibrations will be preserved on electronic media.

4.5 Inspection/Acceptance of Supplies and Consumables

Inspection and acceptance of field supplies, including laboratory-prepared sampling bottles, will be performed by the FC. All primary chemical standards and standard solutions used for this project, either in the field or laboratory, will be traceable to documented, reliable commercial sources. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities found in the standard will be documented.

4.6 Data Management

Field data sheets will be checked for completeness and accuracy by the FC prior to delivery to the Data Manager. Data generated in the field will be documented in electronic or hard copy format and provided to the Data Manager, who is responsible for the data entry into the database. All manually entered data will be verified by a second party. Field documentation will be filed in the main project file after data entry and verification are complete.

Laboratory data will be provided to the Data Manager in Anchor QEA's custom EQuIS electronic format. Laboratory data that are electronically provided and loaded into the database will undergo a check against the laboratory hard copy data. Data will be validated or reviewed manually, and qualifiers, if assigned, will be entered manually. The accuracy of all manually entered data will be verified by a second party. Data tables and reports will be exported from EQuIS to Microsoft Excel tables.

5 Data Reduction, Validation, and Usability

Once data are received from the laboratory, a number of QC procedures will be followed to provide an accurate evaluation of the data quality. Specific procedures will be followed to assess data precision, accuracy, and completeness.

5.1 Compliance Assessments

Laboratory and field performance audits consist of on-site reviews of QA systems and equipment for sampling, calibration, and measurement. Laboratory audits will not be conducted as part of this study; however, all laboratory audit reports will be made available to the QA Manager upon request. The laboratory is required to have written procedures addressing internal QA/QC. These procedures have been submitted, and the QA Manager will review them to verify compliance with this QAPP. The laboratory must verify that personnel engaged in analytical tasks have appropriate training. The laboratory will provide written details of any and all method modifications planned prior to project commencement.

5.2 Response and Corrective Actions

The following sections identify the responsibilities of key project team members and actions to be taken in the event of an error, problem, or non-conformance to protocols identified in this document.

5.2.1 Field Activities

The FC will be responsible for correcting equipment malfunctions during the field sampling effort. The QA Manager will be responsible for resolving situations identified by the FC that may result in non-compliance with this QAPP. All corrective measures will be immediately documented in the field logbook.

5.2.2 Laboratory

The laboratory is required to comply with its SOPs. The Laboratory PM will be responsible for ensuring that appropriate corrective actions are initiated as required for conformance with this QAPP. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data.

The Laboratory PM will be notified if any QC sample exceeds the project-specified control limits. The analyst will identify and correct the anomaly before continuing with the sample analysis. If the laboratory internal corrective action does not resolve the non-conformance, the Laboratory PM will notify the QA Manager. A narrative describing the anomaly, the steps taken to identify and correct

the anomaly, and the treatment of the relevant sample batch (i.e., recalculation, re-analysis, and re-extraction) will be submitted with the data package in the form of a cover letter.

5.3 Data Review, Validation, and Verification

During the validation process, analytical data will be evaluated for project, method, and laboratory QC compliance, and their validity and applicability for program purposes will be determined. Based on the findings of the validation process, data validation qualifiers may be assigned. The validated project data, including qualifiers, will be entered into the project database, thus enabling this information to be retained or retrieved as needed.

5.4 Validation and Verification Methods

Data validation includes the following: signed entries by the field and laboratory technicians on field data sheets and laboratory datasheets, respectively; review for completeness and accuracy by the FC and Laboratory PM; review by the QA Manager for outliers and omissions; and the use of QC criteria to accept or reject specific data. All data will be entered into the EQuIS database, and a raw data file will be printed or exported. A second data manager or designee will perform a cursory verification of the database raw data file. If errors are found, further verification will be performed to verify that all data are accurate. Any errors found will be corrected in the database.

All laboratory data will be reviewed and verified to determine whether DQOs have been met and that appropriate corrective actions have been taken, when necessary. The QA Manager or designee will be responsible for the final review of data generated from analyses of samples.

The first level of review will take place in the laboratory as the data are generated. The Laboratory Department Manager or designee will be responsible for ensuring that the data generated meet minimum QA/QC requirements and that the instruments were operating under acceptable conditions during generation of data. DQOs will also be assessed at this point by comparing the results of QC measurements with pre-established criteria as a measure of data acceptability.

The analysts and/or Laboratory Department Manager will prepare a preliminary QC checklist for each parameter and for each sample delivery group (SDG) as soon as analysis of an SDG has been completed. Any deviations from the DQOs on the checklist will be brought to the attention of the Laboratory PM to determine whether corrective action is needed and to determine the impact on the reporting schedule.

Data packages will be checked for completeness immediately upon receipt from the laboratory to verify that data and QA/QC information requested are present. Data validation will be conducted by

a reviewer using current National Functional Guideline documents (EPA 2020a, 2020b) as guidance by considering the following information, as applicable per method and level of validation:

- CoC documentation and sample receipt condition
- Holding times
- Instrument performance checks
- Initial calibrations
- Continuing calibrations
- Method blanks
- Surrogate recoveries
- Internal standard recoveries
- Detection limits
- RLs
- Laboratory control samples
- MS/MSD samples
- Field and laboratory duplicates
- Equipment blanks
- Standard reference material results
- Raw data review

The data will be validated in accordance with the project-specific DQOs described above, analytical method criteria, and the laboratory's internal performance standards based on its SOPs. Validated data will be exported from the EQuIS database in NYSDEC's Electronic Data Warehouse Standards or as otherwise directed by the Division of Environmental Remediation. A Data Usability Summary Report will be submitted describing the results of the validation and including an evaluation of the analytical data to determine whether or not the data meet the site/project-specific criteria for data quality and use.

6 Corrective Action

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-QC performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. Corrective action proposed and implemented should be documented in QA reports to management. Corrective action should be implemented only after the approval of the PM and the QA Manager. If immediate corrective action is required, approvals secured by telephone should be documented.

For non-compliance problems, a formal corrective action program will be determined and implemented at the time that the problem is identified. The person who identifies the problem is responsible for notifying the PM and QA Manager. Implementation of corrective action will be confirmed in writing through the same channels.

Non-conformance with the established QC procedures in the QAPP will be identified and corrected in accordance with the QAPP. The FC, QA Manager, or their designees will issue a non-conformance report describing non-conformance action depending on if the non-conformance is related to the field or laboratory activities.

6.1 Field Corrective Action

Corrective action in the field may be required when the sample network is changed (e.g., more or fewer samples, or sampling locations other than those identified in the Pre-Design Investigation Work Plan or QAPP) or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. The need for corrective action and recommendations will be communicated to the PM, who will approve the corrective action and verify that the corrective action has been implemented. Corrective actions will be implemented and documented in a bound field logbook. No Anchor QEA personnel will initiate corrective action without prior communication of findings through proper channels.

If corrective action taken will result in fewer samples collected, fewer parameters analyzed, alternate sampling locations, or other changes that might result in non-attainment of QA objectives, then the PM must be advised of the proposed corrective action and must concur with its implementation.

6.2 Corrective Action During Data Quality Review and Data Assessment

The need for corrective action may be identified during data quality review or data assessment. Potential types of corrective action may include resampling by the field team or repreparation and/or re-analyses of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team, and whether the data to be collected are necessary to meet the required DQOs. If a

corrective action situation is identified, the PM and QA Manager will recommend the implementation of corrective action. The QA Manager will implement and document the approved corrective action.

6.3 Quality Assurance Reports to Management

QA reports to management will only be required if corrective action has been initiated during any phase of this project. The content of the QA report will include a summary of the issue requiring the corrective action, action performed, and results of the follow-up inspection. The impact on any data will also be summarized. QA results will be reported in the Phase II report.

7 References

- ASTM (ASTM International), 2002. Standard Practices for Use of the Term Precision and Bias in ASTM Test Methods. 177-90a.
- EPA, 2020a. *National Functional Guidelines for Superfund Organic Methods Data Review*. Office of Superfund Remediation and Technology Innovation. EPA-540-R-20-005. November 2020.
- EPA, 2020b. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. EPA-540-R-2017-001. November 2020.

Tables

Table 1 Sample Sizes, Containers, and Hold Times

	Sample	Container Size			
Parameter	Size	and Type	Preservative	Maximum Holding Time	
Soil Samples					
Total solids	F0 ~	4-oz WM-G	Cool/0–6°C	None established	
Total solids	50 g	4-0Z WW-G	Freeze -18°C	None established	
VOCs	10 g	3 x 40 mL VOA vial	Methanol or sodium bisulfate	14 days	
VOCS	50 g	4-oz WM-G	Cool/0-6°C; no headspace	14 days	
			Cool/0–6°C	14 days to extraction	
SVOCs	100 g	4-oz WM-G, amber	Freeze -18°C	1 year to extraction	
			Cool/0–6°C	40 days to analysis	
Matala	Γ0	4 \A/\ 4 C	Cool/0–6°C	6 months; 28 days for mercury	
Metals	50 g	4-oz WM-G	Freeze -18°C	180 days (except mercury)	
Groundwater Samples					
VOCs	120 mL	3 x 40-mL VOA vials	Cool/0–6°C; HCl to pH <2, store in the dark.	14 days to analysis	
		2 x 250-mL amber		7 days to extraction	
SVOCs	250 mL	glass with HDPE- lined lid	Cool/0–6°C; store in the dark	40 days to analysis	
		ililea lia	Cool/0–6°C; field filter dissolved		
Metals	250 mL	250-mL HDPE	samples or within 24 hours;	180 days (except mercury)	
Wetais	250 1112	230 1112 1121 2	HNO_3 to pH <2	roo days (except mercury)	
Investigation Derived V	Waste				
TCLP VOCs	100 g	2-oz wide-mouth glass with Teflon lined septa cap, no headspace	Cool/0–6°C	14 days to extraction, 40 days to analysis	
	40 mL	3 x 40-mL septum- sealed VOA vials	Cool/0-6°C, HCl to pH<2		
	100 g	8-oz WM-G	Cool/0–6°C		
TCLP SVOCs	250 mL	2 x 250-mL amber glass with HDPE- lined lid	Cool/0-6°C	14 days to extraction, 40 days to analysis	
TOLDAN	50 g	4-oz WM-G	Cool/0–6°C	180 days and 28 days for	
TCLP Metals	250 mL	250-mL HDPE	Cool/0–6°C, HNO3 to pH < 2	mercury to TCLP extraction/analysis	

Notes: g: gram

HCl: hydrochloric acid

HDPE: high density polyethylene

HNO₃: nitric acid mL: milliliter oz: ounce

TCLP: toxicity characteristic leaching procedure

WM-G: wide-mouth glass

Table 2
Analyte List, Methods, and Reporting and Detection Limits for Soils

D		61 1 12		Method
Parameter Conventional Parameters (%)	Analytical Method	Cleanup Levels ^{1,2}	Reporting Limit	Detection Limit
Total solids	SM 2540G		0.1	0.1
TCL Volatile Organic Compounds (µg/kg)	3IVI 2340G		0.1	U. I
Methylene chloride	EPA 8260		10	0.816
1,1-Dichloroethane	EPA 8260		1.5	0.2952
Chloroform	EPA 8260		1.5	0.3246
Carbon tetrachloride	EPA 8260		1.5	0.3246
1,2-Dichloropropane	EPA 8260		3.5	0.2112
Dibromochloromethane	EPA 8260		3.5	0.3078
1,1,2-Trichloroethane	EPA 8260		1.5	0.3078
Tetrachloroethene	EPA 8260		1.5	0.393
Chlorobenzene	EPA 8260		1	0.3062
Trichlorofluoromethane	EPA 8260		·	0.1862
1,2-Dichloroethane	EPA 8260 EPA 8260		5	0.3914
1,1,1-Trichloroethane			1 1	
Bromodichloromethane	EPA 8260			0.2698
	EPA 8260		1	0.3848
trans-1,3-Dichloropropene	EPA 8260		1	0.3006
cis-1,3-Dichloropropene	EPA 8260		1 -	0.2672
1,1-Dichloropropene	EPA 8260		5	0.4556
Bromoform	EPA 8260		4	0.4954
1,1,2,2-Tetrachloroethane	EPA 8260		1	0.2402
Benzene	EPA 8260	60	1	0.2972
Toluene	EPA 8260	700	1.5	0.2416
Ethylbenzene	EPA 8260	1,000	1	0.2214
Chloromethane	EPA 8260		5	0.7832
Bromomethane	EPA 8260		2	0.6478
Vinyl chloride	EPA 8260		2	0.7534
Chloroethane	EPA 8260	1	2	0.4384
1,1-Dichloroethene	EPA 8260		1	0.2598

Table 2
Analyte List, Methods, and Reporting and Detection Limits for Soils

				Method
Parameter	Analytical Method	Cleanup Levels ^{1,2}	Reporting Limit	Detection Limit
trans-1,2-Dichloroethene	EPA 8260		1.5	0.3916
Trichloroethene	EPA 8260	1	1	0.224
1,2-Dichlorobenzene	EPA 8260		5	0.3642
1,3-Dichlorobenzene	EPA 8260		5	0.3996
1,4-Dichlorobenzene	EPA 8260		5	0.4198
Methyl tert butyl ether	EPA 8260	930	2	0.487
p/m-Xylene	EPA 8260		2	0.43
o-Xylene	EPA 8260		2	0.4174
Total xylene	calculated	260		
cis-1,2-Dichloroethene	EPA 8260		1	0.3014
Dibromomethane	EPA 8260		10	0.4348
Styrene	EPA 8260		2	0.726
Dichlorodifluoromethane	EPA 8260		10	0.3888
Acetone	EPA 8260		10	3.235
Carbon disulfide	EPA 8260		10	0.3754
2-Butanone	EPA 8260		10	3.8772
Vinyl acetate	EPA 8260		10	0.751
4-Methyl-2-pentanone	EPA 8260		10	0.8164
1,2,3-Trichloropropane	EPA 8260		10	0.387
2-Hexanone	EPA 8260		10	0.3964
Bromochloromethane	EPA 8260		5	0.3022
2,2-Dichloropropane	EPA 8260		5	0.795
1,2-Dibromoethane	EPA 8260		4	0.4088
1,3-Dichloropropane	EPA 8260		5	0.5656
1,1,1,2-Tetrachloroethane	EPA 8260		1	0.3284
Bromobenzene	EPA 8260		5	0.2202
n-Butylbenzene	EPA 8260	12,000	1	0.3144
sec-Butylbenzene	EPA 8260	11,000	1	0.2756
tert-Butylbenzene	EPA 8260	5,900	5	0.6032

Table 2
Analyte List, Methods, and Reporting and Detection Limits for Soils

				Method
Parameter	Analytical Method	Cleanup Levels ^{1,2}	Reporting Limit	Detection Limit
o-Chlorotoluene	EPA 8260		5	0.313
p-Chlorotoluene	EPA 8260		5	0.3608
1,2-Dibromo-3-chloropropane	EPA 8260		5	0.8366
Hexachlorobutadiene	EPA 8260		5	0.4582
Isopropylbenzene	EPA 8260	2,300	1	0.177
p-Isopropyltoluene	EPA 8260	10,000	1	0.2732
Naphthalene	EPA 8260	12,000	5	0.7696
Acrylonitrile	EPA 8260		10	0.3756
n-Propylbenzene	EPA 8260	3,900	1	0.284
1,2,3-Trichlorobenzene	EPA 8260		5	0.4034
1,2,4-Trichlorobenzene	EPA 8260		5	0.7898
1,3,5-Trimethylbenzene	EPA 8260	8,400	5	0.6016
1,2,4-Trimethylbenzene	EPA 8260	3,600	5	0.573
1,4-Dioxane	EPA 8260		100	17.4
1,4-Diethylbenzene	EPA 8260		4	0.2
4-Ethyltoluene	EPA 8260		4	0.097
1,2,4,5-Tetramethylbenzene	EPA 8260		4	0.181
Ethyl ether	EPA 8260		5	0.3798
trans-1,4-Dichloro-2-butene	EPA 8260		5	1.478
TCL Semivolatile Organic Compounds (μg/kg)				
Phenol	EPA 8270D		33	3.2
Bis(2-chloroethyl)ether	EPA 8270D		33	6.1
2-Chlorophenol	EPA 8270D		33	2.2
1,3-Dichlorobenzene	EPA 8270D		33	6.8
1,4-Dichlorobenzene	EPA 8270D		33	6.9
Benzyl Alcohol	EPA 8270D		67	22
1,2-Dichlorobenzene	EPA 8270D		33	7.3
2-Methylphenol	EPA 8270D		33	2.9
Bis(2-chloroisopropyl)ether	EPA 8270D		33	5.6

Table 2
Analyte List, Methods, and Reporting and Detection Limits for Soils

				Method
Parameter	Analytical Method	Cleanup Levels ^{1,2}	Reporting Limit	Detection Limit
Acetophenone	EPA 8270D		33	4.2
4-Methylphenol	EPA 8270D		33	4.4
N-Nitroso-di-n-propylamine	EPA 8270D		33	5.7
Hexachloroethane	EPA 8270D		33	5.6
Nitrobenzene	EPA 8270D		33	3.5
Isophorone	EPA 8270D		33	3.7
2-Nitrophenol	EPA 8270D		33	3.6
2,4-Dimethylphenol	EPA 8270D	-	33	5.5
Bis(2-chloroethoxy)methane	EPA 8270D		33	3.4
2,4-Dichlorophenol	EPA 8270D		33	3.6
1,2,4-Trichlorobenzene	EPA 8270D		33	2.1
Naphthalene	EPA 8270D		33	2.2
4-Chloroaniline	EPA 8270D		33	3.0
Hexachlorobutadiene	EPA 8270D		33	6.5
P-Chloro-M-Cresol	EPA 8270D		33	4.8
2-Methylnaphthalene	EPA 8270D		33	2.6
Hexachlorocyclopentadiene	EPA 8270D		200	37
2,4,6-Trichlorophenol	EPA 8270D		33	3.0
2,4,5-Trichlorophenol	EPA 8270D		33	4.0
2-Chloronaphthalene	EPA 8270D		33	2.3
2-Nitroaniline	EPA 8270D		33	5.4
Dimethylphthalate	EPA 8270D		33	2.6
Acenaphthylene	EPA 8270D	100,000	33	2.9
2,6-Dinitrotoluene	EPA 8270D		33	8.6
3-Nitroaniline	EPA 8270D		67	3.5
Acenaphthene	EPA 8270D	20,000	33	3.3
2,4-Dinitrophenol	EPA 8270D		200	57
4-Nitrophenol	EPA 8270D		553	183
Dibenzofuran	EPA 8270D		33	2.5

Table 2
Analyte List, Methods, and Reporting and Detection Limits for Soils

_		. 12		Method
Parameter	Analytical Method	Cleanup Levels ^{1,2}	Reporting Limit	Detection Limit
2,4-Dinitrotoluene	EPA 8270D		33	2.3
Diethylphthalate	EPA 8270D		33	3.4
4-Chlorophenyl phenyl ether	EPA 8270D		33	3.2
Fluorene	EPA 8270D		33	2.5
4-Nitroaniline	EPA 8270D		200	4.5
4,6-Dinitro-2-Methylphenol	EPA 8270D		200	64
NitrosoDiPhenylAmine(NDPA)/DPA	EPA 8270D		33	2.3
4-Bromophenyl phenyl ether	EPA 8270D	-	33	3.1
Hexachlorobenzene	EPA 8270D	1	33	3.2
Pentachlorophenol	EPA 8270D		200	60
Phenanthrene	EPA 8270D	100,000	33	2.1
Anthracene	EPA 8270D	100,000	33	1.7
Di-n-butylphthalate	EPA 8270D		33	3.2
Fluoranthene	EPA 8270D	100,000	33	2.9
Pyrene	EPA 8270D	100,000	33	2.8
Butylbenzylphthalate	EPA 8270D		33	6.7
3,3'-Dichlorobenzidine	EPA 8270D		67	5.7
Benz(a)anthracene	EPA 8270D	1,000	33	1.9
Chrysene	EPA 8270D	1,000	33	2.3
Bis(2-Ethylhexyl)phthalate	EPA 8270D		33	8.7
Di-n-octylphthalate	EPA 8270D		67	14
Benzo(b)fluoranthene	EPA 8270D	1,000	33	2.9
Benzo(k)fluoranthene	EPA 8270D	800	33	2.5
Benzo(a)pyrene	EPA 8270D	1,000	33	2.4
Indeno(1,2,3-cd)Pyrene	EPA 8270D	500	33	2.7
Dibenz(a,h)anthracene	EPA 8270D	330	33	3.5
Benzo(ghi)perylene	EPA 8270D	100,000	33	2.6
Aniline	EPA 8270D		33	5.0
Carbazole	EPA 8270D		33	2.1

Table 2
Analyte List, Methods, and Reporting and Detection Limits for Soils

		12		Method
Parameter	Analytical Method	Cleanup Levels 1,2	Reporting Limit	Detection Limit
Benzidine	EPA 8270D		933	216
n-Nitrosodimethylamine	EPA 8270D		33	8.4
Biphenyl	EPA 8270D		33	3.5
Benzoic Acid	EPA 8270D		2000	423
1,2,4,5-Tetrachlorobenzene	EPA 8270D		33	3.2
Atrazine	EPA 8270D		33	2.9
Azobenzene	EPA 8270D		33	2.5
Benzaldehyde	EPA 8270D	-	33	8.4
Caprolactam	EPA 8270D		67	4.9
Pyridine	EPA 8270D		133	5.9
Metals (mg/kg)				
Aluminum	EPA 6020B		10	1.480
Antimony	EPA 6020B		0.16	0.014
Arsenic	EPA 6020B		0.05	0.007
Barium	EPA 6020B		0.3	0.021
Beryllium	EPA 6020B		0.03	0.009
Cadmium	EPA 6020B		0.02	0.003
Calcium	EPA 6020B		50	6.080
Chromium	EPA 6020B		0.2	0.047
Cobalt	EPA 6020B		0.05	0.005
Copper	EPA 6020B		0.2	0.019
Iron	EPA 6020B		20	2.060
Lead	EPA 6020B		0.06	0.015
Magnesium	EPA 6020B		10	1.232
Manganese	EPA 6020B		0.2	0.044
Mercury	EPA 7474		0.0125	0.002
Nickel	EPA 6020B		0.1	0.027
Potassium	EPA 6020B		10	1.588
Selenium	EPA 6020B		0.2	0.076

Table 2
Analyte List, Methods, and Reporting and Detection Limits for Soils

				Method
Parameter	Analytical Method	Cleanup Levels ^{1,2}	Reporting Limit	Detection Limit
Silver	EPA 6020B		0.05	0.005
Sodium	EPA 6020B		15	1.172
Thallium	EPA 6020B		0.02	0.005
Vanadium	EPA 6020B		0.1	0.038
Zinc	EPA 6020B		1	0.260

- 1. NYSDEC (New York State Department of Environmental Conservation), 2010. CP-51: Soil Cleanup Guidance. October 21, 2010.
- 2. New York State Groundwater Effluent Limitations, Class GA (NYSDEC 1998)

NYSDEC (New York State Department of Environmental Conservation), 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Class GA. Division of Water Technical and Operational Guidance Series (1.1.1). June 1998.

--: not applicable

EPA: U.S. Environmental Protection Agency mg/kg: milligrams per kilogram mg/L: milligrams per liter

SM: Standard Method

Table 3
Analyte List, Methods, and Reporting and Detection Limits for Groundwater

	Analytical	Groundwater	Reporting	Method Detection
Parameter	Method	Method Screening Levels ¹		Limit
TCL Volatile Organic Compounds (բ	ıg/L)			
Methylene chloride	EPA 8260	5	3.0	0.289
1,1-Dichloroethane	EPA 8260	5	0.75	0.21
Chloroform	EPA 8260	7	0.75	0.162
Carbon tetrachloride	EPA 8260	0.4	0.5	0.134
1,2-Dichloropropane	EPA 8260	1	1.75	0.133
Dibromochloromethane	EPA 8260	50	0.5	0.149
1,1,2-Trichloroethane	EPA 8260	1	0.75	0.144
Tetrachloroethene	EPA 8260	0.7	0.5	0.181
Chlorobenzene	EPA 8260	5	0.5	0.178
Trichlorofluoromethane	EPA 8260	5	2.5	0.161
1,2-Dichloroethane	EPA 8260	0.6	0.5	0.132
1,1,1-Trichloroethane	EPA 8260	5	0.5	0.158
Bromodichloromethane	EPA 8260	50	0.5	0.192
trans-1,3-Dichloropropene	EPA 8260	0.4	0.5	0.164
cis-1,3-Dichloropropene	EPA 8260	0.4	0.5	0.144
1,3-Dichloropropene, Total	EPA 8260	0.4	0.5	0.144
1,1-Dichloropropene	EPA 8260	5	2.5	0.173
Bromoform	EPA 8260	50	2.0	0.248
1,1,2,2-Tetrachloroethane	EPA 8260	0.2	0.5	0.144
Benzene	EPA 8260	1	0.5	0.159
Toluene	EPA 8260	5	0.75	0.161
Ethylbenzene	EPA 8260	5	0.5	0.168
Chloromethane	EPA 8260	5	2.5	0.176
Bromomethane	EPA 8260	5	1.0	0.256
Vinyl chloride	EPA 8260	0.3	1.0	0.0699
Chloroethane	EPA 8260	5	1.0	0.134
1,1-Dichloroethene	EPA 8260	0.7	0.5	0.142
trans-1,2-Dichloroethene	EPA 8260	5	0.75	0.163
1,2-Dichloroethene (total)	EPA 8260		0.5	0.163
Trichloroethene	EPA 8260	5	0.5	0.175
1,2-Dichlorobenzene	EPA 8260	3	2.5	0.184
1,3-Dichlorobenzene	EPA 8260	3	2.5	0.186
1,4-Dichlorobenzene	EPA 8260	3	2.5	0.187
Methyl tert butyl ether	EPA 8260	10	1.0	0.2
p/m-Xylene	EPA 8260	5	1.0	0.3
o-Xylene	EPA 8260	5	1.0	0.3
Xylene (Total)	EPA 8260	5	1.0	0.3
cis-1,2-Dichloroethene	EPA 8260	5	0.5	0.187
Dibromomethane	EPA 8260	5	5.0	0.363
1,4-Dichlorobutane	EPA 8260		5.0	0.464
1,2,3-Trichloropropane	EPA 8260	0.04	5.0	0.176

Table 3
Analyte List, Methods, and Reporting and Detection Limits for Groundwater

	Analytical	Groundwater	Reporting	Method Detection
Parameter	Method	Screening Levels ¹	Limit	Limit
Styrene	EPA 8260	5	1.0	0.359
Dichlorodifluoromethane	EPA 8260	5	5.0	0.245
Acetone	EPA 8260	50	5.0	1.46
Carbon disulfide	EPA 8260	60	5.0	0.299
2-Butanone	EPA 8260	50	5.0	1.94
Vinyl acetate	EPA 8260		5.0	0.311
4-Methyl-2-pentanone	EPA 8260		5.0	0.416
2-Hexanone	EPA 8260	50	5.0	0.515
Ethyl methacrylate	EPA 8260	3	5.0	0.606
Acrylonitrile	EPA 8260	5	5.0	0.43
Bromochloromethane	EPA 8260	5	2.5	0.138
Tetrahydrofuran	EPA 8260	50	5.0	0.525
2,2-Dichloropropane	EPA 8260	5	2.5	0.204
1,2-Dibromoethane	EPA 8260	0.0006	2.0	0.193
1,3-Dichloropropane	EPA 8260	5	2.5	0.212
1,1,1,2-Tetrachloroethane	EPA 8260	5	0.5	0.164
Bromobenzene	EPA 8260	5	2.5	0.152
n-Butylbenzene	EPA 8260	5	0.5	0.192
sec-Butylbenzene	EPA 8260	5	0.5	0.181
tert-Butylbenzene	EPA 8260	5	2.5	0.185
o-Chlorotoluene	EPA 8260	5	2.5	0.17
p-Chlorotoluene	EPA 8260	5	2.5	0.185
1,2-Dibromo-3-chloropropane	EPA 8260	0.04	2.5	0.327
Hexachlorobutadiene	EPA 8260	0.5	0.5	0.217
Isopropylbenzene	EPA 8260	5	0.5	0.187
p-lsopropyltoluene	EPA 8260	5	0.5	0.188
Naphthalene	EPA 8260	10	2.5	0.216
n-Propylbenzene	EPA 8260	5	0.5	0.173
1,2,3-Trichlorobenzene	EPA 8260	5	2.5	0.234
1,2,4-Trichlorobenzene	EPA 8260	5	2.5	0.22
1,3,5-Trimethylbenzene	EPA 8260	5	2.5	0.174
1,3,5-Trichlorobenzene	EPA 8260	5	2	0.127
1,2,4-Trimethylbenzene	EPA 8260	5	2.5	0.191
trans-1,4-Dichloro-2-butene	EPA 8260	5	2.5	0.173
Ethyl ether	EPA 8260		2.5	0.15
Methyl Acetate	EPA 8260		10	0.234
Ethyl Acetate	EPA 8260		10	0.716
Isopropyl Ether	EPA 8260		2.0	0.425
Cyclohexane	EPA 8260		10	0.271
Ethyl-Tert-Butyl-Ether	EPA 8260		2.0	0.179
Tertiary-Amyl Methyl Ether	EPA 8260		2.0	0.278
1,4-Dioxane	EPA 8260		250	41.1

Table 3
Analyte List, Methods, and Reporting and Detection Limits for Groundwater

	Analytical	Groundwater	Reporting	Method Detection
Parameter	Method	Screening Levels ¹	Limit	Limit
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260	5	10	0.148
Methyl cyclohexane	EPA 8260		10	0.396
1,4-Diethylbenzene	EPA 8260		2.0	0.392
4-Ethyltoluene	EPA 8260		2.0	0.34
1,2,4,5-Tetramethylbenzene	EPA 8260	5	2.0	0.542
TCL Semivolatile Organic Compounds (μg/L)			l
Bis(2-chloroethyl)ether	EPA 8270D	0.03	0.5	0.0929
Phenol	EPA 8270D	2	0.5	0.0512
2-Chlorophenol	EPA 8270D		0.5	0.0912
1,3-Dichlorobenzene	EPA 8270D	3	0.5	0.0783
1,4-Dichlorobenzene	EPA 8270D	3	0.5	0.0828
1,2-Dichlorobenzene	EPA 8270D	3	0.5	0.0680
Bis(2-chloroisopropyl)ether	EPA 8270D	5	0.5	0.1080
2-Methylphenol	EPA 8270D		0.5	0.1040
Hexachloroethane	EPA 8270D	5	0.5	0.1020
N-Nitroso-di-n-propylamine	EPA 8270D		0.5	0.1230
4-Methylphenol	EPA 8270D		0.5	0.1130
Nitrobenzene	EPA 8270D	0.4	0.5	0.1020
Isophorone	EPA 8270D	50	0.5	0.1260
2-Nitrophenol	EPA 8270D		0.5	0.1150
2,4-Dimethylphenol	EPA 8270D	50	2.0	0.2410
Bis(2-chloroethoxy)methane	EPA 8270D	5	0.5	0.0854
2,4-Dichlorophenol	EPA 8270D	5	0.5	0.0996
1,2,4-Trichlorobenzene	EPA 8270D	5	0.5	0.0961
Naphthalene	EPA 8270D	10	0.5	0.0876
4-Chloroaniline	EPA 8270D	5	0.5	0.1280
Hexachlorobutadiene	EPA 8270D	0.5	0.5	0.0855
P-Chloro-M-Cresol	EPA 8270D		0.5	0.1030
2-Methylnaphthalene	EPA 8270D		0.5	0.0911
1,2,4,5-Tetrachlorobenzene	EPA 8270D	5	0.5	0.0797
Hexachlorocyclopentadiene	EPA 8270D	5	0.5	0.1530
Pentachloronitrobenzene	EPA 8270D	ND	0.5	0.1690
2,4,6-Trichlorophenol	EPA 8270D		0.5	0.1520
2,4,5-Trichlorophenol	EPA 8270D		0.5	0.0913
2-Chloronaphthalene	EPA 8270D	10	0.5	0.0899
2-Nitroaniline	EPA 8270D	5	0.5	0.1380
Acenaphthylene	EPA 8270D		0.5	0.1120
Dimethylphthalate	EPA 8270D	50	0.5	0.1170
2,6-Dinitrotoluene	EPA 8270D	0.07	0.5	0.1680
Acenaphthene	EPA 8270D	20	0.5	0.0955
3-Nitroaniline	EPA 8270D	5	0.5	0.1110
2,4-Dinitrophenol	EPA 8270D	10	5.0	0.7280

Table 3
Analyte List, Methods, and Reporting and Detection Limits for Groundwater

	Analytical	Groundwater	Reporting	Method Detection
Parameter	Method	Screening Levels ¹	Limit	Limit
Dibenzofuran	EPA 8270D		0.5	0.0910
2,4-Dinitrotoluene	EPA 8270D	5	0.5	0.1630
4-Nitrophenol	EPA 8270D		2.5	0.5900
2,3,4,6-Tetrachlorophenol	EPA 8270D		0.5	0.1430
Fluorene	EPA 8270D	50	0.5	0.1040
4-Chlorophenyl phenyl ether	EPA 8270D		0.5	0.0792
Diethylphthalate	EPA 8270D	50	0.5	0.1800
Azobenzene	EPA 8270D	5	0.5	0.1280
4-Nitroaniline	EPA 8270D	5	0.5	0.1120
4,6-Dinitro-2-Methylphenol	EPA 8270D		2.0	0.5100
NitrosoDiPhenylAmine(NDPA)/DPA	EPA 8270D	50	0.5	0.0720
4-Bromophenyl phenyl ether	EPA 8270D		0.5	0.0997
Hexachlorobenzene	EPA 8270D	0.04	0.5	0.1220
Pentachlorophenol	EPA 8270D	2	2.0	0.4300
Phenanthrene	EPA 8270D	50	0.5	0.1110
Anthracene	EPA 8270D	50	0.5	0.1370
Carbazole	EPA 8270D		0.5	0.1430
Di-n-butylphthalate	EPA 8270D	50	0.5	0.0996
Fluoranthene	EPA 8270D	50	0.5	0.1560
Pyrene	EPA 8270D	50	0.5	0.1700
Butylbenzylphthalate	EPA 8270D	50	0.5	0.0848
3,3'-Dichlorobenzidine	EPA 8270D	5	0.5	0.1930
Benz(a)anthracene	EPA 8270D	0.002	0.5	0.1840
Chrysene	EPA 8270D	0.002	0.5	0.1420
Bis(2-Ethylhexyl)phthalate	EPA 8270D	5	0.5	0.0809
Di-n-octylphthalate	EPA 8270D	50	1.0	0.0786
Benzo(b)fluoranthene	EPA 8270D	0.002	0.5	0.0655
Benzo(k)fluoranthene	EPA 8270D	0.002	0.5	0.1610
Benzo(a)pyrene	EPA 8270D	0.002	0.5	0.0602
Indeno(1,2,3-cd)Pyrene	EPA 8270D	0.002	0.5	0.0896
Dibenz(a,h)anthracene	EPA 8270D		0.5	0.0641
Benzo(ghi)perylene	EPA 8270D		0.5	0.1090
Aniline	EPA 8270D	5	1.0	0.1270
Acetophenone	EPA 8270D		1.0	0.2070
Atrazine	EPA 8270D	7.5	0.5	0.1600
Benzaldehyde	EPA 8270D		2.0	0.1190
Benzidine	EPA 8270D	5	20.0	0.4640
Caprolactam	EPA 8270D		2.0	0.1230
n-Nitrosodimethylamine	EPA 8270D		0.5	0.0720
Biphenyl	EPA 8270D	5	0.5	0.1110
Benzyl Alcohol	EPA 8270D		0.5	0.1230
Pyridine	EPA 8270D	50	0.5	0.1630

Table 3
Analyte List, Methods, and Reporting and Detection Limits for Groundwater

	Analytical	Groundwater	Reporting	Method Detection
Parameter	Method	Screening Levels ¹	Limit	Limit
Benzoic Acid	EPA 8270D		40.0	3.0100
Total and Dissolved Metals (mg/L)				
Aluminum	EPA 6020B		0.01	0.0033
Antimony	EPA 6020B	0.003	0.004	0.0004
Arsenic	EPA 6020B	0.05	0.0005	0.0002
Barium	EPA 6020B	1	0.0005	0.0002
Beryllium	EPA 6020B	0.003	0.0003	0.0001
Cadmium	EPA 6020B	0.005	0.0002	0.0001
Calcium	EPA 6020B		0.1	0.0394
Chromium	EPA 6020B	0.05	0.001	0.0002
Cobalt	EPA 6020B		0.0005	0.0002
Copper	EPA 6020B	0.2	0.001	0.0004
Iron	EPA 6020B		0.050	0.0191
Lead	EPA 6020B	0.05	0.001	0.0003
Magnesium	EPA 6020B	35	0.070	0.0242
Manganese	EPA 6020B		0.001	0.0004
Mercury	EPA 7474	0.0007	0.0001	0.000026
Nickel	EPA 6020B	0.1	0.002	0.0006
Potassium	EPA 6020B		0.100	0.0309
Selenium	EPA 6020B	0.01	0.005	0.0017
Silver	EPA 6020B	0.05	0.0004	0.0002
Sodium	EPA 6020B		0.100	0.0293
Thallium	EPA 6020B	0.0005	0.0005	0.0001
Vanadium	EPA 6020B		0.005	0.0016
Zinc	EPA 6020B	2	0.010	0.0034

NYSDEC (New York State Department of Environmental Conservation), 1998. *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.* Class GA. Division of Water Technical and Operational Guidance Series (1.1.1). June 1998.

--: not applicable

μg/L: micrograms per liter

CAS RN: Chemical Abstracts Service Registry Number

EPA: U.S. Environmental Protection Agency

mg/L: milligrams per liter

ND: "a non-detectable concentration by the approved analytical methods referenced in section 700.3"

SM: Standard Method TCL: Target Compound List

^{1.} New York State Groundwater Effluent Limitations, Class GA (NYSDEC 1998)

Table 4
Waste Characterization Analyte List, Methods, and Reporting and Detection Limits

	Recommended		
Parameter	Analytical Method	MDL ¹	MRL ¹
Conventionals (mg/kg)	•		
pH (SU)	EPA 9045D	_	_
lgnitablility (°)	EPA 1030	_	_
Corrosivity	EPA 9040C	_	
Total Solids (%)	SM 2540 G	0.10	0.10
TCLP Metals (mg/L)	•		
Arsenic	EPA 6020A	0.05	0.10
Barium	EPA 6020A	2.5	5.00
Cadmium	EPA 6020A	0.05	0.10
Chromium	EPA 6020A	0.05	0.10
Lead	EPA 6020A	0.025	0.05
Mercury	EPA 6020A	0.0035	0.007
Selenium	EPA 6020A	0.05	0.10
Silver	EPA 6020A	0.05	0.10
TCLP VOCs (mg/L)	•		
Benzene	EPA 8260C	0.00625	0.0125
Carbon tetrachloride	EPA 8260C	0.0125	0.025
Chlorobenzene	EPA 8260C	0.0125	0.025
Chloroform	EPA 8260C	0.025	0.05
1,2-Dichloroethane	EPA 8260C	0.0125	0.025
1,1-Dichloroethene	EPA 8260C	0.0125	0.025
1,4-Dichlorobenzene	EPA 8260C	0.0125	0.025
2-Butanone	EPA 8260C	0.25	0.5
Tetrachloroethene	EPA 8260C	0.0125	0.025
Trichloroethene	EPA 8260C	0.0125	0.025
Vinyl chloride	EPA 8260C	0.0125	0.025
TCLP SVOCs (mg/L)			
2,4,5-Trichlorophenol	EPA 8270D	0.0025	0.005
2,4,6-Trichlorophenol	EPA 8270D	0.0025	0.005
2,4-Dinitrotoluene	EPA 8270D	0.001	0.002
2-Methylphenol	EPA 8270D	0.0025	0.005
3- & 4-Methylphenol	EPA 8270D	0.0025	0.005
Hexachlorobenzene	EPA 8270D	0.001	0.002
Hexachlorobutadiene	EPA 8270D	0.0025	0.005
Hexachloroethane	EPA 8270D	0.0025	0.005
Nitrobenzene	EPA 8270D	0.0025	0.005
Pentachlorophenol	EPA 8270D	0.005	0.01
Pyridine	EPA 8270D	0.005	0.01
TCLP PCBs (ug/L)			
Aroclor 1016	EPA 8082A	0.02	0.01
Aroclor 1221	EPA 8082A	0.02	0.01
Aroclor 1232	EPA 8082A	0.02	0.01

Table 4
Waste Characterization Analyte List, Methods, and Reporting and Detection Limits

Parameter	Recommended Analytical Method	MDL ¹	MRL ¹
Aroclor 1242	EPA 8082A	0.02	0.01
Aroclor 1248	EPA 8082A	0.02	0.01
Aroclor 1254	EPA 8082A	0.02	0.01
Aroclor 1260	EPA 8082A	0.02	0.01

1. Actual MDLs and MRLs may vary based on sample aliquot size, moisture content, and required dilution factor.

—: not applicable

μg/kg: micrograms per kilogram

EPA: U.S. Environmental Protection Agency

MDL: method detection limit mg/kg: milligrams per kilogram mg/L: milligrams per liter MRL: method reporting limit PCB: polychlorinated biphenyl SM: Standard Method

SVOC: semivolatile organic compound

TCLP: toxicity characteristic leaching procedure

VOC: volatile organic compound

Table 5
Laboratory Quality Control Sample Analysis Summary for Soil and Groundwater

Analysis Type	Initial Calibration	Ongoing Calibration	Laboratory Control Samples	Duplicates	Matrix Spikes	Matrix Spike Duplicates	Method Blanks	Surrogate Spikes
Total solids	Daily ^{1,2}	N/A	N/A	1 per 20 samples	N/A	N/A	N/A	N/A
VOCs	As needed ⁴	Every 12 hours	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	Every sample
SVOCs	As needed ⁴	Every 12 hours	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	Every sample
Metals	Daily ³	Every 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	N/A	N/A

- 1. Calibration and certification of drying ovens and weighing scales are conducted bi-annually.
- 2. Scale should be calibrated with Class 5 weights daily; weights must bracket the weight of sample and weighing vessel.
- 3. Initial calibration verification and calibration blank must be analyzed at the beginning of each batch.
- 4. Initial calibrations are considered valid until the ongoing continuing calibration no longer meets method specifications. At that point, a new initial calibration is performed.

N/A: not applicable

SVOC: semivolatile organic compound VOC: volatile organic compound

Table 6
Data Quality Objectives

Parameter	Precision ¹	Accuracy ²	Completeness	
Soil Samples				
Total solids	± 20% RPD	N/A	95%	
VOCs	± 35% RPD	50–150% R	95%	
SVOCs	± 35% RPD	50–150% R	95%	
Metals	± 30% RPD	75–125% R	95%	
Groundwater Samples				
VOCs	± 35% RPD	60–140% R	95%	
SVOCs	± 35% RPD	60–140% R	95%	
Total and dissolved metals	± 20% RPD	80–120% R	95%	
Waste Characterization Sample	s	•	-	
VOCs, SVOCs, PCBs	± 35% RPD	50 to 150% R	95%	
Metals	± 25% RPD	75 to 125% R	95%	

1. When the sample concentration is greater than five times the reporting limit.

2. Accuracy goals apply to laboratory control samples and matrix spike samples, as applicable to the analysis.

N/A: not applicable

PCB: polychlorinated biphenyl

R: recovery

RPD: relative percent difference SVOC: semivolatile organic compound VOC: volatile organic compound

Appendix B Health and Safety Plan

March 2022 Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570



Appendix B Health and Safety Plan

Prepared for

Consolidated Edison Company of New York, Inc. 3101 20th Avenue, Building 136, 2nd Floor Long Island City, New York 11105

Prepared by

Anchor QEA, PLLC 290 Elwood Davis Road, Suite 340 Liverpool, New York 13088

Certification Page

Scott Andrews
Field Lead
Anchor QEA, PLLC
Date:

The information in this Health and Safety Plan has been designed for pre-design investigations presently contemplated by Anchor QEA, PLLC (Anchor QEA) and outlined in the Pre-Design Investigation Work Plan (Anchor QEA 2022). Therefore, this document may not be appropriate if the work is not performed by or using the methods presently contemplated by Anchor QEA. In addition, as the work is performed, conditions different from those anticipated may be encountered and this document may have to be modified. Therefore, Anchor QEA only intends this plan to address currently anticipated activities and conditions and makes no representations or warranties as to the adequacy of the Health and Safety Plan for all conditions encountered.

Health and Safety Plan Acknowledgement Form

Project Number: E10921-02.05

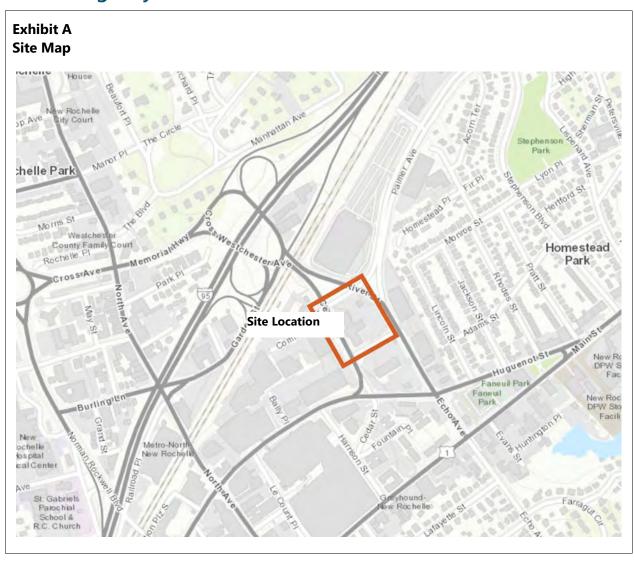
Project Name: Cedar Street Works Former Manufactured Gas Plant – Emergent Contaminant Sampling

My signature below certifies that I have read and understand the policies and procedures specified in this Health and Safety Plan (HASP). For non-Anchor QEA employees, this HASP may include company-specific attachments to this plan developed by entities other than Anchor QEA.

Date	Name (print)	Signature	Company

Date	Name (print)	Signature	Company

Site Emergency Procedures



Emergency Contact Information

Table A
Site Emergency Form and Emergency Phone Numbers*

Category Inform		nation		
Possible Chemicals of Concern Sulfide		Benzene, o-,m-,p-Xylenes, Toluene, Ethyl Benzene, Hydrogen Sulfide, coal tar pitch volatiles, Naphthalene, Polycyclic Aromatic Hydrocarbons (PAHs), Cyanide		
Minimum Level of Protection	Modifi	ied Level D		
Site(s) Location Address	Point I	ocation – 47 Cedar Stree	t, New Rochelle, New York 10801	
Eme	rgency P	Phone Numbers		
Ambulance		911		
Fire		911		
Police		911		
Poison Control		(800) 222-1222		
Con Edison Project Manager: Melissa Abt		(646) 860-5143		
Project Manager/Superintendent: Nicholas Smit	h, PG	(315) 414-2017		
Field Lead: Scott Andrews		Cell: (206) 303-7070		
Corporate Health and Safety Manager		David Templeton	Office: (206) 287-9130 Cell: (206) 910-4279	
NYS Spill Hotline		(800) 457-7362		
EPA Emergency Response Team, ¹ Region 2		(212) 637-3660		

Notes:

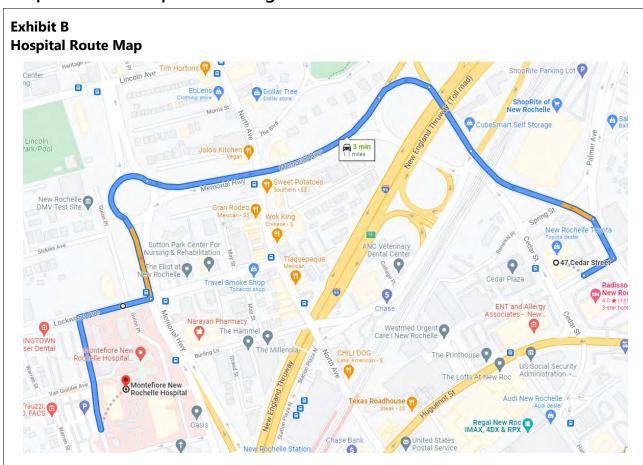
Table B
Hospital Information

Category	Information
Hospital Name	Montefiore New Rochelle Hospital
Address	16 Guion Place
City, State	New Rochelle, New York 10801
Phone	(914) 365-3770
Emergency Phone	911

^{*} In the event of any emergency, contact the PM and FL.

^{1.} For local resources, please visit: http://www2.epa.gov/emergency-response/emergency-response-my-community. The National Response Center hotline is (800) 424-8802.

Hospital Route Map and Driving Directions



- 1. Head northeast on Radisson Plaza towards River Street; approximately 200 feet.
- 2. Turn left onto River Street.
- 3. Continue on River Street, and merge onto Cedar Street; 0.3 miles.
- 4. Continue straight and then continue onto Memorial Highway; 0.1 miles.
- 5. Continue onto Norman Rockwell Blvd; 0.2 mile.
- 6. Turn right onto Lockwood Avenue; approximately 130 feet.
- 7. Turn left on Glover Johnson PI and follow signs to emergency room

WorkCare Incident Intervention

Anchor QEA has an additional Incident Intervention resource from WorkCare to help answer questions, alleviate uncertainty and stress in a potential injury situation, and maintain the health and safety of our employees. Incident Intervention is an injury and illness management tool that provides employees with 24 hours a day/7 days a week (24/7) <u>immediate</u> telephone access to a member of

WorkCare's clinical staff of nurses and physicians who intervene at the time of a workplace injury or illness. Contact information is provided below:

Access WorkCare 24/7 from anywhere using the toll-free number: 1-888-449-7787

At the time of a workplace injury or illness, the employee, manager, or another employee at the scene notifies WorkCare using the toll-free number listed above. The caller provides information on the type of incident, possible cause, and the scope of the situation. With the details of the incident recorded, an experienced nurse or physician provides the following:

- Responsive evaluation of the incident
- Direction on the appropriate course of action
- Consultation with the employee's treating physician to design a quality care treatment plan
 that meets the needs of the employee and Anchor QEA

All employees are encouraged to use this service should a workplace injury or illness occur.

Key Safety Personnel

The following people share responsibility for health and safety at the site. See Section 4 of this Health and Safety Plan (HASP) for a description of the role and responsibility of each.

Client Contact: Con Edison Project Manager, Melissa Abt

Cell: (646) 860-5143

Project Manager: Anchor QEA, Nicholas Smith, PG

Office: (315) 414-2017

Field Lead: Anchor QEA, Scott Andrews

Cell: (206) 303-7070

Corporate Health and Safety Manager: David Templeton

Office: (206) 287-9130

Cell: (206) 910-4279

Emergency Response Procedures

In the event of an emergency, immediate action must be taken by the first person to recognize the event. Use the following steps as a guideline:

- 1. Survey the situation to ensure that it is safe for you and the victim. Do not endanger your own life. Do not enter an area to rescue someone who has been overcome unless properly equipped and trained. Ensure that all protocols are followed. If applicable, review Safety Data Sheets (SDS) to evaluate response actions for chemical exposures.
- 2. Call the appropriate emergency number (911, if available) or direct someone else to do this immediately (see **Table A**). Explain the physical injury, chemical exposure, fire, or release and location of the incident.
- Have someone retrieve the nearest first aid kit (containing appropriate items for the particular work scope) and Automated External Defibrillator (AED), if available. Note: Only use an AED if you have been properly trained and are currently certified to do so.
- 4. Decontaminate the victim without delaying life-saving procedures (see Section 8).

- 5. Administer first aid and cardiopulmonary resuscitation (CPR), if properly trained, until emergency responders arrive.
- 6. Notify the Project Manager (PM), Field Lead (FL), and owner.
- 7. Complete the appropriate incident investigation reports.
- 8. In the event that evacuation is required, the FL must perform a head count to verify that all Anchor QEA personnel are accounted for.

First Aid and CPR Guidelines

Personnel qualified and currently certified in basic first aid and/or CPR procedures may perform these procedures as necessary. Personnel qualified and currently certified in basic first aid and/or CPR are protected under Good Samaritan policies as long as they only perform the basic tasks that they were taught. Do not perform first aid and/or CPR tasks if you have not been trained in first aid and/or CPR.

Fire

In the case of a fire on the Site, the Health and Safety Representative and/or Key Foreperson will assess the situation and direct fire-fighting activities. The Health and Safety Representative and/or Key Foreperson will ensure the client and PM/Superintendent is notified immediately of any fires, as soon as it is safe to do so. Site personnel may attempt to extinguish small fires with available fire extinguishers, if it is safe to do so and qualified personnel are available. In the event of a fire when Site personnel are not qualified or otherwise unable to safely extinguish, the local fire department will be summoned (see **Table A** for contact information).

Injury Management/Incident Notification

Observe the following injury management/incident notification procedures and practices:

Injury Management

- Once a personal injury incident is discovered, the first action will be to ensure that the injured party receives appropriate medical attention.
- If it is safe to do so, the nearest site personnel will immediately assist a person who shows signs of medical distress or who is involved in an accident.
- Call 911 or the appropriate emergency number and render first aid as soon as possible.
- Escort the injured person to the occupational clinic or hospital or arrange for an ambulance.
- Proceed immediately to Notification Requirements, below.

Notification Requirements

- Directly after caring for an injured person, summon the FL. The FL will immediately contact the PM or other designated individual to alert them of the medical emergency. The FL will advise them of the following:
 - Location of the victim at the work site
 - Nature of the emergency
 - Whether the victim is conscious
 - Specific conditions contributing to the injury, if known
- Contact the PM (if not contacted previously) and owner immediately.
- The PM will contact upper line management, including the Corporate Health and Safety Manager (CHSM).
- The CHSM will facilitate the incident investigation.

All client requirements pertinent to personal injury incident reporting will also be adhered to.

Incident Other Than Personal Injury

All incidents including, but not limited to, fire, explosion, property damage, or environmental release will be responded to in accordance with the site-specific HASP. In general, this includes securing the site appropriate to the incident, turning control over to the emergency responders, or securing the site and summoning appropriate remedial personnel or equipment. Anchor QEA will immediately notify the client of any major incident, fire, equipment or property damage, or environmental incident with a preliminary report. A full report will be provided within 72 hours.

Near-miss Reporting

All near-miss incidents (i.e., those that could have reasonably led to an injury, environmental release, or other incident) must be reported to the FL and/or PM immediately so action can be taken to ensure that such conditions that led to the near-miss incident are readily corrected in order to prevent future occurrences.

Spills and Releases of Hazardous Materials

Contaminant Release

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

- Notify the Key Foreperson and Health and Safety Representative immediately.
- Evacuate the area of release and assess what type of release/chemicals may be involved.
- Conduct air monitoring to determine the needed level of personal protective equipment (PPE).

• Don appropriate PPE, if it is safe to do so and personnel are qualified, and implement control measures to stop and control the release. If the release is unable to be contained safely, or Site personnel are not qualified to respond to the release, the local fire department will be summoned (see **Table A** for contact information).

When required, the PM/Superintendent will coordinate with the client and site owner (as applicable) to notify the National Response Center and local state agencies (see **Table A** for contact information). If hazardous waste has been released or produced through control of the incident, the PM/Superintendent will ensure that:

- Waste is collected and contained by qualified personnel
- Containers of waste are removed or isolated from the immediate site of the emergency
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided
- No waste that is incompatible with released material is used or stored at the Site until cleanup procedures are completed
- All emergency equipment used is decontaminated, recharged, and fit for its intended use before operations resume.

When required, notify the National Response Center and local state agencies. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility

The emergency telephone number for the National Response Center is 1-800-424-8802. If hazardous waste is released or produced through control of the incident, ensure that:

- Waste is collected and contained
- Containers of waste are removed or isolated from the immediate site of the emergency
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided
- No waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed

Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.

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ATTACHMENTS

Attachment A	Health and Safety Plan Forms
Attachment B	Training Records

Attachment C Safety Data Sheets for Chemicals of Concern

Attachment D Activity Hazard Analysis Forms

Attachment E Consolidated Edison Corporate Environmental Health and Safety Procedures

Attachment F COVID-19 Management Plan

ABBREVIATIONS

AED Automated External Defibrillator

AHA Activity Hazard Analysis

ANSI American National Standards Institute

ASTM ASTM International

BTEX benzene, ethylbenzene, toluene, and xylenes

CAMP Community Air Monitoring Program

CDC Centers for Disease Control
CFR Code of Federal Regulations

CHSM Corporate Health and Safety Manager

COC contaminant of concern

Con Edison Company of New York, Inc.

CPR cardiopulmonary resuscitation
CRZ Contamination Reduction Zone
DEET N,N-diethyl-meta-toluamide
DNAPL dense non-aqueous phase liquid
DOT U.S. Department of Transportation
EPA U.S. Environmental Protection Agency

EZ Exclusion Zone/Hot Zone

GFCI Ground-fault Circuit Interrupter

HASP Health and Safety Plan

HAZWOPER Hazardous Waste Operations and Emergency Response

HEPA High Efficiency Particulate Air

IDLH Immediately Dangerous to Life and Health

IDW investigation-derived waste

kPa kilopascal

LEL lower exposure limit

LNAPL light non-aqueous phase liquid

LO/TO lock out/tag out

mg/m³ milligrams per cubic meter
MGP manufactured gas plant
MHR maximum heart rate
NAPL nonaqueous phase liquid
NEC National Electrical Code

NIOSH National Institute for Occupational Safety and Health

OSHA Occupational Safety and Health Administration

PAH Polychlorinated aromatic hydrocarbon

PE Professional Engineer

PEL Permissible Exposure Limit
PFD personal floatation device
PID Photo Ionization Detector

PM Project Manager

PPE Personal Protective Equipment

ppm parts per million

RIR Remedial Investigation Report

SDS Safety Data Sheet

Site Con Edison Former MGP Site
STEL Short Term Exposure Limit

SVOC semivolatile organic compound

SC Support Zone/Clean Zone

TBD to be determined
TLV Threshold Limit Value
TWA time-weighted average

USCG U.S. Coast Guard

UV ultraviolet

VOC Volatile Organic Compounds
WBGT wet bulb globe temperature

1 Introduction

This Health and Safety Plan (HASP) has been prepared on behalf of Consolidated Edison Company of New York, Inc. (Con Edison), and presents health and safety requirements and procedures that will be followed by Anchor QEA, PLLC (Anchor QEA) personnel and subcontractors during work activities at the Cedar Street Works former manufactured gas plant (MGP). The location of the former MGP is situated within Cedar Street and the parcel designated as Section 1, Block 247, Lot 15 (the parcel) on the Tax Map of the City of New Rochelle, County of Westchester (hereinafter referred to as the "Site"). This HASP has been developed in accordance with Title 29 of the Code of Federal Regulations (CFR), Part 1910.120 (b), and will be used in conjunction with Anchor QEA's Corporate Health and Safety Program.

The provisions of this HASP are mandatory for all Anchor QEA personnel assigned to the project. A copy of this HASP must be maintained on site and available for employee review at all times. Anchor QEA subcontractors are also expected to follow the provisions of this HASP unless they have their own HASP that covers their specific activities related to this project. Any subcontractor HASPs must include the requirements set forth in this HASP, at a minimum. All visitors to the work site associated with Anchor QEA work activities must also abide by the requirements of this HASP and will attend a pre-work briefing where the contents of this HASP will be presented and discussed.

Each member of the project team will endorse the signature page of this HASP indicating they understand and agree to abide by the health and safety requirements for the Site. For each new task, a project kick-off meeting will be conducted to review the site-specific HASP and discuss the Scope of Work and planned activities for the day.

1.1 Health and Safety Plan Modifications

This HASP will be modified by amendment, if necessary, to address changing field conditions or additional work tasks not already described in this document. Modifications will be proposed by the Field Lead (FL) using the Modification to Health and Safety Plan form included in **Attachment A.** Modifications will be reviewed by the Corporate Health and Safety Manager (CHSM) or authorized representative and approved by the Project Manager (PM).

2 Statement of Health and Safety Policy

Anchor QEA's Corporate Health and Safety Program is designed to provide guidelines to ensure that Anchor QEA provides its employees a place of employment that is free from recognized hazards that may cause death, serious physical harm, or illness. It is not intended to replace direct, ongoing communication. Cooperation and communication from all employees are essential for an effective health and safety program.

Safety is one of Anchor QEA's Core Values. Each and every Anchor QEA employee has both the authority and responsibility to make safety-related decisions at any time, including the decision to stop a work task if conditions appear or may become unsafe. This fundamental approach is supported throughout the highest levels of management and fosters a proactive attitude toward maintaining a program that meets and, in many respects, exceeds federal, local, and client requirements.

3 Site Background Information

3.1 Site Location and Description

The Site is located in New Rochelle, New York, and is bounded by Spring Street to the north, River Street to the east, and Radisson Plaza to the south (see Exhibits A and B). The Site includes the parcel and a portion of Cedar Street.

3.2 Site History

Table 3-1 presents an overview of Site history, operations, and ownership based on information presented in the Remedial Investigation Report (RIR), unless noted otherwise.

Table 3-1
Site History and Operations

Years	Property Owner	Property Use
1863–1888	New Rochelle Gas Light Company	MGP–Coal Carbonization
1888–1895	New Rochelle Gas Light Co.	MGP–Carbureted Water Gas (beginning in 1890)
1896–1899	New Rochelle Gas and Fuel Company (operated by the American Gas Company of Philadelphia) ¹	MGP–Carbureted Water Gas
1899–1900	NY Suburban Gas Co.	MGP–Carbureted Water Gas
1900–1911	Westchester Lighting Co.	MGP–Carbureted Water Gas
1911–1951	Westchester Lighting Co.	Gas Storage
1951–1953	Con Edison	Gas Storage
1953–1992	R.E.C. Realty Corporation	Transportation (PS Trucking Company); Automotive Sales; and Repair
1992–2019	Donnybrook Realty Corp.	Automotive Sales and Repair

Note:

Information regarding the decommissioning or removal of former MGP subsurface structures is not available, nor is information regarding the installation of the current Cedar Street right-of-way over the former MGP structures.

3.3 Nature and Extent of Constituents of Interest

The results of the remedial investigation indicated that subsurface soil and groundwater contain concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX), a subset of volatile organic compounds (VOCs); a more general class of organic compounds called polycyclic aromatic hydrocarbons (PAHs); and cyanide. PAHs are a subgroup of semi-volatile organic compounds

^{1.} Based on a review of Sanborn Fire Insurance Maps provided in the RIR, and February 11, 1895 edition of The American Gas Light Journal, in 1895, the gas works was noted as owned and operated by the American Gas Works of Philadelphia.

(SVOCs) that consists of approximately 17 commonly recognized multi-ringed, aromatic compounds. These compounds are typically associated with coal tar nonaqueous phase liquid (NAPL) from former MGP operations (USEPA 1988).

In general, the primary MGP-related byproduct responsible for most of the impacts at a former MGP site is coal tar, which generally appears as a dense nonaqueous phase liquid (DNAPL). DNAPLs are heavier than water and tend to sink below the water table if released in sufficient quantities. Depending on the type of gas manufacturing processes employed, coal tar DNAPL may range from only slightly denser (and slightly more viscous) than water, to coal tars that were solid when exposed to ambient air and highly viscous (USEPA 1988). Because the former MGP operations at this Site included both coal carbonization as well as carbureted water gas methods, the coal tar physical characteristics may vary across the Site.

Coal tar comprises of many organic compounds, including BTEX and PAHs that are regulated by the New York State Department of Environmental Conservation (NYSDEC). These two groups of compounds, in addition to NAPLs, are useful in characterizing the nature and extent of contamination on Site related to former MGP operations (hereafter referred to as MGP-related impacts or MGP impacts). Visual characterization of Site soil and laboratory analysis of environmental samples for BTEX and PAHs are appropriate methods used to identify the nature and extent of environmental media affected by coal tar. Therefore, soils containing visual indications of coal tar as well as groundwater and subsurface soils (deeper than 5 feet below ground surface [bgs]) containing BTEX and PAHs above NYSDEC standards, criteria, and guidelines have been identified as the contaminants of concern (COCs) for the Site.

4 Scope of Work Evaluation

This plan addresses health and safety issues associated with the following field task and additional details are included in the Pre-Design Investigation (PDI) Work Plan (Anchor QEA 2022):

- Evaluation of existing monitoring wells, including well assessment, installations, and development.
- Subsurface soil investigation
- NAPL recovery testing in existing wells
- NAPL monitoring utilizing existing wells and any new temporary wells, if installed.

4.1 NAPL Recovery Well Installations and Development

A licensed drilling contractor will mobilize to the Site to install NAPL recovery wells via sonic drilling. At each location soil samples will be collected for visual inspection only while a 10-inch borehole is advanced to the target depth. The 10-inch borehole will allow for a 6-inch recovery well to be installed.

Following installation, each recovery well will be developed to remove any soil that settled within the recovery well during installation and fine-grained soils from the well screen filter pack. Each recovery well will be constructed of stainless-steel and consist of a 2-foot sump placed below the well screen and well riser pipe connected above to the ground surface. All of the well screen and riser pipe will be connected with flush-joint threads.

Soil cuttings and development water will be containerized in 55-gallon drums for profiling and disposal.

5 Hazard/Risk/Exposure Assessment

As required by Con Edison, a site- and task-specific risk analysis will be conducted before commencing any potentially intrusive work activities at the Site. An example of a site-specific risk review checklist is included as **Exhibit 5-1**, which must be modified by the PM prior to performing work at the Site and as related to the specific planned work activities. This checklist documents potential existing exposures that may impact the work, surrounding facilities, equipment, workers, or the public at large. The analysis includes locating, documenting, and/or photographing items such as the following:

- Overhead and underground utilities, including electrical power
- Sewer, water, and communications utilities
- Overhead and underground steam, fuel oil, and/or natural gas pipelines
- Existing building interferences (including foundations, footers, or other associated structures)
- Traffic
- Security
- Fences
- Water hazards
- Existing geographical and environmental conditions
- Investigation Derived Waste Disposal

Upon completion of the site-specific risk analysis, personnel must identify and control work-related hazards and propose controls and mitigation strategies for high-risk activities. This step is further detailed in the remaining sections of this HASP.

Exhibit 5-1
Example Site-Specific Risk Review Checklist

Date:	Project or Location:	
Risk/Hazard	Detail	Present?
Employee Exposure	Hazardous Chemicals	
	Overhead and underground utilities	
	Heavy equipment	
	Traffic	
	Airborne contaminants (dust, mists, fumes)	
	Other (specify):	
Hazardous Waste	Handling, removal or storage of hazardous	
Crane Work	Mobile cranes	
	÷	
	-	
Drilling/ Sampling	Drill rig hazards	-
	Grab Sampling	
Electrical	Staging area	
Personal Protective	Work activities or work site requires hearing protection	
Equipment		
	Work activities or location requires special protective clothing	
Public Exposure	Work activities or location requires special precautions to protect the public	
Permits	Required	
* 1 * 1	Hot permit	
Other Exposures	Other exposure or high-risk activities (list):	
		*

6 Authority and Responsibilities of Key Personnel

This section describes the authority and responsibilities of key project personnel and will be updated as applicable.

6.1 Key Project Personnel

Anchor QEA staff performing the work will be listed in the Table 6-1.

Table 6-1
Anchor QEA, LLC Information

Entity	Telephone
Anchor QEA, LLC Address: 290 Elwood Davis Rd, Suite 340, Liverpool, New York 13088	(518) 222-5486
Project Executive responsible for project: Margaret Carrillo-Sheridan	(315) 414-2049
Project Manager/Superintendent: Nicholas Smith, PG	(315) 414-2017
Health and Safety Representative/Manager: Timothy Shaner	(251) 375-5282
Key Foreperson or Forepersons: Matthew Cavas, PG	(518) 886-0643
Field Lead: Scott Andrews	Cell: (206) 303-7070

6.2 Authorities and Responsibilities of Key Personnel

6.2.1 All Personnel

All project personnel have responsibility for accident prevention and compliance with corporate, regulatory, and client requirements. No person may work in a manner that conflicts with these procedures. Prior to initiating site activities, all project personnel and subcontractor personnel will receive training in accordance with applicable regulations and be familiar with the requirements and standards referenced in the site-specific HASP. Training records for Anchor QEA field personnel are included in **Attachment B**. In addition, all personnel will attend daily safety meetings (tailgate meetings) to discuss site-specific hazards prior to beginning each day's work. Every employee, subcontractor, and client representative at the site has the responsibility to stop or suspend work if conditions arise that pose an unacceptable health and safety risk to the field crew or environment, or if conditions arise that warrant revision or amendment of the site-specific HASP.

6.2.2 Project Executive

The project executive is responsible for providing resources so that the project activities are completed in accordance with the site-specific HASP and for meeting all regulatory and contractual requirements.

6.2.3 Project Manager/Superintendent

The PM/Superintendent provides overall direction for the project. They are responsible for ensuring that the project meets the client's objectives in a safe and timely manner. The PM/Superintendent is responsible for providing qualified staff for the project and adequate resources and budget for the health and safety staff to carry out their responsibilities during the field work. The PM will be in regular contact with the Key Forepersons and health and safety representatives to ensure that appropriate health and safety procedures are implemented into each project task.

The PM/Superintendent has authority to direct response operations; the PM/Superintendent assumes total control over project activities but may assign responsibility for aspects of the project to others. In addition, the PM/Superintendent performs the following tasks:

- Oversees the preparation and organization of background review of the project, the work plan, and the field team.
- Ensures that the team obtains permission for site access and coordinates activities with appropriate officials.
- Briefs the Key Forepersons and field personnel on specific assignments.
- Together with the Key Forepersons, sees that health and safety requirements are met.
- Consults with the Health and Safety Representative(s) regarding unsafe conditions, incidents, or changes in site conditions or the Scope of Work.

6.2.4 Health and Safety Representative/Manager

The Health and Safety Representative/Manager (or his/her designee) will be responsible for managing on-site health and safety activities and will provide support to the PM/Superintendent and Key Forepersons on health and safety issues. The following are specific duties of the health and safety manager:

- Provide technical input into the design and implementation of the site-specific HASP, as well as review and approval of changes or addenda to the HASP.
- Advise on the potential for occupational exposure to project hazards, along with appropriate methods and/or controls to eliminate site hazards.
- Ensure that a hazard assessment has been performed and that the adequacy of the PPE selected was evaluated as required by 29 CFR 1910.132(d), 1910.134, 1926.25, and 1926.55, and is duly noted by the signatures and date appearing on the Certification Page of the sitespecific HASP.
- Consult with the forepersons on matters relating to suspending site activities in the event of an emergency.
- Verify that all on-site personnel have read and signed the HASP Acknowledgement Form on page iv of this HASP.

 Verify that corrective actions resulting from deficiencies identified by audit and observations are implemented and effective.

The Health and Safety Representative/Manager or his/her designee will ensure that field staff have completed required training as applicable (e.g., Occupational Safety and Health Administration [OSHA] training, U.S. Department of Transportation [DOT] training, first aid and cardiopulmonary resuscitation [CPR] training, etc.).

6.2.5 Key Foreperson or Forepersons

The Key Foreperson or Forepersons report to the PM/Superintendent, has authority to direct response operations, and assumes control over on-site activities. The Key Foreperson will direct field activities, will coordinate the technical and health and safety components of the field program, and is responsible in general for enforcing the site-specific HASP and Corporate Health and Safety Program requirements. The Key Foreperson will be the primary point of contact for all field personnel and visitors and has direct responsibility for implementation and administration of the site-specific HASP. The Key Foreperson and any other member of the field crew have STOP WORK AUTHORITY—the authority to stop or suspend work in the event of an emergency, if conditions arise that pose an unacceptable health and safety risk to the field crew or environment, or if conditions arise that warrant revision or amendment of this HASP. It is critical that both the Key Foreperson, PM/Superintendent, and Health and Safety Representative communicate regularly to proactively identify and address any safety-related concerns that may arise. The following include, but are not necessarily limited to, the functions of the Key Foreperson related to the health and safety program:

- Conduct and document daily safety meetings or designate an alternate representative in his
 or her absence.
- Execute the work plan and schedule.
- Conduct periodic field health and safety inspections to ensure compliance with the sitespecific HASP.
- Oversee implementation of safety procedures.
- Implement worker protection levels.
- Enforce site control measures to help ensure that only authorized personnel are allowed on site.
- After coordinating with the PM/Superintendent and Con Edison, notify (when necessary) local public emergency officials.
- Follow-up on incident reports to the PM/Superintendent and Con Edison.
- Periodically inspect protective clothing and equipment for adequacy and safety compliance.
- Ensure that protective clothing and equipment are properly stored and maintained.
- Perform or oversee air monitoring (if required) in accordance with this HASP.

- Maintain and oversee operation of monitoring equipment and interpretation of data from the monitoring equipment.
- Monitor workers for signs of stress, including heat stress, overexertion, cold exposure, and fatigue.
- Require participants to use the "buddy" system in performing tasks.
- Provide (via implementation of the site-specific HASP) emergency procedures, evacuation routes, and telephone numbers for the local hospital, poison control center, fire department, and police department.
- Communicate incidents promptly to the PM/Superintendent and Con Edison.
- Maintain communication with the Health and Safety Representative on site activities.
- If applicable, ensure that decontamination and disposal procedures are followed.
- Maintain the availability of required safety equipment.
- Advise appropriate health services and medical personnel of potential exposures.
- Notify emergency response personnel in the event of an emergency and coordinate emergency medical care.

The Key Foreperson will record health-and-safety-related details of the project in the field logbook. At a minimum, each day's entries must include the following information:

- Project name or location
- Names of all on-site personnel
- Level of PPE worn and any other specifics regarding PPE
- Weather conditions
- Type of field work being performed

6.2.6 Subcontractors

Subcontractors and their personnel must understand and comply with the requirements established in the site-specific HASP. Subcontractors may prepare their own task-specific HASPs, which must meet the requirements of the site-specific HASP, at a minimum. Subcontractor personnel must attend and participate in the daily safety meetings and all other Site safety meetings.

6.2.7 Site Visitors

All visitors must read and acknowledge their understanding of the site-specific HASP, abide by the requirements of the plan, and cooperate with Site supervisors to provide for a safe work Site. All Site personnel, including visitors, will immediately report any issues, accidents, or unsafe situations to the Site supervisors.

7 Potential Chemicals of Concern and General Site Control Measures

7.1 General

The following sections discuss the potential chemicals of concern that may be encountered during intrusive activities at the Site and general site control measures to mitigate the potential hazards.

7.2 Potential Chemicals of Concern

Table 7-1 provides a summary of potential chemicals of concern that may be encountered during intrusive activities at a Con Edison Former MGP Site. The list is not all-inclusive and will be reviewed and modified by Anchor QEA, as required based on Site-specific conditions.

These chemicals can be encountered during monitoring well sampling in and around the Site. Real-time breathing zone air-monitoring for onsite workers will be performed by Anchor QEA's field investigator, using a photoionization detector and additional gas monitors as needed in accordance with applicable regulations. The real-time data will be recorded in the field book by the field investigator/site health and safety representative following each observation and during sampling activities. Requirements for real-time breathing zone air monitoring are presented in Section 10. Safety Data Sheets (SDSs) for potential chemicals of concern are presented in **Attachment C**.

Table 7-1
Relevant Properties of Known or Suspected VOCs and SVOCs

Compound (synonym)	OSHA PEL ⁽¹⁾ (ppm or as otherwise noted)	IDLH (ppm)	LEL (%)	Odor Threshold ⁽²⁾ (ppm)	Odor Character	Vapor Pressure (mm Hg)	Physical State at STP	Detectible w/ 11.7 eV lamp PID (I.P. eV)
Benzene	1 5 [STEL]	500 [Ca]	1.2	119	Aromatic, sweet	75	Flammable Liquid	Yes (9.24)
o-,m-, p-Xylenes	100 150 [STEL]	1000	0.9	20	Aromatic	7,9,9	Flammable Liquid Vapor	Yes (8.4–8.6)
Toluene	200 300 [CEIL]	500	1.1	37	Sweet, pungent Benzene- like	20	Flammable Liquid Vapor	Yes (8.82)
Ethyl Benzene	100 125 [TLV-STEL]	800	0.8	0.8	Oily Solvent	10	Flammable Liquid	Yes (8.76)

Compound (synonym)	OSHA PEL ⁽¹⁾ (ppm or as otherwise noted)	IDLH (ppm)	LEL (%)	Odor Threshold ⁽²⁾ (ppm)	Odor Character	Vapor Pressure (mm Hg)	Physical State at STP	Detectible w/ 11.7 eV lamp PID (I.P. eV)
Hydrogen Sulfide	10	100	4	0.8	Rotten Egg	17.6	Flammable Liquid	No ⁽³⁾
Naphthalene	10 [TLV- STEL]	250	0.9	0.64	Mothballs/ Tar/Creosote	0.08	Combustible Solid	Yes (8.2)
Polynuclear Aromatic Hydrocarbons (PAHs)	0.2 mg/m³ [CA]	80 mg/m ³	Varies	Varies	Varies	Very low	Combustible Solid	No

Notes:

- 1. 29 CFR 1910, June 30, 1993 (8-hour Time weighted average unless otherwise specified.). These values may be modified by OSHA. The values should be checked and updated, as necessary, prior to commencing work activities.
- 2. ACGIH 1989 Highest reported value of acceptable odor threshold range. These values may be modified by ACGIH. The values should be checked and updated, as necessary, prior to commencing work activities.
- 3. For hydrogen sulfide detection, a gas meter with hydrogen sulfide detection capability will be used.

CA: suspected carcinogen – Minimize all possible exposures

CEIL: ceiling limit - not to de exceeded at any time during a work day

IDLH: Immediately dangerous to life or health

LEL: lower explosive limit

mg/m³: milligrams per cubic meter

OSHA: Occupational Safety and Health Administration

PEL: Permissible Exposure Limit

ppm: parts per million

SKIN: Designates that skin is an important possible route of exposure

STP: Standard Temperature and Pressure STEL: 15-minute Short Term Exposure Limit

TLV: Threshold Limit Value

7.3 Possible Exposure Routes

Possible routes of exposure to the chemicals potentially encountered on this project include inhalation, dermal contact, and ingestion of dust, mist, gas, vapor, or liquid. Exposure will be minimized by using engineering controls, safe work practices and by wearing the appropriate PPE. Further discussion of PPE requirements is presented in Section 9.

7.3.1 Inhalation

Inhalation of particulates, dust, mist, gas, or vapor during field activities is possible. Whenever possible, work activities will be oriented so personnel are upwind of the sampling location. Section 10 describes air monitoring requirements and associated action levels.

7.3.2 Dermal Contact

Dermal contact with potentially contaminated materials, soil, sediment, or groundwater during field activities is possible. Direct contact will be minimized through the use of appropriate PPE, engineering controls, real-time air monitoring (particulates), and decontamination procedures.

7.3.3 Ingestion

Direct ingestion of contaminants can occur by inhaling airborne dust, mist, or vapors, or by swallowing contaminants that are trapped in the upper respiratory tract. Indirect ingestion can occur by introducing the contaminants into the mouth by way of food, tobacco, fingers, or other carriers. Although ingestion of contaminants can occur, proper hygiene, real-time air monitoring (particulates), decontamination, and contamination-reduction procedures should reduce the probability of this route of exposure.

7.4 General Site Control Measures

The primary purposes for site controls are to establish the Exclusion Zone perimeter, reduce migration of contaminants into clean areas by using a Contamination Reduction Zone, and prevent unauthorized access or exposure to hazardous materials by site personnel and the public. Site control is especially important in emergency situations.

7.4.1 General Site Control Safety Procedures

The following standard safe work practices apply to all site personnel and shall be discussed in the safety briefing prior to initiating work on the Site:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited on site, except in designated areas.
- Hands and faces must be washed upon leaving the work area and before eating, drinking, chewing gum or tobacco, and smoking.
- A buddy system shall be used. Radio, cell phone, or hand signals will be established to maintain communication.
- During site operations, each worker will consider himself/herself as a safety backup to his/her partner.
- Visual contact will be maintained between buddies on site when performing potentially hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and (if required) medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does
 not comply with safety policy as established in this HASP may be subject to corrective action,
 potentially including reprimanded or immediate dismissal.

 Proper decontamination procedures must be followed before leaving a contaminated work area.

7.4.2 Work Area Access Control

If work is performed in public areas, the following precautions shall be taken to protect the workers and the public. Access control to the work area will be accomplished by the use of a combination of the following devices and/or methods:

- Traffic-control devices and/or use of flaggers
- Caution tape
- Other methods to keep the site secure and provide a visual barrier to help keep unauthorized personnel from entering the site and active work areas

7.4.3 Hazardous Waste Site Work Control Procedures

To prevent contamination from migrating from personnel and equipment, work areas will be clearly specified as an Exclusion Zone/Hot Zone (EZ), Contamination Reduction Zone (CRZ), or Support Zone/Clean Zone (SZ) prior to beginning operations. Each work area will be clearly identified using signs or physical barriers. At the end of each workday, the site should be secured and/or guarded to prevent unauthorized entry.

Site work zones will include the following:

- Exclusion Zone/Hot Zone. The EZ will be the "hot zone" or contaminated area inside the site perimeter. The EZ is the defined area where potential respiratory and/or health hazards exist. All personnel entering the EZ must use the required PPE, as set forth in the site-specific HASP, and meet the appropriate training and medical clearance. Entry to and exit from this zone will be made through a designated point. Appropriate warning signs to identify the EZ should be posted (e.g., DANGER, AUTHORIZED PERSONNEL ONLY, PROTECTIVE EQUIPMENT REQUIRED BEYOND THIS POINT). Personnel and equipment decontamination must be performed upon exiting the EZ.
- Contamination Reduction Zone. The CRZ, also known as the "warm zone," is a transitional zone between the EZ and the SZ (also known as the "cold zone" or "clean zone"). The CRZ provides a location for removal and decontamination of PPE and tools leaving the EZ. A separate decontamination area will be established for heavy equipment. All personnel and equipment must exit via the CRZ. If the CRZ is compromised at any time, a new CRZ will be established.
- **Support Zone/Clean Zone**. This uncontaminated zone will be the area outside the EZ and CRZ and within the geographic perimeters of the site (including sample processing and analysis areas). The SZ is used for support personnel; staging materials; parking vehicles; office, laboratory, and sanitation facilities; and receiving deliveries. Personnel entering this

zone may include delivery personnel, visitors, security guards, and others who will not necessarily be permitted in the EZ or CRZ.

A log of all personnel (including subcontractors) visiting, entering, or working on the site shall be maintained by the Key Foreperson. No personnel (or subcontractors) will be allowed in the EZ without showing proof of training and medical certification, per 29 CFR 1910.120I, (f) (and 29 CFR 1926.1101(k)(9), (m) if appropriate).

7.5 Activity Hazard Analysis

The party performing the work and their subcontractors are required to conduct an Activity Hazard Analyses (AHA) for all aspects of the work activities. The AHA consists of the following three steps:

- 1. Identify the task and break it down into steps.
- 2. Identify the hazards associated with each step.
- 3. Identify the specific hazard control measure(s) (e.g., engineering controls, administrative controls, and/or PPE) that will be used to ensure these tasks are conducted in a safe manner.

Exhibit 7-1 shows an example AHA form. **Exhibit 7-2** shows a training record to be completed and kept on file for each AHA. Example AHAs can be found in **Attachment D**. The intent of an AHA is to identify the steps, hazards, and control measures involved with performing a specific task. The AHAs included in this HASP are not inclusive of all activities that may be performed at the site, and may not include all of the steps, hazards, or control measures required to safely complete a task. Any individual given a work assignment shall review the corresponding AHA prior to commencing work activities to determine whether the AHA needs to be modified for site-specific conditions or if an additional AHA should be developed.

Exhibit 7-1
Example Activity Hazards Analysis Form
and the second s

Topic

Project Name:	Project Number: Fill in	JSA Number:	Issue Date:
Location: Fill in	Contractor:	Analysis by:	Analysis Date:
Work Operation: Fill in – same as Topic	Superintendent/Competent Person: Fill in	Revised by:	Revised Date:
Required Personal Protective Equi	pment (PPE):	Reviewed by:	Reviewed Date:
1.		Approved by:	Approved Date:

Work Activity Potential Hazards		Preventive or Corrective Measures	Inspection Requirements		
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Training Requirements:

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1 of 1

JOB NUMBER	*		
AHA NUMBER			
JOB LOCATION			
		DATE:	
NAME OF TRAINER: SUBJECTS COVERED:			
SCENECIS COVERED:			
TRAINING AIDS USED:			
ATTENDEES (PLEASE SIGN NAME LEG	IRI V)		
ATTEMPELS (TEEASE STON NAME LEG	IDLI).		
	<u></u>		

8 Health and Safety Training, Informational, and Communication Programs

8.1 General

This section describes the health and safety training and informational programs with which all project site personnel must comply. All certifications required in this section will be kept on internal file.

Anchor QEA personnel performing the work and/or their subcontractors will, as applicable, identify OSHA-regulated and certified competent persons for work or tasks requiring that level of training and/or supervision. The project personnel listed below will be assigned to the project and have the designated certifications.

This section will be updated by Anchor QEA based on site-specific requirements and prior to the commencement of work at the Site.

Name	Job Title	40-hour HAZWOPER	8-hour HAZWOPER Supervisor	8-hour HAZWOPER Refresher Expires	Other Training (i.e., excavation, confined space, first aid, CPR)
Scott Andrews	Field Lead	Yes	Yes	03/2020	First aid, CPR
Sylvia Jacobson	Field staff	Yes	No	05/2020	First aid, CPR
Peter Kwon	Field Staff	Yes	No	07/2019	First aid, CPR

8.2 Initial Project Site Orientation

Work on the project site will require participation in an initial health and safety orientation presented by the PM/Superintendent or Key Foreperson that will consist of, at a minimum, the following topics:

- A review of the contents of the site-specific HASP, including the Scope of Work and associated site hazards and control methods and procedures.
- Provisions of this plan are mandatory for all personnel assigned to the project.
- Subcontractors are also expected to follow the provisions of this plan unless they have their own HASP that covers their specific activities related to this project and includes the minimum requirements of the site-specific HASP.
- All visitors to the work Site will also be required to abide by the requirements of this plan.
- Personnel assigned to perform work at the project Site, working under the provisions of the site-specific HASP, will be required to read the plan and must sign the Health and Safety Plan Acknowledgement Form to confirm that they understand and agree to abide by the

provisions of the plan. Personnel not directly affiliated with the project (i.e., visitors) may also be required to sign a Liability Waiver (prepared on behalf of Anchor QEA).

8.3 Daily Safety Meetings

Daily safety meetings ("tailgate meetings") make accident prevention a top priority for everyone and reinforce awareness of important accident-prevention techniques. The following daily safety meeting procedures and practices are required:

- Daily safety meetings will be held each morning prior to conducting site activities.
- The example Daily Safety Briefing form shown in **Exhibit 8-1** below will be used (at a minimum) to document each meeting.
- Copies of the completed Daily Safety Briefing forms will be maintained on site while the project.

8.4 End-of-Day Wellness Checks

Similar to the daily safety meetings, field staff will gather at the end of the day to verify group health and wellness and discuss any near misses that occurred that day. The wellness checks will be recorded on that day's Daily Safety Briefing form.

Notes:	y Meeting (Daily Safety Meeting)				
Reviewed by:	Title:	Date:			
Date:	Project/Location:				
Subcontractor Representative:	Project Manager (Anchor QEA):				
Phone:	Phone:				
Subcontractor Safety Representative:	Safety Manager (Anchor QEA):				
Phone:	Phone:				
Site Orientation Requirements Pre-mobilization Safety Meeting/Date Crane Inspection Certification Personal Protective Equipment (PPE)	,				
Environmental Hazards					
Other:					
Medical					
Emergency Procedures					
Site Security					
Smoking Policy					
Medical Services Requirements					
Treatment Locations / Addresses /DL					
Treatment Locations/Addresses/Phon Other					

8.5 Hazardous Waste Operations Training

Anchor QEA staff working on project sites that present a potential exposure to hazardous wastes or other hazardous substances shall be trained in accordance with the requirements of the 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation. Training requirements will consist of the following:

- Field personnel must complete a minimum of 40 hours of hazardous waste activity instruction.
- Field personnel must complete a minimum of 3 days of supervised field instruction.
- Field personnel assigned to the site will also have received 8 hours of refresher training if the time lapse since their previous training has exceeded 1 year.
- On-site managers and supervisors directly responsible for employees engaged in hazardous waste operations will receive an additional 8 hours of supervisory training.
- Field personnel shall be current in first aid/CPR training offered by the American Red Cross or equivalent.
- Other training may be required depending on the task to be performed (e.g., confined space, excavation/trenching, underground storage tank removal, fall protection, lock out/tag out (LO/TO), respiratory protection, and hazard communication).

8.6 Hazard Communication Program

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at the field project site are communicated to all project personnel and subcontractors according to 29 CFR 1926.59.

Every container of hazardous materials must be labeled by the manufacturer, who must also provide a SDS upon initial order of the product and upon request thereafter. Maintain manufacturer labels where possible and practicable. The label may use words or symbols to communicate the following:

- Introduction
- Hazard(s) identification
- Composition/information on ingredients
- First-aid measures
- Fire-fighting measures
- Accidental release response measures
- Handling and storage
- Exposure controls/personal protection
- Physical and chemical properties
- Stability and reactivity properties
- Toxicological properties
- Ecological properties

- Disposal considerations
- Transport considerations
- Regulatory information
- Other information, including at a minimum, label preparation or last revision date

SDS for all chemicals brought onto the site or anticipated to be used on site shall be provided in an attachment of the Site-specific HASP. SDSs for potential chemicals of concern (for a generic MGP site) are presented in **Attachment C.** These SDSs shall be readily available for reference by Site personnel and emergency response personnel.

Hazardous materials received without proper labels will be set aside and not distributed for use until properly labeled.

If a hazardous chemical is transferred into a portable container (approved safety can), even if for immediate use only, the contents (e.g., acetone or gasoline) of the portable container must be identified.

8.7 Employee Communication System and Policy

An open, two-way communication between management and staff on health and safety issues is essential to an injury-free, productive workplace. The following system of communication is designed to facilitate a continuous flow of health and safety information between management and staff in a form that is readily understandable and consists of one or more of the following checked items:

- New worker orientation including a discussion of health and safety policies and procedures.
- Workplace health and safety training programs.
- Regular weekly and daily safety meetings.
- Effective communication of health and safety concerns between workers and supervisors, including translation where appropriate.
- Posted or distributed safety information.

8.8 Medical Surveillance Program

This section describes the medical surveillance program that Anchor QEA field personnel must comply with when working on sites where there is a potential for exposure to hazardous wastes or other hazardous substances.

8.8.1 General Requirements

Anchor QEA employees shall be enrolled in a medical surveillance program in compliance with OSHA standards (29 CFR 1910.120(f)) under the following circumstances.

If they are involved with any of the following operations:

- Cleanup operations required by a governmental body, whether federal, state, local, or other
 involving hazardous substances that are conducted at uncontrolled hazardous waste sites
 (including, but not limited to, the EPA's National Priority List [NPL] sites, state priority list sites,
 sites recommended for the EPA NPL, and initial investigation of government-identified sites
 that are conducted before the presence or absence of hazardous substances has been
 ascertained)
- Corrective actions involving cleanup operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 United States Code 6901 et seq.)
- Voluntary cleanup operations at sites recognized by federal, state, local, or other governmental bodies as uncontrolled hazardous waste sites
- Operations involving hazardous wastes that are conducted at treatment, storage, and disposal (TSD) facilities regulated by 40 CFR 264 and 40 CFR 265 pursuant to RCRA or by agencies under agreement with the EPA to implement RCRA regulations
- Emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard

And, if they meet the following criteria:

 Are or may be exposed to hazardous substances or health hazards at or above the established PEL, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more per year

In addition, employees are required to be enrolled in the medical surveillance program if they meet any of the following conditions:

- Wear a respirator for 30 days or more per year
- Are injured, become ill, or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operations
- Are members of a Hazardous Materials (HAZMAT) team

Anchor QEA employees required to be enrolled in a medical surveillance program under 29 CFR 1910.120(f) shall have medical examinations and consultations made available to them by Anchor QEA on the following schedule:

- Prior to assignment
- At least once every 12 months unless the attending physician believes a longer interval (not greater than biennially) is appropriate
- At termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last 6 months

- As soon as possible upon notification that the employee has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards, or that the employee has been injured or exposed above the PEL or published exposure levels in an emergency situation
- At more frequent times, if the examining physician determines that an increased frequency of examination is medically necessary

The content of medical examinations or consultations made available to employees shall be determined by the attending physician but shall include, at a minimum, a medical and work history with special emphasis on symptoms related to the handling of hazardous substances and health hazards, and to fitness for duty including the ability to wear any required PPE under conditions (i.e., temperature extremes) that may be expected at the work site.

The attending physician shall provide Anchor QEA with a written opinion for each examined employee that contains the following information:

- Whether the employee has any detected medical conditions that would place the employee at an increased risk of impairment of the employee's health from hazardous waste operations work, emergency response, or respirator use
- Any recommended limitations on the employee's assigned work
- A statement that the employee has been informed of the results of the medical examination and any medical conditions that require further examination or treatment

The written opinion obtained by Anchor QEA shall not reveal specific findings or diagnoses unrelated to occupational exposures. Medical surveillance and other employee-related medical records shall be retained for at least the duration of employment plus 30 years.

9 General PPE Requirements

The minimum level of PPE should be selected according to the hazards that may be encountered during Site activities in accordance with established EPA levels of protection (D and C) and following Con Edison procedures included in **Attachment E**. Only PPE that meets American National Standards Institute (ANSI) standards shall be worn. Workers must maintain proficiency in the use and care of PPE. Damaged or defective PPE must be replaced and may not be used. Anchor QEA will provide all necessary PPE for its employees as described in the site-specific HASP.

9.1 Minimum Requirements – Level D Protection

The minimum level of protection will be Level D protection, which consists of the following equipment:

- Standard work uniform/coveralls
- Work boots with safety toe conforming to ASTM International (ASTM) F2412-05/ASTM
 F2413-05
- Approved safety glasses or goggles (meets ANSI Z87.1 2010 requirements for eye protection)
- Hard hat (meets ANSI Z89.1 1986 requirements for head protection)
- Traffic safety vest
- Hearing protection when there are high noise levels
- Disposable boot covers

Level D protection will be used only when:

- The atmosphere contains no known hazards
- Work functions preclude splashes, immersions, generation of dust particulates or the potential for unexpected inhalation of, or contact with, hazardous concentrations of chemicals
- Atmospheric concentrations of contaminants are less than the Permissible Exposure Limit (PEL) and/or Threshold Limit Value (TLV)

9.1.1 Modified Level D Protection Requirements

Depending on the Scope of Work and the potential hazards to be encountered, Level D protection shall be modified to include additional protective equipment such as face shields/goggles, and disposable gloves of varying materials depending on the chemical substances involved. An upgrade to Modified Level D occurs when there is a possibility that contaminated media can contact the skin or work uniform, or if unique, site-specific hazards exist.

Initially at portions of the site where remaining contaminants may be encountered based on the site-specific conditions, work will start in Modified Level D (including disposable gloves).

9.2 Respiratory Protection Requirements

Respiratory protection devices may potentially be used for protection against particulates and potential site-specific contaminants during the course of an intrusive field project. The need for respiratory protection will be determined by air monitoring results and site conditions. However, engineering and administrative controls must first be evaluated for use as the primary controls for protection against site respiratory hazards. In the event that engineering and administrative controls are deemed not feasible, respiratory protection will be required.

9.2.1 Level C Protection Requirements

An upgrade to Level C protection occurs when the results of air monitoring reveal that action levels have been exceeded.

Level C protection, in addition to Level D equipment, involves the use of full-face and/or half-face air-purifying respirators equipped with P-100/organic vapor or P-100/mercury vapor or equivalent (OSHA/National Institute for Occupational Safety and Health [NIOSH] approved) as applicable based on air monitoring. For this site, the potential for particulate and organic vapor action level exceedances exists.

Level C protection shall be used in the following situations:

- When there is a recognized need for protection against particulates, organic vapors, or other airborne contaminants during the course of the project.
- During activities where product odors or exposure symptoms are noted.

If, during the use of respiratory protection, any unusual odors or other evidence of elevated concentrations of chemicals in the workers' breathing zone is noted, the work shall be stopped, workers shall exit the work area, and the PM/Superintendent and Health and Safety Representative shall be contacted for instructions.

This HASP has not provided requirements for upgrade to Level B protection. If Anchor QEA believes that a potential upgrade to Level B protection may be necessary, based on Site-specific conditions, appropriate requirements for upgrade to Level B will be included in the Site-specific HASP.

9.2.2 Cartridge Change-out Schedule

Anchor QEA will prepare a cartridge change-out schedule based on the type of equipment used and include this information in the Site-specific HASP. Cartridges will be changed immediately if breakthrough, a chemical warning property (e.g., eye, nose, or throat irritation or odor), or cartridge end-of-life indicator activation occurs. All workers will use the buddy system when using respirators and periodically check all end-of-life indicators on the cartridges of all other workers (every 30 minutes at a minimum). The Key Foreperson will review this requirement after monitoring the

employee's breathing zone for site contaminants and will revise this schedule as may be necessary to avoid overexposure.

9.2.3 Respirator Fit Testing

All project personnel who may be required to wear an air-supplied, or negative-pressure, air-purifying respirator in the performance of their work duties at the site shall be quantitatively fit-tested on an annual basis. Employees who wear a respirator for more than 30 days per year shall be enrolled in a medical surveillance program as pursuant to the Anchor QEA's policies and applicable regulations. Employees shall have the opportunity to handle the respirators and wear them in normal air for a familiarity period prior to fit testing. On each occasion that employees don a respirator for work purposes, they shall test the piece-to-face seal by use of the following positive and negative pressure tests:

- Positive Pressure Test: With the exhaust port(s) blocked, the positive pressure of slight exhalation should remain consistent for several seconds.
- Negative Pressure Test: With the intake ports blocked, the negative pressure of slight inhalation should remain constant for several seconds.

Air-purifying respirators shall not be worn when conditions prevent a seal of the respirator to the wearer. Such conditions may be the growth of a beard, sideburns, a skull cap that projects under the face piece, or temple pieces on glasses. No employee may wear a beard if it interferes with the fit of the respirator. Also, the absence of one or both dentures can seriously affect the fit of a face piece and should be worn at all times when respirators are being used.

9.2.4 Respirator Cleaning, Maintenance, and Inspection

All respirators used on site shall be cleaned and maintained in the following manner:

- Remove filters and cartridges.
- Visually inspect face piece and parts, discard faulty items.
- Remove all elastic headbands.
- Remove exhalation cover and inhalation valves.
- Wash, sanitize, and rinse face piece. Wash any parts that were removed separately.
- Dry the mask. Wipe face pieces and valves.
- Disassemble and clean the exhalation valve.
- Visually inspect face piece and all parts for deterioration, distortion, or other faults that might affect the performance of the respirator.
- Replace any questionable or faulty parts.
- Reassemble mask and visually inspect completed assembly.
- Seal mask in plastic bag.

10 General Air Monitoring Requirements

10.1 General Requirements

In general, air monitoring shall be conducted when the possibility of hazardous atmospheres, chemical volatilization, or contaminated airborne dust exists (e.g., from intrusive activities involving contaminated soils or groundwater, confined space entry, or others). Anchor QEA will determine if the planned activities at the site require air monitoring activities and develop a site-specific air monitoring program as part of the site-specific HASP. Typically, air monitoring will be conducted, as necessary, during implementation of groundwater sampling activities at the Site (including activities when staging/handling waste materials with potential contamination). The monitoring devices to be used, at a minimum, are a RAE Systems MultiRAE (or equivalent) photoionization detector that measures organic vapors, oxygen, combustible gases, carbon monoxide, and hydrogen sulfide.

In addition to the above mentioned air monitoring, a community air monitoring plan (CAMP) will be implemented during site intrusive activities (see Appendix C to the PDI Work Plan).

10.2 Air Monitoring Action Levels

Air monitoring action levels for a Site with remaining MGP-related contaminants are provided as a reference in **Table 10-1** below. This Site-specific HASP includes air monitoring requirements in accordance with all local, state, and federal regulations and existing site conditions. All air monitoring results shall be documented in the field logbook or similar form.

Table 10-1
Air Monitoring Action Levels

Contaminant/ Instrument ¹	Job Tasks/Functions	Measurement	Monitoring Schedule ²	Actions ³
Conduct air		0 to 1 ppm above background	Every 15 to 30 minutes	Acceptable, continue work.
Total Organic Vapors (using Photoionization Detector with 11.7 eV Lamp)	monitoring for organic vapors during intrusive activities. Monitor in the workers' breathing zone.	> 1 ppm ⁴ above background	Stop Work	Stop work, investigate cause of reading, consult with Project Manager and Qualified Health and Safety Representative to determine PPE, mechanical ventilation, or possible changes in work task.

Contaminant/ Instrument ¹	Job Tasks/Functions	Measurement	Monitoring Schedule ²	Actions ³
Understand	Hydrogen Sulfide Real- Time Gas Monitor Conduct air monitoring for hydrogen sulfide during activities. Monitor in the workers' breathing zone.	< 1 ppm hydrogen sulfide	If PID greater than 5 ppm sustained, periodically (every 15 minutes)	Acceptable, continue work.
Sulfide Real- Time Gas		≥ 1 ppm hydrogen sulfide	Stop Work	Stop work, investigate cause of reading, consult with Project Manager and Qualified Health and Safety Representative to determine PPE, mechanical ventilation, or possible changes in work task.
	Conduct air	< 10 ppm		Acceptable, continue work.
Carbon Monoxide Meter	Monoxide during activities.	≥ 10 ppm	Continuous in areas carbon monoxide may be present	Stop work required. Leave work area and contact Project Manager and Qualified Health and Safety Representative to determine PPE, mechanical ventilation, or possible changes in work task.
	Conduct air	19.5% to 23.5%		Acceptable, continue work.
Oxygen (O ₂) Multi-Gas Meter	-		Continuous in areas where O ₂ may be out of normal range	Stop work required. Leave work area and contact Project Manager and Qualified Health and Safety Representative for guidance.
Limit (LEL) Multi-Gas Meter		≤ 5%		Acceptable, continue work.
	Conduct air monitoring in work area. Monitor in the workers' breathing zone.	> 5% to 10%	Continuous	Stop work required. Contact Project Manager and Qualified Health and Safety Representative. Implement engineering controls following consult with Project Manager and Qualified Health and Safety Representative.
		> 10%		Stop work and evacuate.

Notes:

- 1. Instruments must be calibrated according to manufacturer's recommendations.
- 2. Monitoring frequency is from the beginning of each task and at specified intervals thereafter, or when detectable contamination is encountered (as indicated by strong, sustained odor; visual evidence of product; or discolored sampling matrices).
- 3. For VOCs, a sustained reading for greater than 2 minutes in excess of the action level will trigger a protective measure.
- 4. 25 ppm total organic vapors as measured at the downwind perimeter of the work area as described in *New York State DER-10 Technical Guidance for Site Investigation and Remediation*, page 204 Appendix 1A.

eV: electron volts PID: Photo Ionization Detector ppm: parts per million

10.3 Equipment Calibration and Maintenance

Calibration and maintenance of all air monitoring equipment shall follow manufacturer specifications and must be documented. Recalibration and adjustment of air monitoring equipment shall be completed as site conditions and equipment operation warrant. Record all air monitoring equipment calibration and adjustment information in the field logbook.

10.4 Air Monitoring Frequency Guidelines

Air monitoring will be conducted during all groundwater sampling activities and when the following situations arise:

- It is possible that an immediately dangerous to life or health condition or a flammable atmosphere has developed (e.g., confined space entry or intrusive activities)
- There is an indication that exposures may have risen over established action levels, PELs, or published exposure levels since the last monitoring. Look for a possible rise in exposures associated with the following situations:
 - Change in site area Work begins on a different section of the Site.
 - Change in on-Site activity One operation ends and another begins.
 - Change in contaminants Handling contaminants other than those first identified.
 - Visible signs of particulate exposure from intrusive activities such as drilling, boring, or excavation.
 - Perceptible chemical odors or symptoms of exposure.
 - Handling leaking drums or containers.
 - Working with obvious liquid contamination (e.g., a spill or lagoon).
 - Conduct air monitoring when the possibility of volatilization exists (such as with a new monitoring well or a well containing known contaminants of concern [COCs]).

11 General Health and Safety Procedures and Practices

In addition to the Activity Hazard Analyses forms presented in **Attachment D** and Con Edison health and safety procedures included in **Attachment E** of this HASP, this section lists general health and safety procedures and practices applicable to this project. For additional information, consult with the PM. Anchor QEA will review these procedures and incorporate company-specific and additional procedures, as necessary, to the site-specific HASP.

11.1 Physical Hazards

Physical hazards that may be encountered include but are not limited to heat stress, cold related illness, ultra-violet radiation, working on or adjacent to a waterway, and noise hazards.

11.1.1 General Site Activities

Observe the following general procedures and practices to prevent physical hazards:

- Legible and understandable precautionary labels shall be affixed prominently to containers of potentially contaminated soil, sediment, water, and clothing.
- No food or beverages shall be present or consumed in areas that have the potential to contain COCs and/or contaminated materials or equipment.
- No tobacco products or cosmetics shall be present or used in areas that have the potential to contain COCs and/or contaminated materials or equipment.
- An emergency eyewash unit shall be located immediately adjacent to employees who handle
 hazardous or corrosive materials, including decontamination fluids. All operations involving
 the potential for eye injury or splash must have approved eyewash units locally available
 capable of delivering at least 0.4 gallons per minute for at least 15 minutes.
- Personnel working within 10 feet of bodies of water shall wear U.S. Coast Guard (USCG)approved personal floatation devices (PFDs).
- Certain project sites may have newly finished work (e.g., concrete, paving, framing, habitat
 reconstruction, or sediment caps) that may be damaged by unnecessary contact, or that could
 cause dangerous conditions for personnel (e.g., slipping, sinking, or tripping). Personnel
 working in or around these areas shall communicate with the PM, FL, and property owner as
 needed to prevent damaging new work or entering dangerous conditions.
- Generally, all on-site activities will be conducted during daylight hours. If work after dusk is planned or becomes necessary due to an emergency, adequate lighting must be provided.
- Hazardous work, such as handling hazardous materials and heavy loads and operating equipment, should not be conducted during severe storms.
- All temporary electrical power must have a Ground-fault Circuit Interrupter (GFCI) as part of its circuit if the circuit is not part of permanent wiring. All equipment must be suitable and approved for the class of hazard present.

11.1.2 Slips, Trips, and Falls

Observe the following procedures and practices to prevent slips, trips, and falls:

- Inspect each work area for slip, trip, and fall potential prior to each work task.
- Slip, trip, and fall hazards identified must be communicated to all personnel. Hazards identified shall be corrected or labeled with warning signs to be avoided.
- All personnel must be aware of their surroundings and maintain constant communication with each other at all times.

11.1.3 Ergonomic Considerations

Certain field tasks may involve workers in fixed positions (e.g., observing subcontractor work) or performing repetitive motions over a period of time (e.g., sediment sample processing). It is important that workers self-monitor for ergonomic fatigue (e.g., soreness, tightness, stiffness, or pain in muscles) and make adjustments to work tasks, body positions, or work areas so that ergonomic stressors are minimized. Suggestions for decreasing the likelihood of ergonomic stress include the following:

- Limit fixed positions. Periodically vary standing and sitting positions, take frequent short walks, and modify observation locations when possible.
- Minimize extreme postures. Conduct work tasks using comfortable postures (particularly if the tasks are repetitive) and use tools or structures to minimize the need to hold or work with materials or access the work area.
- Limit contact stress. Be aware of soft tissue resting on hard surfaces, and limit these occurrences (e.g., use comfortable footwear, and use tools to hold materials).
- Contact the Field Mobilization Team in advance for prolonged field efforts that involve a field trailer. This group can set up field staff with a monitor, mouse, and keyboard so they are not working solely on laptops.
- Take breaks from work tasks, particularly repetitive ones.
- Consider performing stretching exercises before and during work activities, if those tasks are anticipated to be long in duration and/or strenuous.

11.1.4 Electric Safety

Observe the following procedures and practices to prevent electric shock:

- General
 - Use only appropriately trained and certified electricians to perform tasks related to
 electrical equipment. A good rule of thumb is to defer any task that would not normally
 and reasonably be completed by the average public consumer.
 - Each circuit encountered will be considered live until proven otherwise.
 - Only proper tools will be used to test circuits.

No wire will be touched until the circuit is determined to be de-energized.

Extension Cords

- All extension cords used on any project will be three-pronged.
- All extension cords will be in good working order.
- Each extension cord ground will be tested for continuity on at least a quarterly basis and marked to indicate when the inspection occurred.
- Each extension cord will be visually inspected before each use.
- If any extension cord is found in disrepair or fails the continuity test, it will be taken out
 of service.
- Any extension cord that does not have the grounding pin will be taken out of service and not used.
- Extension cords will not be used in place of fixed wiring.
- Extension cords will not be run through holes in walls, ceilings, or floors.
- Extension cords will not be attached to the surface of any building.
- No extension cord will be of the "flat wire" type. Every extension cord will have each individual wire insulated and further protected by an outside cover.
- Be sure to locate extension cords out of traffic areas or, if this is unavoidable, flag cords and protect workers from tripping over them (i.e., use barricades and tape the cord down).
- Do not stage extension cords or powered equipment in wet areas, to the degree possible. Elevate cords, connections, and equipment out of puddles.

Power Tools/Plug and Cord Sets

- Any cord that is cut in a way that exposes insulation will be removed from service.
- All tools and plug and cord sets will be tested for continuity.
- If grounding pins are missing, the plug and cord will be removed from service.
- Any tool or plug and cord set failing the continuity test will be removed from service.
- All power tools will have three-pronged plugs unless double insulated.

• Ground-fault Circuit Interrupters

- Each 120-volt electrical wall receptacle providing power to the job site will be protected by a portable GFCI.
- Each GFCI will be tested quarterly and marked to indicate when the inspection occurred.
- Each 120-volt, single-phase, 15- and 20-ampere receptacle outlet, including those on generators, will have an approved GFCI.
- GFCIs will be located in line as close to the piece of equipment as possible.

Specific

 If unsure if a task requires specific electrical training, err on the side of caution and contact the PM/Superintendent prior to proceeding.

- If subsurface work is to be performed, follow the guidelines and conduct utility locating prior to work and in accordance with local ordinances. Use of a checklist such as shown in **Exhibit 11-1**, below, is recommended. All Con Edison procedures listed in the Con Edison Utility Clearance Process for Intrusive Activities Revision 1, dated October 8, 2003 (Con Edison 2003), included as **Attachment B**, must be followed.
- If LO/TO procedures are required (i.e., de-energizing machinery or equipment so work may be performed), the equipment owner must provide LO/TO procedures and training. By default, the equipment owner should perform any LO/TO. If it becomes necessary for personnel to perform LO/TO tasks, contact the PM/Superintendent prior to doing so.
- Maintain appropriate distance from overhead utilities.
- If unexpected electrical equipment is encountered (i.e., buried wire) assume it is live,
 stop work, and contact the PM/Superintendent immediately.
- If working in enclosed or restricted areas where electrical hazards may be present,
 contact a licensed electrician or other suitably trained party to provide barriers, shields,
 or insulating materials to prevent electric shock.
- If working in areas where electrical hazards are present, ensure that conductive clothing and jewelry is replaced with non-conductive clothing, or removed.

11.1.4.1 Lockout/Tagout Procedures

Only fully qualified and trained personnel will perform maintenance procedures. Before maintenance begins on energized equipment, LO/TO 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 must be used. Tagout is the placement of a warning tag on an energy- or material-isolating device to indicate that the equipment controls may not be operated until the tag is removed by the person who attached the tag.

11.1.5 General Falls/Ladders

Observe the following general falls/ladders procedures and practices:

- Assess work areas for fall hazards. A fall protection system that meets OSHA and ANSI Z3591 standards must be used if work is conducted 6 feet or more above the surface.
- Use ANSI Type 1A rated ladders.
- Ensure that ladders are placed so their rungs, cleats, and steps are parallel, level, and uniformly spaced prior to use.
- Make sure ladder rungs are sturdy and free of cracks.
- Use ladders with secure safety feet.

- Pitch ladders at a 1 horizontal to 4 vertical (1H:4V) ratio.
- Secure ladders at the top or have another person at the bottom to help stabilize it.
- Ladders used to access an upper landing surface shall extend at least 3 feet above the upper landing surface.
- Use non-conductive ladders near electrical wires.
- The top rung of a ladder should not be used as a step.
- Do not carry any object or load that could cause a loss of balance or a fall.
- If a ladder is defective, damaged, or in disrepair (i.e., broken or missing rungs, cleats, or steps; broken or split rails; corroded components; or other faulty or defective components), tag the ladder "Do Not Use" and remove it from service until repaired.

11.1.6 Hand and Power Tools

Observe the following procedures and practices when working with hand and power tools:

- Keep hand tools sharp, clean, oiled, dressed, and not abused.
- Worn tools are dangerous. For example, the "teeth" in a pipe wrench can slip if worn smooth, an adjustable wrench will slip if the jaws are sprung, and hammerheads can fly off loose handles.
- Tools subject to impact (e.g., chisels, star drills, and caulking irons) tend to "mushroom." Keep them dressed to avoid flying spalls and use tool holders.
- Do not force tools beyond their capacity.
- Flying objects can result from operating almost any power tool, so always warn people in the vicinity and use proper eye protection.
- Each power tool should be examined before use for damaged parts, loose fittings, and frayed or cut electric cords. Tag and return defective tools for repairs. Ensure that there is adequate lighting, inspect tools for proper lubrication, and relocate tools or material that could "vibrate into trouble."
- Compressed air must be shut off or the electric cord unplugged before making tool adjustments. Air must be "bled down" before replacement or disconnection.
- Proper guards or shields must be installed on all power tools before issue. Do not use improper tools or tools without guards in place.
- Replace all guards before startup. Remove cranks, keys, or wrenches used in service work.

11.1.7 Motor Vehicle Operation

All drivers are required to have a valid driver's license, and all vehicles must have appropriate state vehicle registration and inspection stickers. Anchor QEA prohibits the use of hand-held wireless devices while driving any vehicle for business use at any time, for personal use during business hours, and as defined by law Additionally, site-specific motor vehicle requirements must be followed, if any.

When driving to, from, and within the job site, be aware of potential hazards including:

- Vehicle accidents
- Distractions
- Fatigue
- Weather and road conditions

To mitigate these hazards, observe the following procedures and practices regarding motor vehicle operation:

- Before leaving, inspect fuel and fluid levels and air pressure in tires, and adjust mirrors and seat positions appropriately.
- Wear a seat belt at all times and make sure that clothing will not interfere with driving.
- Plan your travel route and check maps for directions or discuss with colleagues.
- Clean windows and mirrors as needed throughout the trip.
- Wear sunglasses as needed.
- Fill up when the fuel level is low (not near empty).
- Follow a vehicle maintenance schedule to reduce the possibility of a breakdown while driving.
- Stop driving the vehicle, regardless of the speed (e.g., even 5 miles per hour) or location (e.g., a private road), when the potential of being distracted by conversation exists.
- Using hand-held communication devices (e.g., cell phones) while operating any motor vehicle is prohibited.
- Get adequate rest prior to driving.
- Periodically change your seat position, stretch, open the window, or turn on the radio to stay alert.
- Pull over and rest if you are experiencing drowsiness.
- Check road and weather conditions prior to driving.
- Be prepared to adjust your driving plans if conditions change.
- Travel in daylight hours, if possible.
- Give yourself plenty of time to allow for slowdowns due to construction, accidents, or other unforeseen circumstances.
- Use lights at night and lights and wipers during inclement weather.

11.1.8 Vehicular Traffic

Observe the following procedures and practices regarding vehicular traffic:

- Wear a traffic safety vest when vehicle hazards exist.
- Use cones, flags, barricades, and caution tape to define the work area.
- Use a vehicle to block the work area (if conditions allow).
- Engage a police detail for high-traffic situations.

- Always use a spotter in tight or congested areas for material deliveries.
- As necessary, develop traffic control plans and train personnel as flaggers in accordance with the DOT MUTCD and/or local requirements.

If work activities will take place within a street, diagrams will be provided to Con Edison for midstreet and intersection traffic protection mechanisms. Work-area protection plans shall, minimally, conform to the most recent Con Edison Work Area Protection and Traffic Control Field Manual.

The work area may be located within or adjacent to a public or private roadway or sidewalk where exposure to vehicular traffic is possible. For work within roadways and sidewalks, a permit will be required, as issued by the New York City Department of Transportation or New York State Department of Transportation, or both organizations, as applicable. Signage and other control measures stipulated by the permitting authority or authorities will be applied during field activities. This may include the closure of a travel lane or lanes or sidewalks, and erection of signs, cones, barricades, or flashing lights, as applicable.

In addition, during activities along or within 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. Crewmembers working in or near streets will wear orange reflective traffic safety vests.

The flow of traffic into and out of the adjacent business and other organizations 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 to people and equipment.

11.1.9 Lifting and Material Handling

Observe the following procedures and practices for lifting and material handling:

- Use leather gloves when handling metal, wire rope, sharp debris, or transporting materials (e.g., wood, piping, or drums).
- The size, shape, and weight of the object to be lifted must first be considered. No individual
 employee is permitted to lift any object that weighs more than 60 pounds. Multiple
 employees or mechanical lifting devices are required for objects heavier than the 60-pound
 limit.
- Plan a lift before doing it. Bend at the knees and lift with the legs; maintain the natural curves of the back; do not use back muscles.
- Check the planned route for clearance.
- Use the buddy system when lifting heavy or awkward objects.
- Do not twist your body while lifting.

- Know the capacity of any handling device (e.g., crane, forklift, chain fall, or come-along) that you intend to use.
- Use tag lines to control loads.
- Ensure that your body, material, tools, and equipment are safe from such unexpected movement as falling, slipping, rolling, tripping, bowing, or any other uncontrolled motion.
- Trucks (i.e., flat beds) hauling equipment or materials must not be moved once rigging has been released.
- Chock all material and equipment (such as pipe, drums, tanks, reels, trailers, and wagons) as necessary to prevent rolling.
- Tie down all light, large-surface-area material that might be moved by the wind.
- When working at heights, secure tools, equipment, and wrenches against falling.
- Do not store materials or tools on ducts, lighting fixtures, beam flanges, hung ceilings, or similar elevated locations.
- Fuel-powered tools used inside buildings or enclosures shall be vented and checked for excessive noise.

11.1.10 Fire Control

Observe the following fire control procedures and practices:

- Smoke only in designated areas.
- Keep flammable liquids in closed containers.
- Keep the work site clean; avoid accumulating combustible debris such as paper.
- Obtain and follow property owner hot work safety procedures when welding or performing other activities requiring an open flame.
- Isolate flammable and combustible materials from ignition sources.
- Ensure fire safety integrity of equipment installations according to NEC specifications.

11.1.11 Static Electricity and Transfer of Flammable Liquids

Observe the following procedures and practices regarding static electricity when transferring flammable liquids:

- Electrically bond and ground pumps, transfer vessels, tanks, drums, bailers, and probes when moving flammable liquids.
- Electrically bond and ground vacuum trucks and the tanks they are emptying.
- Do not splash fill containers with flammable liquids.
- Pour flammable liquids slowly and carefully.
- Two fire extinguishers (2A20:BC) must be available, charged, inspected, and readily accessible.

11.1.12 Cleaning Equipment

Observe the following procedures and practices when cleaning equipment:

- Wear appropriate PPE to avoid skin and eye contact with isopropyl alcohol, Alconox®, or other cleaning materials.
- Stand upwind to minimize any potential inhalation exposure.
- Dispose of spent cleaning solutions and rinses accordingly.

11.2 Environmental Hazards and Controls

11.2.1 Fatique Management

Because personnel may be working long hours, and depending on the activity, it is important that all personnel are aware of the hazards related to fatigue. Fatigue can be defined as an increasing difficulty in performing physical or mental activities. Signs of fatigue may include tiredness, changes in behavior, loss of energy, and reduced ability to concentrate. Fatigued site personnel may have a reduced ability to recognize or avoid risks on the work site, which may lead to an increase in the number and severity of injuries and other incidents. Fatigue can occur at any time when working and may cause safety concerns due to decreased manual dexterity, reaction time, and alertness.

Fatigue results from insufficient rest and sleep between activities. Contributing factors to fatigue may include the following:

- The time of day that work takes place
- The length of time spent at work and in work-related duties
- The type and duration of a work task and the environment (e.g., weather conditions and ambient noise) in which it is performed
- The quantity and quality of rest obtained prior to, during, and after a work period
- Non-work activities
- Individual factors such as sleeping disorders, medications, or emotional state

Personnel suffering from fatigue may exhibit both physical and mental effects, such as the following:

- Slower movements
- Poor coordination
- Slower response time to interaction
- Bloodshot eyes
- Slumped or weary appearance
- Nodding off
- Distractedness or poor concentration
- Inability to complete tasks
- Fixed gaze

• Appearing depressed, irritable, frustrated, or disinterested

Employees are strongly encouraged to get sufficient pre-work rest, maintain sufficient nutritional intake during work (i.e., eat and drink at regular intervals), and communicate with team members and leaders if their level of fatigue elevates.

Use the following procedures to help detect and address fatigue-related issues:

- Periodically observe and query coworkers for signs or symptoms of fatigue.
- Site personnel that express concern over their level of fatigue, or that are observed to be fatigued such that elevated worker risk is evident, will be relieved or their work tasks adjusted so that they may rest sufficiently.
- Work schedules will consider fatigue factors and optimize continuous periods available for uninterrupted sleep. The employee is responsible for reporting to work properly rested and fit for duty. In case of an emergency or operational difficulties (e.g., limited access due to water levels or boat repairs), work hours may require adjustment.
- Maintain a routine exercise program and regular sleep schedule as much as possible over the course of the work.
- Avoid heavy meals or caffeine and minimize or eliminate the consumption of alcohol and nicotine before sleeping.

11.2.2 Heat Stress

Observe the following general procedures and practices regarding heat stress:

- Increase the number of rest breaks and/or rotate site personnel in shorter work shifts.
- Watch for signs and symptoms of heat stress and fatigue.
- During hot months, plan work for early morning or evening.
- Use ice vests when necessary.
- Rest in cool, dry areas.
- Ensure that employees have access to potable drinking water and shade.
- During conditions exceeding 95° F, ensure that the following additional procedures are adhered to:
 - Establish effective communication by voice, observation, or electronic means.
 - Observe employees for alertness and signs or symptoms of heat illness.
 - Designate one or more employees on each work site as authorized to call for emergency medical services.
 - Remind employees to drink water throughout the shift.
 - Conduct pre-shift meetings before beginning work to review the high heat procedures, encourage drinking water, and remind employees of their right to take a cool-down rest when necessary.

11.2.2.1 Signs, Symptoms, and Treatment

The Key Foreperson will be trained in heat stress prevention, including the following, prior to supervising employees:

- Procedures to prevent heat illness.
- Procedures to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.

The information provided below addresses these training requirements.

Adverse climatic conditions are important considerations in planning and conducting site operations. High ambient temperature can result in health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal illness, and increased accident probability to serious illness or death. Heat stress is of particular concern when chemical protective garments are worn because they prevent evaporative body cooling. Wearing PPE places employees at considerable risk of developing heat stress.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses, regular monitoring and other preventive precautions are vital.

Heat Rash. Heat rash can be caused by continuous exposure to hot and humid air and skin abrasion from sweat-soaked clothing, rubber boots, or impermeable waders. The condition is characterized by a localized red skin rash and reduced sweating. Heat rash reduces the ability to tolerate heat. To treat, keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing. Take measures to prevent heat rash by changing clothes often to maximize use of dry garments or taking frequent breaks to allow doffing of equipment and drying of skin.

Heat Cramps. Heat cramps are caused by profuse perspiration with inadequate electrolytic fluid replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood, which can cause painful muscle spasms and pain in the extremities and abdomen. To treat, move the employee to a cool place and give sips of water or an electrolytic drink. Watch for signs of heat exhaustion or heat stroke.

Heat Exhaustion. Heat exhaustion is a mild form of shock caused by increased stress on various organs to meet increased demand to cool the body. Onset is gradual, and symptoms should subside within 1 hour. Symptoms include a weak pulse; shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; and fatigue. To treat, move the employee to a cool place and remove as much clothing as possible. Give sips of water or electrolytic solution and fan the person continuously to

remove heat by convection. Do not allow the affected person to become chilled. Treat for shock if necessary.

Heat Stroke. Heat stroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death. *This is a medical emergency!* Symptoms include red, hot, dry skin; a body temperature of 105° F or higher; no perspiration; nausea; dizziness and confusion; and a strong, rapid pulse. Because heat stroke is a true medical emergency, transport the patient to a medical facility immediately. Prior to transport, remove as much clothing as possible and wrap the patient in a sheet soaked with water. Fan the patient vigorously while transporting to help reduce body temperature. If available, apply cold packs under the arms, around the neck, or any other place where they can cool large surface blood vessels. If transportation to a medical facility is delayed, reduce body temperature by immersing the patient in a cool-water bath (however, be careful not to over-chill the patient once body temperature is reduced below 102° F). If this is not possible, keep the patient wrapped in a sheet and continuously douse with water and fan.

11.2.2.2 Prevention

The implementation of preventative measures is the most effective way to limit the effects of heat-related illnesses. During periods of high heat, adequate liquids must be provided to replace lost body fluids. Replacement fluids can be a 0.1% saltwater solution, a commercial mix such as Gatorade, or a combination of these with fresh water. The replacement fluid temperature should be kept cool, 50° F to 60° F, and should be placed close to the work area. Employees must be encouraged to drink more than the amount required to satisfy thirst. Employees should also be encouraged to salt their foods more heavily during hot times of the year.

Cooling devices such as vortex tubes or cooling vests can be worn beneath impermeable clothing. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

All site personnel are to rest when any symptoms of heat stress are noticed. Rest breaks are to be taken in a cool, shaded rest area. Employees shall remove chemical protective garments during rest periods and will not be assigned other tasks.

All employees shall be informed of the importance of adequate rest and proper diet, including the harmful effects of excessive alcohol and caffeine consumption.

11.2.2.3 Monitoring

Heat stress monitoring should be performed when employees are working in environments exceeding 90° F ambient air temperature. If employees are wearing impermeable clothing, this monitoring should begin at 77° F. There are two general types of monitoring that the Health and Safety Representative can designate to be used: wet bulb globe temperature (WBGT), and

physiological. The Heat Stress Monitoring Record form (**Attachment A**) will be used to record the results of heat stress monitoring.

Wet Bulb Globe Temperature. The WBGT index is the simplest and most suitable technique to measure the environmental factors that most nearly correlate with core body temperature and other physiological responses to heat. When WBGT exceeds 25° C (77° F), the work regiment in **Table 11-2** should be followed.

Table 11-2
Permissible Heat Exposure Threshold Limit Values

	Workload		
Work/Rest Regimen	Light	Moderate	Heavy
Continuous work	86°F (30.0°C)	80°F (26.7°C)	77°F (25.0°C)
75% work, 25% rest each hour	87°F (30.6°C)	82°F (28.0°C)	78°F (25.9°C)
50% work, 50% rest, each hour	89°F (31.4°C)	85°F (29.4°C)	82°F (27.9°C)
25% work, 75% rest, each hour	90°F (32.2°C)	88°F (31.1°C)	86°F (30.0°C)

These TLVs assume that nearly all acclimated, fully-clothed site personnel with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 100.4° F (38C).

(From OSHA Technical Manual, Section III: Chapter 4 - Heat Stress)

The TLVs denoted in **Table 11-2** above apply to physically fit and acclimatized individuals wearing light, summer clothing. If heavier clothing that impedes sweat or has a higher insulation value is required, the permissible heat exposure TLVs should be adjusted based on the WBGT Correction Factors in **Table 11-3**, below.

Table 11-3
WBGT Correction Factors

Clothing Type	WBGT Correction
Summer lightweight working clothing	0°F (0°C)
Cotton coveralls	-3.6°F (-2°C)
Winter work clothing	-7.2°F (-4°C)
Water barrier, permeable	-10.8°F (-6°C)
Fully encapsulating	-14.4°F (-10°C)

Physiological. Physiological monitoring can be used in lieu of, or in addition to, WBGT. This monitoring can be self-performed once the Health and Safety Representative demonstrates appropriate techniques to affected employees. Because individuals vary in their susceptibility to heat,

this type of monitoring has its advantages. The following two parameters are to be monitored at the beginning of each rest period:

- **Heart Rate** The maximum heart rate (MHR) is the amount of work (beats) per minute a healthy person's heart can be expected to safely deliver. Each individual will count his/her radial (wrist) pulse for 1 minute as early as possible during each rest period. If the heart rate of any individual exceeds 75% of his/her calculated MHR (MHR 200 age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is below 75% of his/her calculated MHR.
- **Temperature** Each individual will measure his/her temperature with a thermometer for 1 minute as early as possible in the first rest period. If the temperature exceeds 99.6° F at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work if his/her temperature exceeds 100.4° F.

11.2.2.4 **Training**

Employees potentially exposed to heat stress conditions will be instructed on the contents of this procedure. This training can be conducted during daily tailgate safety meetings.

11.2.3 Cold Stress

Observe the following procedures and practices regarding cold stress:

- Take breaks in heated shelters when working in extremely cold temperatures.
- Upon entering the shelter, remove the outer layer of clothing and loosen other layers to promote evaporation of perspiration.
- Drink warm liquids to reduce the susceptibility to cold stress.
- Be aware of cold stress symptoms, including shivering, numbness in the extremities, and sluggishness.
- Provide adequate insulating dry clothing to maintain warmth if work is performed in air temperature below 40° F. Wind chill cooling rates and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required.
- If the air temperature is 32° F or less, hands should be protected.
- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of the clothing in use should be impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outer wear should be changed as it becomes wetted. The outer garments should include provisions for easy ventilation in order to prevent wetting of the inner layer by sweat.

- If available clothing does not give adequate protection to prevent cold injury, work should be modified or suspended until adequate clothing is made available, or until weather conditions improve.
- Implement a buddy system in which site personnel are responsible for observing fellow workers for early signs and symptoms of cold stress.

11.2.3.1 Signs, Symptoms, and Treatment

Cold stress can range from frostbite to hypothermia. The signs and symptoms of cold stress are listed below. The appropriate guidelines should be followed if any personnel exhibit these symptoms:

Frostbite. Frostbite is characterized by pain in the extremities and loss of manual dexterity. "Frostnip," or reddening of the tissue, is accompanied by a tingling or loss of sensation in the extremities and continuous shivering.

Hypothermia. Hypothermia is characterized by pain in the extremities and loss of manual dexterity, with severe, uncontrollable shivering, and an inability to maintain the level of activity. Symptoms include excessive fatigue, drowsiness, irritability, or euphoria. Severe hypothermia includes clouded consciousness, low blood pressure, pupil dilation, cessation of shivering, unconsciousness, and possible death.

Move the patient to a warm, dry place. If the patient's clothing is wet, remove it and replace it with dry clothing. Keep the patient warm. Re-warming of the patient should be gradual to avoid stroke symptoms. Dehydration, or the loss of body fluids, may result in a cold injury due to a significant change in blood flow to the extremities. If the patient is conscious and alert, warm sweet liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Extremities affected by frostbite should be gradually warmed up and returned to normal temperature. Moist compresses should be applied; begin with lukewarm compresses and slowly increase the temperature as changes in skin temperature are detected. Keep the patient warm and calm and move them to a medical facility as soon as possible.

11.2.4 Sunlight and Ultraviolet Exposure

Observe the following procedures and practices regarding ultraviolet (UV) exposure:

- Protect against extended exposure to sunlight with shade, long clothing, sunscreen, and high-SPF, broad-spectrum sunscreen applied frequently.
- Plan work to avoid unnecessary UV exposure.
- During peak daylight months, plan work for early morning or evening.
- Many factors affect the hazards associated with UV exposure, including the following:
 - **Time of day:** UV rays are strongest between 10 am and 4 pm.

- Season of the year: UV rays are stronger during spring and summer months. This is less of a factor near the equator.
- Distance from the equator (latitude): UV exposure goes down as you get farther from the equator.
- Altitude: More UV rays reach the ground at higher elevations.
- Cloud cover: The effect of clouds can vary. Sometimes cloud cover blocks some UV from the sun and lowers UV exposure, while some types of clouds can reflect UV and increase UV exposure. What is important to know is that UV rays can get through, even on a cloudy day.
- Reflection off surfaces: UV rays can bounce off surfaces like water, sand, snow, pavement, or grass, leading to an increase in UV exposure.
- Cloud cover does not necessarily protect from UV exposure. Consider monitoring the UV index for your work area: http://www2.epa.gov/sunwise/uv-index.
- Evaluate site-specific factors affecting UV exposure and address work practices as appropriate.

11.2.4.1 Signs, Symptoms, and Treatment

The best way to treat sunburn is to prevent it using the guidelines listed in the bullets above. Signs of sunburn include the following:

- Pinkness or redness
- Skin that feels warm or hot to the touch
- Pain, tenderness, or itching
- Swelling
- Small, fluid-filled blisters, which may break
- Headache, fever, chills, and fatigue if the sunburn is severe

If signs of sunburn are noticed, avoid further exposure and immediately implement treatment. If the sunburn is blistering *and* covers 15% or more of the body, seek medical attention.

11.2.4.2 Prevention

UV exposure hazards and their impacts on each worksite should be evaluated to determine the best practices for risk mitigation. The most effective way to prevent skin damage from UV exposure is to protect bare skin from the exposure. This can be accomplished with shade, clothing (e.g., pants, long sleeves, or hats), sunscreen, and sunglasses. Plan work to either create shade or take advantage of natural shade and avoid peak UV times during the day when possible.

11.2.5 Inclement Weather

Observe the following procedures and practices regarding inclement weather:

- Evaluate the worksite for hazards that may be amplified during inclement weather, such as traction issues, ingress and egress, slope stability, or wind-driven hazards (e.g., dust, debris, or falling trees).
- Stop outdoor work during electrical storms (lightning strikes), hailstorms, high winds, and other extreme weather conditions such as extreme heat or cold.
- Take cover indoors or in a vehicle that will provide adequate protection. In some cases, this may require exiting the worksite, such as during windstorms in areas with overhead hazards (e.g., trees or power lines).
- Listen to local forecasts for warnings about specific weather hazards such as tornadoes, hurricanes, and flash floods.
- Verify that on-site equipment and resources are adequately protected from inclement weather
- If working in an unfamiliar geographic location, consult with local resources for unique weather hazards.

11.2.6 Insects/Spiders

Observe the following general procedures and practices regarding insects/spiders:

- Tuck pants into socks.
- Wear long sleeves.
- Use insect repellent.
- Avoid contact by always looking ahead to where you will be walking, standing, sitting, leaning, grabbing, lifting, or reaching.
- Check for signs of insect/spider bites, such as redness, swelling, and flu-like symptoms.

The most dangerous spiders to humans in North America are black widows and brown spiders (also known as brown recluse or fiddleback spiders). A guide to identifying these spiders is presented in **Table 11-4**.

Table 11-4 North American Hazardous Spider Identification Guide

Hazardous Spider Identification Guide

Black Widow Spider

- Abdomen usually shows hourglass marking
- Female is 3 to 4 centimeters in diameter
- Have been found in well casings and flush-mount covers
- Not aggressive, but more likely to bite if guarding eggs
- Light, local swelling and reddening are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea
- If bitten, see a physician as soon as possible

Brown Spiders (aka Brown Recluse or Fiddleback)

- Found in the central and southern United States, although in some other areas, as well
- 1/4-to-1/2-inch-long body, and size of a silver dollar
- Hide in baseboards, ceiling cracks, and undisturbed piles of material
- Bite may either go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of the affected tissue, and very slow healing
- If bitten, see a physician as soon as possible





11.2.7 Bees and Wasps

Many encounters with bees and wasps occur when nests built in well casings or excavation areas are disturbed. Before opening a well casing, take a few moments to observe whether or not insects are entering or exiting. If they are flying to and from the casing, avoid it if possible. If you must be in an area where disturbing a nest is likely, be sure to wear long pants and a long-sleeved shirt. Stinging insects fly around the top of their target, so if you get into trouble, pull a portion of your shirt over your head and run away.

If you get stung, look for a stinger and, if present, remove it as soon as possible. Several over-the-counter products or a simple cold compress can be used to alleviate the pain of the sting. If the sting is followed by severe symptoms, or if it occurs in the neck or the mouth, seek medical attention immediately because swelling could cause suffocation.

If you need to destroy a nest, consult with the Key Foreman first. Commercially available stinging insect control aerosols are very effective but could potentially contaminate the well. Once the nest is destroyed, fine mesh may be applied over the exit and entry points of a well casing to prevent reinfestation.

1128 Ticks

Ticks in North America can be carriers of several diseases, including Lyme's Disease, Rocky Mountain Spotted Fever, and ehrlichiosis.

Limiting exposure to ticks reduces the likelihood of infection when exposed to tick-infested habitats. Measures to prevent tick exposure include the following:

- Remove leaf litter and brush in areas where you will be working prior to tick season.
- Wear light-colored clothing so that ticks are visible.
- Tuck your pant legs into your socks.
- Apply repellents to discourage tick attachment.
- Promptly inspect your body and remove crawling or attached ticks when you leave a tickinfested area.
- Conduct tick checks on buddies upon exiting any suspect area (may be needed multiple times per work day).
- Be aware of seasonal activity; ticks are often most active in the spring.

Observe the following procedures and practices if you are bitten by a tick:

- Use fine-tipped tweezers or shield your fingers with tissue, paper towel, or rubber gloves.
- Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause mouthparts to break off and remain in the skin.
- Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms.
- Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin.
- After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
- You may wish to save the tick for identification in case you become ill within 2 to 3 weeks.

 Place the tick in a sealed plastic bag in the freezer and mark the bag with the date of the bite.

11.2.9 Mosquitoes

Mosquitoes in the United States have been known to carry West Nile virus, Zika virus, St. Louis encephalitis, and Dengue fever. Avoid mosquito bites by doing the following:

- Apply insect repellent containing DEET (N,N-diethyl-meta-toluamide) when outdoors. DEET is very effective but could potentially contaminate samples.
- Read and follow the product directions whenever you use insect repellent.

- Wear long-sleeved clothes and long pants treated with repellent to further reduce your risk or stay indoors during peak mosquito feeding hours (dusk until dawn).
- Limit the number of places available for mosquitoes to lay their eggs by eliminating standing water sources from around the work area.
- If you need to destroy a mosquito nest, consult with the PM and project FL first.
- Check to see if there is an organized mosquito control program near the project site. If no program exists, work with the local government officials to establish a program.

11.2.10 Poisonous Plants

Poisonous plants include poison ivy, poison oak, and poison sumac as shown in **Table 11-5**. Observe the following procedures and practices regarding poisonous plants:

- Avoid entering areas infested with poisonous plants.
- Immediately wash any areas that come into contact with poisonous plants.
- Use PPE when there is a possibility of contact with poisonous plants.

Table 11-5
North American Hazardous Plant Identification Guide

Hazardous Plant Identification Guide Poison Ivy • Grows in the West, Midwest, Texas, and the East Coast • Several forms—vine, trailing shrub, or shrub • Three leaflets (can vary from three to nine) • Leaves are green in summer and red in fall • Yellow or green flowers • White berries **Poison Oak** • Grows in the East (New Jersey to Texas) and Pacific • 6-foot tall shrubs or long vines • Oak-like leaves in clusters of three Yellow berries **Poison Sumac** • Grows in boggy areas, especially in the Southwest and Northern United States Shrub up to 15 feet tall • Seven to 13 smooth-edged leaflets • Glossy pale yellow or cream-colored berries

If you have been exposed to poison ivy, oak, or sumac, act quickly because the toxin in the plants penetrates the skin within minutes. If possible, stay outdoors until you complete the first two steps:

- 1. Cleanse the exposed skin with generous amounts of isopropyl alcohol.
- 2. Wash the skin with water.
- 3. Take a regular shower with soap and warm water. Do not use soap until this point because it will pick up the toxin from the surface and move it around.
- 4. Wash clothes, tools, and anything else that may have been in contact with the toxin with alcohol and water. Be sure to wear hand protection during that process.

Signs and symptoms of exposure include redness and swelling that appears 12 to 48 hours after exposure. Blistering and itching will follow. If you have had a severe reaction in the past, you should see a physician right away. Over-the-counter products that are available to alleviate symptoms include Cortaid®, Lanacort®, baking soda, Aveeno® oatmeal baths, and calamine lotion.

11.2.11 The Public at Large

The community residents around worksites may pose their own specific hazards. These conditions may include the following:

- Unintentional disruption of work
- Benign or malicious trespass
- Criminal intent

Scenarios may include the following:

- Pedestrians, cyclists, or motorists disregarding site boundaries due to distraction or willful disobedience.
- Public use of private site facilities for shelter, relief, and other reasons with no ill-intention.
- Public use of private site facilities for mischievous or criminal activity, such as loitering, vandalism, or theft.
- Encounters with community members who are disgruntled with the project activity.
- Encounters with criminal activities on or near a project site.

If any of the above are anticipated to be likely, take the following precautions as appropriate:

- Verify that the site is adequately marked and barricaded to limit unintentional disruptions of the work by the public.
- Review the site for attractive nuisances (e.g., hazards or conditions that are likely to attract children) and mitigate those.
- Secure all equipment and site facilities to prevent unauthorized access or use.
- Remove valuable items from the site or adequately secure them on site to limit the temptation for potential criminals.

- Have contact information for the client's or owner's public relations office while on site, and direct disgruntled community members to that office. If necessary, vacate the site to relieve the situation and notify the PM/Superintendent.
- Work in pairs when uncertain of the public safety situation at a site. In questionable situations,
 postpone work as necessary until a plan of action can be developed to verify a safe working
 environment.

11.2.12 Personal Health and Safety

In addition to hazards associated with chemicals of concern, equipment, operations, or site conditions discussed above, there may be additional personal safety issues to consider at a site, including those related to one or multiple protected classes, such as race, gender, religion, ability, sexual orientation, or gender identity. These conditions may involve the following, perpetrated by the public or those associated with the work:

- Malicious disruption of work
- Harassment, including unwanted comments, gestures, or actions
- Threats of violence, either implied (using derogatory language) or explicit
- Assault

Specifically, if any of the above are anticipated, take the following precautions as appropriate:

- Alert the PM, Key Foreman, and/or Human Resources Department of potential issue(s).
- Formulate a plan of action to verify and maintain a safe working environment prior to field work, which may include the following:
 - Working in pairs and/or within a certain physical distance of other work groups.
 - Coordinated check-ins (calls to or from the office or visual check-ins with other field members).
- Whenever possible, schedule work only within daylight hours (which fluctuate seasonally) or on weekends when questionable scenarios may be more minimal.
 - If night work is required, maintain a minimum of two field personnel at all times, and potentially increase the total number of personnel.
 - If working in high-risk areas, discuss the possibility of hiring security if work needs to be performed at night, in low light, or near potentially dangerous areas (e.g., abandoned buildings, public displays of hostility, discrimination, or gang-related activity).
- Maintain a field phone with active GPS and non-locking 911 capability at all times while out in the field.
- If a need arises for a change in field work (e.g., additional sampling or moving to an area that was not planned) or travel plans (e.g., dead battery or flat tire), immediately alert the FL and PM as to the event.

In addition, practice active awareness of your environment. Discuss personal health and safety concerns at the daily tailgate meeting. If you feel unsafe based on the potential behavior of others, immediately bring it up to field team coworkers. If the issue is not resolved to your satisfaction, alert the PM, Key Foreman, and/or Human Resources Department to assist in resolving any potential issue(s).

12 Decontamination Procedures and Practices

12.1 Minimization of Contamination

The following measures will be observed to prevent or minimize exposure to potentially contaminated materials:

Personnel

- Do not walk through spilled materials.
- Do not handle, touch, or smell sample media directly.
- Make sure PPE has no cuts or tears prior to use.
- Protect and cover any skin injuries.
- Stay upwind of airborne dusts and vapors.
- Do not eat, drink, chew tobacco, or smoke in the work zones.

12.2 Decontamination of Equipment

All vehicles and equipment that have entered or contacted potentially contaminated areas will be visually inspected and, if necessary, decontaminated prior to leaving the area. If the level of vehicle contamination is low, decontamination may be limited to rinsing tires and wheel wells with an appropriate detergent and water. If the vehicle is significantly contaminated, steam cleaning or pressure washing may be required. Tools will be cleaned in the same manner. Rinsate from all decontamination activities will be collected for proper disposal. Decontamination of equipment and tools will take place within the CRZ.

The following supplies will be available to perform decontamination activities:

- Wash and rinse buckets
- Tap water and phosphate-free detergent
- Scrub brushes
- Distilled/deionized water
- Pressure washer/steam cleaner, if appropriate
- Paper towels and plastic garbage bags

Site-specific work plans for the planned intrusive work activities may include additional requirements for equipment decontamination, including minimum requirements for post decontamination verification testing.

12.3 Personnel Decontamination

The Key Foreperson will ensure that all site personnel are familiar with personnel decontamination procedures as listed below. All personnel wearing PPE in a work area EZ must undergo

decontamination prior to entering the SZ. Personnel will perform the following decontamination procedures:

- Wash and rinse outer gloves and boots in portable buckets to remove gross contamination.
- If suit is heavily soiled, rinse it off.
- Remove outer gloves; inspect and discard if damaged. Leave inner gloves on. Personnel will remove their outer garment and gloves, dispose of them, and properly label container or drum. Personnel will then decontaminate their hard hats and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items then will be hand-carried to the next station. At the next station workers will remove their respirator (if applicable) and decontaminate with appropriate cleaning solution and place in a clean plastic bag. Finally, workers will remove and dispose of inner gloves.
- Thoroughly wash hands and face before leaving CRZ.
- Sanitize respirators and place in a clean plastic bag.

12.3.1 Disposable PPE

Disposable PPE may include inner latex gloves and respirator cartridges. Dispose of PPE according to the requirements of the client and state and federal agencies.

12.3.2 Non-Disposable PPE

Non-disposable PPE may include respirators and boots and gloves. When decontaminating respirators, observe the following practices and procedures:

- Wipe out the respirator with a disinfecting pad prior to donning.
- Decontaminate the respirator on site at the close of each day with an approved sanitizing solution.

When decontaminating boots and gloves, observe the following practices and procedures:

- Decontaminate the boots or gloves outside with a solution of detergent and water; rinse with water prior to leaving the site.
- Protect the boots or gloves from exposure by covering with disposable covers such as plastic to minimize required decontamination activities.

12.4 Sanitizing of Personal Protective Equipment

Respirators, reusable protective clothing, and other personal articles must not only be decontaminated before being reused, but also sanitized. The insides of masks and clothing become soiled due to exhalation, body oils, and perspiration. Manufacturer's instructions should be used to sanitize respirator masks. If practical, reusable protective clothing should be machine-washed after a thorough decontamination; otherwise, it must be cleaned by hand.

12.5 Emergency Personnel Decontamination

Personnel with medical problems or injuries may also require decontamination. There is the possibility that the decontamination may aggravate or cause more serious health effects. If prompt life-saving, first aid, and medical treatment are required, decontamination procedures will be omitted. In either case, a member of the site management team will accompany contaminated personnel to the medical facility to advise on matters involving decontamination.

12.6 Containment of Decontamination Fluids

As necessary, spill control measures will be used to contain contaminated runoff that may enter into clean areas. Use plastic sheeting, hay bales, or install a spill control system to prevent spills and contain contaminated water.

13 Emergency Procedures

13.1 General

The PM/Superintendent will ensure that comprehensive site-specific emergency procedures and appropriate action plans have been established prior to any work at the Site. The purpose of these procedures and plans are to ensure that immediate mitigative and corrective emergency response actions are in place to minimize the consequences of an emergency, protect worker and public health and safety, provide security, and ensure the continuance of such actions until the emergency is terminated. Development and implementation of an Emergency Action Plan is required for prompt, efficient, and effective response to emergencies in accordance with applicable local, staff, and federal regulations.

This section presents basic components of the Site-specific emergency action plan in addition to the information presented under Site Emergency Procedures in the beginning of this HASP (see page v). that will be developed and implemented Anchor QEA.

Prior to the start of work activities, 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 PM/Superintendent, Key Foreperson, and Health and Safety Representative immediately for appropriate action. Emergency muster locations will be identified and communicated to all Site personnel.

13.2 Emergency Equipment/General Procedures

The following emergency equipment will be available at the Site at all times:

- First Aid Kit
- Fire Extinguishers (appropriate for the type of materials expected to be encountered)
- Portable Eyewash Kit

Evacuation drills will be conducted at the start of the project and periodically to practice emergency procedures. The Health and Safety Representative will conduct and critique (if necessary) the emergency response exercises.

14 Periodic Safety Inspections/Audits

The PM/Superintendent, or their designee, will implement an audit and inspection program including monthly safety inspections (at a minimum). The site inspection is a protocol designed to identify and correct unsafe acts and conditions, as well as recognize safe work practices and accomplishments in the party performing the work or their subcontractors' Scope of Work. The PM/Superintendent should develop standard safety checklists appropriate to the work being performed. **Exhibit 14-1** is an example of a simple checklist to evaluate a project's status, and should be modified to address potential unsafe acts and conditions specific to work activities occurring at the Site.

Inspections involve a daily or weekly site walk of a project site that focuses on safety. Daily site walks do not have to be documented, but once a week the PM, or designee, prepares an inspection report and retains in the project file. Items found to be out of compliance must be assigned to the responsible party for corrective action and the corrective action tracked to completion.

Project:		Date:			
Name:		Date: Time:			
Any items that have	e been found o	leficient must be corrected before work	k or use		
This chec	klist includes	, but is not limited to, the following:			
Safe Access and Workspace			Yes	No	
Are safe access and adequate sp	ace for mover	nent available for:			
Emergencies					
Work area			1		
Walkways and passageways		1			
Are ladders, stairways, and elev					
Is protection provided for floor					
Is overhead protection provided	for all areas c	or exposure?	1	-	
Is lighting adequate? Planning Work for Safety			1		
Are employees provided with al	1 consisted aco	taatirra aanimmant?			
		nated with to prevent congestion and			
avoid hazards?	111		1.2		
		folding provided where required?			
Utilities and Services Identific	ation				
High voltage lines	_		1		
Have all been identified by sign					
Have high voltage lines been mo prevent employee contact?	oved or de-en	ergized, or barriers erected to		1	
Sanitary Facilities			I I I		
Drinking water					
Are toilet facilities adequate?					
Work Procedures – Materials					
Is material handling space adequ					
Is material handling equipment			1 1 1 1		
Is material handling equipment	in good condi	tion?			
Marine Safety	1				
Slip, trip, fall hazards		uscle strain from improper lifting			
Heat or cold stress		nch points			
Insect bites		haling, touching, ingesting ntaminants			
Waves, surges, currents			-		
Noise exposure Drowning Other (e.g., tunnels, excavations, shafts					
	, slidits				
Comments:					

15 Con Edison Written Progressive Disciplinary Program

As directed by Con Edison, items found to be out of compliance must be assigned to the responsible party for corrective action and the corrective action tracked to completion. The project shall have a formal notice of subcontractor violation of health and safety regulations program to ensure that violations are issued in an IDLH situation or when the subcontractor repeatedly fails to comply with health and safety requirements. Any noncompliance items must be advised to the responsible party using a Notice of Violation, an example is included as **Exhibit 15-1**. The notice (**Exhibit 15-1**) documents poor performance and requires a response from subcontractor senior management. The notice contains five distinct levels of discipline, from submission of a recovery plan to contract termination.

		I	Date
Contractor Name			
Address			
=			
his letter offici afety Regulatio		ou have been found	to be in violation(s) of the following
on (date):	141	by,	+ +
Confined Space Entry	Lockout/Tagout	Hot Work	Personal Protective Equipment
Knowledge of the	Awareness of	Evaculation	
invironment			Back-up Alarms
Assembly	T. H. D.	0 0011	Environmental/Hazardous
Locations	Fall Protection	Scaffolding	Material Storage
SafeWrok Practices	Security Practices		
Other:			
_			
This/Those sist	auou(s) occurred at the	ionowing location(s):
This/These viola			

16 Recordkeeping Policy

The following steps must be taken to document implementation of the site-specific HASP:

- Records of hazard assessment inspections, including the persons conducting the inspection, the unsafe conditions and work practices that have been identified and the action taken to correct the identified unsafe conditions and work practices, are recorded on a hazard assessment and correction form.
- Documentation of health and safety training for each worker, including the worker's name or other identifier, training dates, types of training, and training providers are recorded on a worker training and instruction form.
- Other records are retained as required by contract specifications or by local, state, or federal (OSHA regulations). Where regulations do not specify the length of records retention, a period of 3 years after project completion will be used.

17 Investigation-Derived Waste

Investigation-derived waste (IDW) will be generated as part of fieldwork completed under this HASP. IDW will include PPE and solid waste such as gloves, plastic sheeting, and tubing used for collecting groundwater samples as well as purged groundwater removed from monitoring wells prior to sample collection. Gloves and used tubing will be collected and bagged. If not visibly impacted with former MGP waste (e.g., coal tar), bagged gloves and tubing will be disposed of in a commercial dumpster as general waste at the Anchor QEA office.

Purged groundwater will be collected in a 55-gallon steel drum. The drum will be labeled and picked up by a licensed waste transporter on the same day as sampling is completed. A waste characterization sample will be collected to confirm the drums contents conform to the non-hazardous waste profile that has been prepared. HydroChem PSC is the Con Edison-approved waste hauler that Anchor QEA has subcontracted to transport the drum of groundwater. The drum will be transported to Stericycle's Hatfield PA facility, a Con Edison-approved disposal facility, for disposal pending the waste characterization analytical results.

18 References

- Anchor QEA Engineering, PLLC, 2022. *Pre-Design Investigation Work Plan*. Cedar Street Works Former MGP Site. Prepared for Consolidated Edison of New York, Inc. March 2022.
- Beers, F.W., A. D. Ellis & G. C. Soulle, 1868. *Atlas of New York and Vicinity*. New York: Beers, Ellis & Soule.
- Con Edison (Consolidated Edison of New York), 2003. *Utility Clearance Process for Intrusive Activities*. EH&S Remediation Program. October 8, 2003.
- USEPA (U.S. Environmental Protection Agency), 1988. *US Production of Manufactured Gases:*Assessment of Past Disposal Practices. EPA/600/2-88/012. February 1988.

Attachment A Health and Safety Plan Forms





Project Nam	ne:				Dat	te:					
Project Nun	nber:				Loc	Location:					
Temperatur	e:										
Conditions:											
						Calibration	Calibration	Calibration			
	COC	Instr	ument	S	/N	Date	Gas/Method	by			
Organic var											
Particulates	i										
O ₂											
Other:											
Other:											
Other.											
			Organic Va	apor		CG					
Time	Location/De	escription	(ppm)		O2 %	%LEL	Other	Other			
Notes:											
Completed by	y:										
Printed Name			Sign	nature			 Date				







Date:		
Project No:		
Project Name:		
Person Conducting Meeting:	Project Manager:	
TOPICS COVERED: Highlighted topics	are required	
 □ Emergency Procedures and Evacuation Route □ Directions to Hospital □ HASP Review and Location □ Safety Equipment Location □ Proper Safety Equipment Use □ Employee Right-to-Know/ SDS Location □ Fire Extinguisher Location □ Eye Wash Station Location □ Buddy System □ Self and Coworker Monitoring □ Field Team Medical Conditions for 	☐ Lines of Authority ☐ Communication ☐ Site Security ☐ Vessel Safety Protocols ☐ Work Zones ☐ Vehicle Safety and Driving/ Road Conditions ☐ Equipment Safety and Opera ☐ Proper Use of PPE ☐ Decontamination Procedure ☐ Near Miss Reporting Proced for Emergency Purposes (Confidenti	☐ Biological Hazards s ☐ Eating/Drinking/Smoking ures ☐ Reviewed Prior Lessons Learned
□ Other:		
Weather Conditions:		<u>Attendees</u>
_	Pr	inted Name Signature
Daily Work Scope:		
Site-specific Hazards:		
		End of Day Wellness Check
Safety Comments:		







Date:				
Project No	:			
Project Na	me:			
Modification	on:			
Reason for	Modification:			
Site Persor	nnel Briefed			
			Data	
Mama:				
		_		
			_	
Name:				
Name:			Date:	
_				
Approvals				
Field Lead:	Printed Name	Cianatura		Data
	riinteu ivanie	Signature		Date
Project				
Manager:	D' to IN			
	Printed Name	Signature		Date



Heat Stress Monitoring Record



Date:							
Project No:					-		
Project Nam	e:				_		
Location:					_		
				Monitoring Res	ults		
	Initial Reading	First Work	Second Work	Third Work	Fourth Work	Fifth Work	9
	Time:	Period Time:	Period Time:	Period Time:	Period Time:	Period Time:	Р
	WBGT (°F):	WBGT (°F):	WBGT (°F):	WBGT (°F):	WBGT (°F):	WBGT (°F):	,
F I							
	A : - (0-)						

	Initial Reading Time:		Work I Time:		d Work d Time:	Period	Work Time:		n Work I Time:		Work I Time:	Sixth Period	
	WBGT (°F):	WBG	T (°F):	WBG	T (°F):	WBG	T (°F):	WBG	T (°F):	WBG	T (°F):	WBG	Γ (°F):
Employee Name	Air Temp (°F):	Air Ten	np (°F):	Air Ter	np (°F):	Air Ter	np (°F):	Air Ter	np (°F):	Air Ter	np (°F):	Air Ten	np (°F):
	Initial Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:
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	Initial Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:	Initial Temp:	Final Temp:
	Initial H.R.:	Initial H.R.:	Final H.R.:	Initial H.R.:	Final H.R.:	Initial H.R.:	Final H.R.:	Initial H.R.:	Final H.R.:	Initial H.R.:	Final H.R.:	Initial H.R.:	Final H.R.:

Notes:	Completed by:		
	Printed Name	Signature	Date



Attachment B Training Records



Health & Safety Summary

Scott Andrews

Training	Date	Notes
Medical Monitoring	7/14/2021	Cleared
8 Hour Refresher	5/19/2021	Safety Unlimited
Adult & Pediatric First Aid/CPR/AED	5/6/2021	2 Year certification
OSHA Respiratory Protection Training	6/5/2020	Safety Unlimited
Respirator Fit Test	5/29/2020	cleared for ConEd
Medical Monitoring	5/29/2020	fit for duty
8 Hour Refresher	5/14/2020	Safety Unlimited
Adult & Pediatric First Aid/CPR/AED	6/19/2019	Safety Unlimited
Medical Monitoring	4/15/2019	Fit for duty
8 Hour Refresher	3/18/2019	Safety Unlimited
Medical Monitoring	4/13/2018	fit for duty
8 Hour Refresher	3/15/2018	Safety Unlimited
DOT HAZMAT Advanced General Awareness Training	9/27/2017	Safety Unlimited
Medical Monitoring	4/13/2017	fit for duty
8 Hour Refresher	4/10/2017	Safety Unlimited
DOT HAZMAT BASIC General Awareness Training	9/14/2016	Safety Unlimited
CPR, AED and First Aid - 2 yrs.	9/10/2016	ARC
Medical Monitoring	7/7/2016	Fit for duty
Respirator Fit Test	4/6/2016	VO-Toys Site, Harrison, NJ
8 Hour Refresher	4/6/2016	Safety Unlimited
Amtrak Right of Entry Permit/RR Contr. Safety Trng	7/13/2015	Amtrak Contractor
Medical Monitoring	6/11/2015	Annual/Fit for Duty/no restrictions
8 Hour Refresher	1/27/2015	Safety Unlimited
First Aid - 2 yr	8/2/2014	ARC
CPR/AED - 2 yr.	8/2/2014	ARC
Amtrak Right of Entry Permit/RR Contr. Safety Trng	5/23/2014	Amtrak expires 5/23/2015
DOT HAZMAT Advanced General Awareness Training	5/13/2014	Safety Unlimited
Drug and Alcohol Testing	2/21/2014	Exxon Mobile/Baytown
Hazardous Materials Transportation	12/13/2013	National Environmental Trainers
8 Hour Refresher	12/11/2013	Etraining, Inc.
Hazard Communication Training	12/2/2013	in-house training
Medical Monitoring	3/29/2013	Annual



Health & Safety Summary

Scott Andrews

Training	Date	Notes
8 Hour Refresher	3/8/2013	Safety Unlimited
8 HR Initial Supervisor	11/29/2012	Safety Unlimited
HEP A (2nd)	9/4/2012	
HEP B (3rd)	9/4/2012	
HEP B (2nd)	3/26/2012	
8 Hour Refresher	2/28/2012	Safety Unlimited
DOT HAZWOPER Awareness Level	2/27/2012	Michigan State University
TETANUS	2/22/2012	every 10 years
HEP A (1st)	2/22/2012	
DIPHTHERIA	2/22/2012	
HEP B (1st)	2/22/2012	
First Aid - 2 yr	2/21/2012	ARC
CPR/AED - 2 yr.	2/21/2012	ARC
40 Hour Hazwoper	3/24/2006	ARGUS

This certifies that

Scott Andrews

has successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance w/Federal OSHA Regulation 29 CFR 1910.120(e) & (p)

And all State OSHA/EPA Regulations as well including 29 CFR 1926.65 for Construction.

This course (Version 3) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044).

Safety Unlimited, Inc., Provider #5660170-2, is accredited by the International Association for Continuing Education and Training (IACET) and is accredited to issue the IACET CEU. As an IACET Accredited Provider, Safety Unlimited, Inc. offers CEUs for its programs that qualify under the ANSI/IACET Standard. Safety Unlimited, Inc. is authorized by IACET to offer 0.8 CEUs for this program.

Julius P. Griggs

Julius P. Griggs

Julius P. Griggs
Instructor #892

2105195165412

Certificate Number

5/19/2021

Issue Date





2139 Tapo St., Suite 228 Simi Valley,CA 93063 (855) 784-2677 or 805 306-8027 https://www.safetyunlimited.com

Scan this code or visit safetyunlimited.com/v to verify certificate.

Proof of initial certification and subsequent refresher training is NOT required to take refresher training





scott andrews

has successfully completed requirements for

Adult and Pediatric First Aid/CPR/AED

Date Completed: 5/6/2021 Validity Period: 2 - Years

Conducted by: Aquatic Solutions







CEU

scott andrews

has succesfully completed requirements for

Adult and Pediatric First Aid/CPR/AED

Date Completed: 5/6/2021

Conducted by: Aquatic Solutions

Contact Hours: 5.5 CEUs Awarded: 0.6



To verify certificate, scan code or visit redcross.org/digitalcertificate and enter ID.

Learn and be inspired at LifesavingAwards.org

This certifies that

Scott Andrews

has successfully completed

OSHA Respiratory Protection Training

Can be taken as either Initial or Refresher Training.

In Accordance With Federal OSHA Regulation 29 CFR 1910.134

And all State OSHA and EPA Regulations As Well

This course is approved for 4 Contact Hours (.4 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044)

Safety Unlimited, Inc., Provider #5660170-2, is accredited by the International Association for Continuing Education and Training (IACET) and is accredited to issue the IACET CEU. As an IACET Accredited Provider, Safety Unlimited, Inc. offers CEUs for its programs that qualify under the ANSI/IACET Standard. Safety Unlimited, Inc. is authorized by IACET to offer 0.4 CEUs for this program.

<u>Julius P. Griggs</u> Julius P. Griggs

Julius P. Griggs
Instructor #892

20060550165412

Certificate Number

6/5/2020

Issue Date





2139 Tapo St., Suite 228 Simi Valley,CA 93063 (888) 309-SAFE (7233) or 805 306-8027 https://www.safetyunlimited.com

Scan this code or visit safetyunlimited.com/v to verify certificate.

Annual Refresher Training Required



This certifies that

Scott Andrews

has successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance w/Federal OSHA Regulation 29 CFR 1910.120(e) & (p)

And all State OSHA/EPA Regulations as well including 29 CFR 1926.65 for Construction.

This course (Version 3) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044).

Safety Unlimited, Inc., Provider #5660170-2, is accredited by the International Association for Continuing Education and Training (IACET) and is accredited to issue the IACET CEU. As an IACET Accredited Provider, Safety Unlimited, Inc. offers CEUs for its programs that qualify under the ANSI/IACET Standard. Safety Unlimited, Inc. is authorized by IACET to offer 0.8 CEUs for this program.

Julius P. Griggs

Julius P. Griggs

Instructor #892

2005145165412

Certificate Number

5/14/2020

Issue Date





2139 Tapo St., Suite 228 Simi Valley, CA 93063 (888) 309-SAFE (7233) or 805 306-8027 https://www.safetyunlimited.com

Scan this code or visit safetyunlimited.com/v to verify certificate.



Proof of initial certification and subsequent refresher training is NOT required to take refresher training



Scott Andrews

has successfully completed requirements for

Adult and Pediatric First Aid/CPR/AED: valid 2 Years

Date Completed: 06/19/2019

conducted by: American Red Cross

Instructor: Jeffrey Wohlberg



ID: GY0HI0 Scan code or visit: redcross.org/confirm

This certifies that

Scott Andrews

has successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance w/Federal OSHA Regulation 29 CFR 1910.120(e) & (p)

And all State OSHA/EPA Regulations as well including 29 CFR 1926.65 for Construction.

This course (Version 3) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044).

Julius P. Griggs

Julius P. Griggs

Julius P. Griggs Instructor #892 1903185165412

Certificate Number

3/18/2019

Issue Date





2139 Tapo St., Suite 228 Simi Valley,CA 93063 (888) 309-SAFE (7233) or 805 306-8027 https://www.safetyunlimited.com

Scan this code or visit www.safetyunlimited.com/v to verify certificate.

Proof of initial certification and subsequent refresher training is NOT required to take refresher training

This certifies that

Scott Andrews

Has Successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance w/Federal OSHA Regulation 29 CFR 1910.120(e) & (p)

And all State OSHA/EPA Regulations as well including 29 CFR 1926.65 for Construction.

This course (Version 3) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044).

Julius P. Griggs

1803155165412

3/15/2018

Julius P. Griggs
Training Director

Certificate Number

Issue Date



2139 Tapo St., Suite 228 Simi Valley, CA 93063 888 309-SAFE (7233) or 805 306-8027 866-869-7097 (fax) www.safetyunlimited.com

Proof of initial certification and subsequent refresher training is NOT required to take refresher training Want to be sure this certificate is valid? Visit safetyunlimited.com/verification

This certifies that

Scott Andrews

Has Successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance w/Federal OSHA Regulation 29 CFR 1910.120(e) & (p)

And all State OSHA and EPA Regulations As Well

This course (Version 3) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044).

Julius P. Griggs

1704105165412

4/10/2017

Julius P. Griggs Training Director Certificate Number

Issue Date



2139 Tapo St., Suite 228 Simi Valley, CA 93063 888 309-SAFE (7233) or 805 306-8027 866-869-7097 (fax) www.safetyunlimited.com

Proof of initial certification and subsequent refresher training is NOT required to take refresher training Want to be sure this certificate is valid? Visit safetyunlimited.com/verification

This certifies that

Scott Andrews

Has Successfully completed

DOT Hazmat Basic General Awareness Training

Includes Safety Awareness and Security Awareness. Does not include: Function Specific, Modal Specific or Driver Training.

In Accordance with Part 172 Subpart H of Title 49

This Certificate is Valid for Initial or Refresher Training

This course is approved for 4 Contact Hours (0.4 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044)

Julius P. Griggs

Julius P. Griggs Training Director 1609144557950

Certificate Number

9/14/2016

Issue Date



2139 Tapo St., Suite 228 Simi Valley, CA 93063 888 309-SAFE (7233) or 805 306-8027 866-869-7097 (fax) www.safetyunlimited.com

Refresher Training Required at Least Every 3 Years Want to be sure this certificate is valid? Visit safetyunlimited.com/verification 9/12/2016



Saba

Certificate of Completion

Scott Andrews

has successfully completed requirements for

Adult First Aid/CPR/AED - valid 2 Years

conducted by American Red Cross

Date Completed: 09/10/2016
Instructors: Rafael Gonzalez



Certificate ID: GTOO92

To verify, scan code or visit: redcross.org/confirm

This certifies that

Scott Andrews

Has Successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance w/Federal OSHA Regulation 29 CFR 1910.120(e) & (p)

And all State OSHA and EPA Regulations As Well

This course (Version 2) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) issued by Safety Unlimited, Inc. (Accreditation # 044).

Julius P. Grigg Julius P. Griggs

Training Director

1604065165412

Certificate Number

4/6/2016

Issue Date



2139 Tapo St., Suite 228 Simi Valley, CA 93063 888 309-SAFE (7233) or 805 306-8027 866-869-7097 (fax) www.safetyunlimited.com

Proof of initial certification and subsequent refresher training is NOT required to take refresher training Want to be sure this certificate is valid? Visit safetyunlimited.com/verification



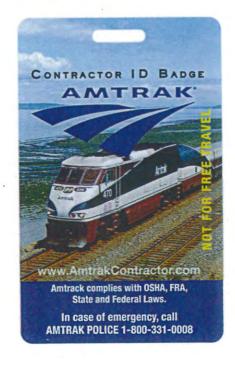
Amtrak Contractor

Anchor Qea

Scott Andrews A-US-NY-0514-01008

Company Phone # 3154539009

Has completed AMTRAK
Contractor Orientation Safety
I must be escorted by Amtrak
employee at all times.
NJT/SEPTA Excluded



AMTRAK Contractor



Scott Andrews

A-US-NY-0514-01008

Anchor Qea 3154539009

Has successfully completed Amtrak Contractor Orientation 7/13/2015

TEMPORARY - EXPIRES 7/28/2015

This is your temporary card. You must make sure your photo is uploaded to our system. This card is good with or without a photo displayed on it.

This temporary card is good for 15 days from the date you completed the course.

In case of emergency Amtrak Police 800-331-0008



This is to certify that

Scott T. Andrews

has satisfactorily completed 40 hours of training in

Hazardous Waste Operations And Emergency Response

to comply with the training requirements of OSHA 29 CFR 1910.120 and WAC 296-843

Certificate Number 1021311

Susm N. Mars



Mar 20 - 24, 2006 Date(s) of Training

Annual Refresher Required by: Mar 24, 2007

Argus Pacific, Inc. • 1900 W. Nickerson • Suite 315 • Seattle, Washington 98119 • 206.285.3373 • fax 206.285.3927



Scott Andrews

has successfully completed requirements for

Adult and Pediatric First - valid 2 Years

conducted by

American Red Cross

Date Completed: 08/02/2014

Instructors:

Madge Philantrope, Jennifer

M Saunders



Certificate ID: 0VNMCS

To verify, scan code or visit: redcross.org/confirm



Amtrak Contractor

Anchor Qea

Scott Andrews A-US-NY-0514-01008 Company Phone # 3154539009

Has completed AMTRAK Contractor Orientation Safety I must be escorted by Amtrak employee at all times. NJT/SEPTA Excluded



This certifies that

Scott Andrews

Has Successfully completed

DOT Hazmat Advanced General Awareness Training

Includes Security Awareness and Function Specific, for Hazmat Table, Labeling, Marking, Placarding, Packaging, and Shipping Papers

In Accordance with Part 172 Subpart H of Title 49

This Certificate is Valid for Initial or Refresher Training

This course is approved for 10 Contact Hours (1.0 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) issued by Safety Unlimited, Inc. (Accreditation # 044)

Julius P. Griggs

Julius P. Griggs Instructor #892 1405134557950

Certificate Number

5/13/2014

Issue Date



2139 Tapo St., Suite 228 Simi Valley, CA 93063 888 309-SAFE (7233) or 805 306-8027 866-869-7097 (fax) www.safetyunlimited.com

Refresher Training Required at Least Every 3 Years Want to be sure this certificate is valid? Visit safetyunlimited.com/verification



eTraining, Inc.

Certificate of Completion

This certifies that

Scott Andrews

has received 8 hours of training for successfully completing the

2013 Hazwoper 8 Hour Refresher

OSHA 29 CFR 1910.120/1926.65

December 11, 2013

Certificate Number: 32469

www.etraintoday.com

Niall O'Malley, President

Larry A. Baylor, VP Content Development

THE NATIONAL ENVIRONMENTAL TRAINERS

Scott Andrews

has satisfactorily passed an exam and completed a training course entitled

DOT Hazardous Materials Transportation

meeting the requirements identified in Title 49 CFR 172.704.

This course has been awarded .5 Industrial Hygiene CM Points by the American Board of Industrial Hygiene-Approval Number 13338. This course is also eligible for .25 Continuance of Certification (COC) points from the Board of Certified Safety Professionals



Certificate Number: 788635

www.nationalenvironmentaltrainers.com

Signature of Instructor

 $\mathbb{W} \subset$

Clay A. Bednarz, MS, RPIH

December 13, 2013

This certifies that

Scott Andrews

Has Successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance W/Federal OSHA Regulation 29 CFR 1910.120(e), (p) & (q)

And all State OSHA and EPA Regulations As Well

This course is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) issued by Safety Unlimited, Inc. (Accreditation # 044)

Julius P. Griggs

130308557950

3/8/2013

Julius P. Griggs Instructor #892

Certificate Number

Issue Date



2139 Tapo St., Suite 228 Simi Valley, CA 93063 888 309-SAFE (7233) or 805 306-8027 866-869-7097 (fax) www.safetyunlimited.com

Proof of initial certification and subsequent refresher training is NOT required to take refresher training Want to be sure this certificate is valid? Visit safetyunlimited.com/verification

This certifies that

Scott Andrews

Has Successfully completed

8 Hour HAZWOPER Supervisor Training

This certificate does not in itself indicate initial 24 or 40 Hour HAZWOPER Training

In Accordance With Federal OSHA Regulation 29 CFR 1910.120(e)(4)

And all State OSHA/EPA Regulations as well

This course is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) issued by Safety Unlimited, Inc. (Accreditation # 044)

Julius P. Griggs

Julius P. Griggs Instructor #892 121129457950

Certificate Number

11/29/2012

Issue Date



2139 Tapo St., Suite 228 Simi Valley, CA 93063 888 309-SAFE (7233) or 805 306-8027 866-869-7097 (fax) www.safetyunlimited.com

Annual Refresher Training NOT Required Want to be sure this certificate is valid? Visit safetyunlimited.com/verification

This certifies that

Scott Andrews

Has Successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance W/Federal OSHA Regulation 29 CFR 1910.120(e), (p) & (q)

And all State OSHA and EPA Regulations As Well

<u>Julius *P. Griggs*</u> Julius P. Griggs

Instructor #892

120228557950

2/28/2012

Certificate Number

Issue Date



690A East Los Angeles Ave Suite 180 Simi Valley, CA 93065 888-309-7233 * 805-306-8027 * 866-869-7097 (F) www.safetyunlimited.com

Proof of initial certification and subsequent refresher training is NOT required to take refresher training Want to be sure this certificate is valid? Visit safetyunlimited.com/verification



School of Criminal Justice East Lansing, Michigan

This certifies that:

Haz Awareness

Has completed the following on-line safety training from "saferesponse.com":

Hazardous Materials Response - Awareness Level

As described in OSHA requirements on Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)

02/27/2012

Completion Date

Departmental Representative

209254

Certificate Number

Emergency Response Solutions Industrial Safety Consultants, Inc. 86

Course Score

CERTIFICATE of COMPLETION

This is to certify that:

Scott Andrews

has attended

Course Title - Adult First Aid/CPR/AED

and has successfully completed the following elements

First Aid: valid 2 Years

Adult CPR: valid 2 Years

AED-Adult: valid 2 Years

Conducted by

Instructor: Rocky Tang;

on

2/21/2012

The American Red Cross is an authorized provider of IACET this course may be eligible for CEUs.

Contact your local chapter for details.





Attachment C Safety Data Sheets for Chemicals of Concern







Material Safety Data Sheet Acenaphthene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Acenaphthene

Catalog Codes: SLA2332

CAS#: 83-32-9

RTECS: AB1000000

TSCA: TSCA 8(b) inventory: Acenaphthene

CI#: Not applicable.

Synonym: Ethylenenaphthalene

Chemical Name: 1,8-Dehydroacenaphthalene

Chemical Formula: C10H6(CH2)2

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Acenaphthene	83-32-9	100

Toxicological Data on Ingredients: Acenaphthene LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available.

Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at

least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of oxidizing materials.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Combustible.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid needles.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 154.21 g/mole

Color: White.

pH (1% soln/water): Not applicable.

Boiling Point: 277.5°C (531.5°F)

Melting Point: 93.6 (200.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.02 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol.

Solubility:

Partially soluble in methanol. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory

tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Acenaphthene Massachusetts RTK: Acenaphthene

New Jersey: Acenaphthene

TSCA 8(b) inventory: Acenaphthene

CERCLA: Hazardous substances.: Acenaphthene

Other Regulations: Not available.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or

equivalent. Splash goggles.

Section 16: Other Information

References:

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.

-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.

Other Special Considerations: Not available.

Created: 10/09/2005 03:35 PM

Last Updated: 11/06/2008 12:00 PM

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ICON

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

1 Identification of the substance/mixture and of the company/undertaking

- 1.1 Product identifier
- Trade name: ALCONOX
- 1.2 Relevant identified uses of the substance or mixture and uses advised against No further relevant information available.
- · Application of the substance / the mixture: Cleaning material/ Detergent
- · 1.3 Details of the supplier of the Safety Data Sheet
- · Manufacturer/Supplier:

Alconox, Inc.

30 Glenn St., Suite 309

White Plains, NY 10603

Phone: 914-948-4040

- · Further information obtainable from: Product Safety Department
- · 1.4 Emergency telephone number:

ChemTel Inc.

(800)255-3924, +1 (813)248-0585

2 Hazards identification

- · 2.1 Classification of the substance or mixture
- · Classification according to Regulation (EC) No 1272/2008



GHS05 corrosion

Eye Dam. 1; H318: Causes serious eye damage.



GHS07

Skin Irrit, 2; H315: Causes skin irritation.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC



Xi; Irritant

R38-41: Irritating to skin. Risk of serious damage to eyes.

· Information concerning particular hazards for human and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

· Classification system:

The classification is according to the latest editions of the EU-lists, and extended by company and literature data.

The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

- · 2.2 Label elements
- Labelling according to Regulation (EC) No 1272/2008

The product is classified and labelled according to the CLP regulation.

(Contd. on page 2)

Safety Data Sheet according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

· Hazard pictograms

(Contd. of page 1)



· Signal word: Danger

· Hazard-determining components of labelling:

sodium dodecylbenzene sulfonate

· Hazard statements

H315: Causes skin irritation.

H318: Causes serious eye damage.

· Precautionary statements

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P264: Wash thoroughly after handling.

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 on this label).

P362: Take off contaminated clothing and wash before reuse.

P332+P313: If skin irritation occurs: Get medical advice/attention.

P302+P352: IF ON SKIN: Wash with plenty of soap and water.

· Hazard description:

· WHMIS-symbols:

D2B - Toxic material causing other toxic effects



· NFPA ratings (scale 0 - 4)



· HMIS-ratings (scale 0 - 4)



HMIS Long Term Health Hazard Substances

None of the ingredients is listed.

- 2.3 Other hazards
- Results of PBT and vPvB assessment
- · PBT: Not applicable.
- · vPvB: Not applicable.

(Contd. on page 3)

Safety Data Sheet according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

(Contd. of page 2)

3 Composition/information on ingredients

- · 3.2 Mixtures
- Description: Mixture of substances listed below with nonhazardous additions.

CAS: 68081-81-2	sodium dodecylbenzene sulfonate Xn R22; Xi R36 ∴ Acute Tox. 4, H302; Eye Irrit. 2, H319	10-25%
CAS: 497-19-8 EINECS: 207-838-8 Index number: 011-005-00-2	Sodium Carbonate Xi R36	2,5-10%
CAS: 7722-88-5 EINECS: 231-767-1	tetrasodium pyrophosphate substance with a Community workplace exposure limit	2,5-10%
CAS: 151-21-3 EINECS: 205-788-1	sodium dodecyl sulphate Xn R21/22; Xi R36/38 Acute Tox. 4, H302; Acute Tox. 4, H312; Skin Irrit. 2, H315; Eye Irrit. 2, H319	2,5-10%

· Additional information: For the wording of the listed risk phrases refer to section 16.

4 First aid measures

- 4.1 Description of first aid measures
- · After inhalation: Supply fresh air; consult doctor in case of complaints.
- After skin contact:

Immediately wash with water and soap and rinse thoroughly.

If skin irritation continues, consult a doctor.

· After eye contact:

Remove contact lenses if worn.

Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

After swallowing:

Rinse out mouth and then drink plenty of water.

Do not induce vomiting; call for medical help immediately.

4.2 Most important symptoms and effects, both acute and delayed

No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

5 Firefighting measures

- 5.1 Extinguishing media
- Suitable extinguishing agents:

CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

(Contd. on page 4)

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

(Contd. of page 3)

- 5.2 Special hazards arising from the substance or mixture: No further relevant information available.
- 5.3 Advice for firefighters
- · Protective equipment:

Wear self-contained respiratory protective device.

Wear fully protective suit.

· Additional information: No further relevant information available.

6 Accidental release measures

· 6.1 Personal precautions, protective equipment and emergency procedures

Product forms slippery surface when combined with water.

- 6.2 Environmental precautions: Do not allow to enter sewers/ surface or ground water.
- · 6.3 Methods and material for containment and cleaning up:

Pick up mechanically.

Clean the affected area carefully; suitable cleaners are:

Warm water

· 6.4 Reference to other sections

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

7 Handling and storage

· 7.1 Precautions for safe handling

Prevent formation of dust.

Keep receptacles tightly sealed.

- Information about fire and explosion protection: No special measures required.
- · 7.2 Conditions for safe storage, including any incompatibilities
- Storage:
- Requirements to be met by storerooms and receptacles: No special requirements.
- Information about storage in one common storage facility: Not required.
- Further information about storage conditions: Protect from humidity and water.
- · 7.3 Specific end use(s): No further relevant information available.

8 Exposure controls/personal protection

- · Additional information about design of technical facilities: No further data; see item 7.
- · 8.1 Control parameters
- · Ingredients with limit values that require monitoring at the workplace:

7722-88-5 tetrasodium pyrophosphate

REL (USA) 5 mg/m³

TLV (USA) TLV withdrawn

EV (Canada) 5 mg/m3

(Contd. on page 5)

Safety Data Sheet according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

(Contd. of page 4)

- · Additional information: The lists valid during the making were used as basis.
- · 8.2 Exposure controls
- · Personal protective equipment:
- General protective and hygienic measures:

Keep away from foodstuffs, beverages and feed.

Immediately remove all soiled and contaminated clothing.

Wash hands before breaks and at the end of work.

Avoid contact with the skin.

Avoid contact with the eyes and skin.

· Respiratory protection:

Not required under normal conditions of use.

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.

· Protection of hands:



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

· Material of gloves

Butyl rubber, BR

Nitrile rubber, NBR

Natural rubber, NR

Neoprene gloves

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

· Penetration time of glove material

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· Eye protection:



Safety glasses

Body protection: Protective work clothing

(Contd. on page 6)

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

(Contd. of page 5)

9.1 Information on basic physical	and chemical properties
General Information	and chemical properties
Appearance:	
Form:	Powder
Colour:	White
Odour:	Odourless
Odour threshold:	Not determined.
pH-value (10 g/l) at 20 °C:	9,5 (- NA for Powder form)
Change in condition	
Melting point/Melting range:	Not Determined.
Boiling point/Boiling range:	Undetermined.
Flash point:	Not applicable.
Flammability (solid, gaseous):	Not determined.
Ignition temperature:	
Decomposition temperature:	Not determined.
Self-igniting:	Product is not self-igniting.
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.
Vapour pressure:	Not applicable.
Density at 20 °C:	1,1 g/cm³
Relative density	Not determined.
Vapour density	Not applicable.
Evaporation rate	Not applicable.
Solubility in / Miscibility with	As v
water:	Soluble.
Partition coefficient (n-octanol/wa	ter): Not determined.
Viscosity:	E TE AC
Dynamic:	Not applicable.
Kinematic:	Not applicable.
Solvent content:	3.16
Organic solvents:	0,0 %
Solids content:	100 %
9.2 Other information	No further relevant information available.

(Contd. on page 7)

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

(Contd. of page 6)

10 Stability and reactivity

- 10.1 Reactivity
- · 10.2 Chemical stability
- · Thermal decomposition / conditions to be avoided:

No decomposition if used according to specifications.

· 10.3 Possibility of hazardous reactions

Reacts with acids.

Reacts with strong alkali.

Reacts with strong oxidizing agents.

- · 10.4 Conditions to avoid: No further relevant information available.
- 10.5 Incompatible materials: No further relevant information available.
- · 10.6 Hazardous decomposition products:

Carbon monoxide and carbon dioxide

Phosphorus compounds

Sulphur oxides (SOx)

11 Toxicological information

- · 11.1 Information on toxicological effects
- · Acute toxicity:
- · Primary irritant effect:
- On the skin: Irritant to skin and mucous membranes.
- On the eye: Strong irritant with the danger of severe eye injury.
- · Sensitization: No sensitizing effects known.
- · Additional toxicological information:

The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:

Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

12 Ecological information

- 12.1 Toxicity
- Aquatic toxicity: No further relevant information available.
- · 12.2 Persistence and degradability: No further relevant information available.
- 12.3 Bioaccumulative potential: Not worth-mentioning accumulating in organisms
- · 12.4 Mobility in soil: No further relevant information available.
- · Additional ecological information:
- · General notes:

Water hazard class 2 (German Regulation) (Self-assessment): hazardous for water. Do not allow product to reach ground water, water course or sewage system. Danger to drinking water if even small quantities leak into the ground.

- · 12.5 Results of PBT and vPvB assessment
- · PBT: Not applicable.

(Contd. on page 8)

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

· vPvB: Not applicable.

· 12.6 Other adverse effects: No further relevant information available.

(Contd. of page 7)

13 Disposal considerations

- · 13.1 Waste treatment methods
- Recommendation

Smaller quantities can be disposed of with household waste.

Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.

The surfactant used in this product complies with the biodegradability criteria as laid down in Regulation (EC) No. 648/2004 on detergents. Data to support this assertion are held at the disposal of the competent authorities of the Member States and will be made available to them, at their direct request or at the request of a detergent manufacturer.

- · Uncleaned packaging:
- · Recommendation: Disposal must be made according to official regulations.
- · Recommended cleansing agents: Water, if necessary together with cleansing agents.

14.1 UN-Number	Net Positeted	
DOT, ADR, IMDG, IATA, ICAO	Not Regulated	_
14.2 UN proper shipping name DOT, ADR, IMDG, IATA, ICAO	Not Regulated	
14.3 Transport hazard class(es)		
DOT, ADR, IMDG, IATA, ICAO Class	Not Regulated	
14.4 Packing group DOT, ADR, IMDG, IATA, ICAO	Not Regulated	
14.5 Environmental hazards: Marine pollutant:	No	
14.6 Special precautions for user	Not applicable.	
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.	
UN "Model Regulation":	Not Regulated	

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

(Contd. of page 8)

15 Regulatory information

- 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
- · United States (USA)
- SARA
- Section 355 (extremely hazardous substances):

None of the ingredients is listed.

Section 313 (Specific toxic chemical listings):

None of the ingredients is listed.

· TSCA (Toxic Substances Control Act):

All ingredients are listed.

- · Proposition 65 (California):
- · Chemicals known to cause cancer:

None of the ingredients is listed.

· Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed.

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed.

· Chemicals known to cause developmental toxicity:

None of the ingredients is listed.

- · Carcinogenic Categories
- · EPA (Environmental Protection Agency)

None of the ingredients is listed.

· IARC (International Agency for Research on Cancer)

None of the ingredients is listed.

· TLV (Threshold Limit Value established by ACGIH)

None of the ingredients is listed.

· NIOSH-Ca (National Institute for Occupational Safety and Health)

None of the ingredients is listed.

· OSHA-Ca (Occupational Safety & Health Administration)

None of the ingredients is listed.

(Contd. on page 10)

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 Revision: 31.12.2013

Trade name: ALCONOX

· Canada		(Contd. of page 9)
Canadian	Domestic Substances List (DSL)	
All ingredie	ents are listed.	
· Canadian	Ingredient Disclosure list (limit 0.1%)	
None of the	e ingredients is listed.	
· Canadian	Ingredient Disclosure list (limit 1%)	
497-19-8	Sodium Carbonate	
7722-88-5	tetrasodium pyrophosphate	
151-21-3	sodium dodecyl sulphate	

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

· Relevant phrases

H302: Harmful if swallowed.

H312: Harmful in contact with skin.

H315: Causes skin irritation.

H319: Causes serious eye irritation.

R21/22: Harmful in contact with skin and if swallowed.

R22: Harmful if swallowed.

R36: Irritating to eyes.

R36/38: Irritating to eyes and skin.

Abbreviations and acronyms:

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road) IMDG: International Maritime Code for Dangerous Goods DOT: US Department of Transportation

IATA: International Air Transport Association

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

ACGIH: American Conference of Governmental Industrial Hygienists

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

WHMIS: Workplace Hazardous Materials Information System (Canada)





Health	0
Fire	1
Reactivity	0
Personal Protection	Ε

Material Safety Data Sheet Anthracene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Anthracene

Catalog Codes: SLA3670

CAS#: 120-12-7

RTECS: CA9350000

TSCA: TSCA 8(b) inventory: Anthracene

CI#: Not available.

Synonym:

Chemical Formula: C14H10

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Anthracene	120-12-7	100

Toxicological Data on Ingredients: Anthracene LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of inhalation. Hazardous in case of skin contact (permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Very hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of inhalation.

Hazardous in case of skin contact (permeator), of ingestion.

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Clear evidence.) by NTP, +

(Proven.) by OSHA.

MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to kidneys, lungs, mucous membranes.

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged

inhalation of dust may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 540°C (1004°F)

Flash Points: CLOSED CUP: 121°C (249.8°F).

Flammable Limits: LOWER: 0.6%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Slight.

Taste: Not available.

Molecular Weight: 178.22 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 342°C (647.6°F)

Melting Point: 218°C (424.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.25 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 6.15 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Clear evidence.) by NTP, +

(Proven.) by OSHA.

Causes damage to the following organs: kidneys, lungs, mucous membranes.

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant, sensitizer), of inhalation.

Hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Anthracene Massachusetts RTK: Anthracene TSCA 8(b) inventory: Anthracene

SARA 313 toxic chemical notification and release reporting: Anthracene

CERCLA: Hazardous substances.: Anthracene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R38- Irritating to skin.

R41- Risk of serious damage to eyes.

R43- May cause sensitization by skin

contact.

R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 0

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 0

Splash goggles.

Specific hazard:

Protective Equipment:

Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 11:19 AM

Last Updated: 11/06/2008 12:00 PM

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Material Safety Data Sheet Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C6-H6

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].

The substance is toxic to blood, bone marrow, central nervous system (CNS).

The substance may be toxic to liver, Urinary System.

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials.

Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire.

Reacts on contact with iodine heptafluoride gas.

Dioxygenyl tetrafluoroborate is as very powferful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition.

Contact with sodium peroxide with benzene causes ignition.

Benzene ignites in contact with powdered chromic anhydride.

Virgorous or incandescent reaction with hydrogen + Ranev nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:

Benzene vapors + chlorine and light causes explosion.

Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.

Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion.

Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.

The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.

Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion.

Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States] TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States]

TWA: 0.1 STEL: 1 from NIOSH

TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States]

TWA: 10 (ppm) from OSHA (PEL) [United States]

TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m3) [United Kingdom (UK)]

TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m3) [Canada]

TWA: 0.5 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:

Aromatic. Gasoline-like, rather pleasant.

(Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether,

acetone.

Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Benzene vapors + chlorine and light causes explosion.

Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.

Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in

trichlorotrifluoroethane causes explosion.

Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.

The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.

Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion.

Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 930 mg/kg [Rat].

Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].

Causes damage to the following organs: blood, bone marrow, central nervous system (CNS).

May cause damage to the following organs: liver, Urinary System.

Other Toxic Effects on Humans:

Very hazardous in case of inhalation.

Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects.

May affect genetic material (mutagenic).

May cause cancer (tumorigenic, leukemia))

Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism, and urinary system.

Eyes: Causes eye irritation.

Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and

other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value)

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene

Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene

Illinois toxic substances disclosure to employee act: Benzene

Illinois chemical safety act: Benzene New York release reporting list: Benzene

Rhode Island RTK hazardous substances: Benzene

Pennsylvania RTK: Benzene

Minnesota: Benzene

Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene

New Jersey: Benzene New Jersey spill list: Benzene

Louisiana spill reporting: Benzene

California Director's list of Hazardous Substances: Benzene

TSCA 8(b) inventory: Benzene

SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable.

R22- Harmful if swallowed.

R38- Irritating to skin.

R41- Risk of serious damage to eyes.

R45- May cause cancer.

R62- Possible risk of impaired fertility.

S2- Keep out of the reach of children.

S26- In case of contact with eyes, rinse

immediately with plenty of water and seek

medical advice.

S39- Wear eye/face protection.

S46- If swallowed, seek medical advice

immediately and show this container or label.

S53- Avoid exposure - obtain special

instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or

equivalent. Wear appropriate respirator

when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 11/06/2008 12:00 PM

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Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification

Material Name: Benzo(a)pyrene CAS Number: 50-32-8

Chemical Formula: C₂₀H₁₂ EINECS Number: 200-028-5 ACX Number: X1002798-4

Synonyms: B(A)P; BAP; BENZO(D,E,F)CHRYSENE; 3,4-BENZOPIRENE; 1,2-BENZOPYRENE; 3,4-BENZOPYRENE; 6,7-BENZOPYRENE; BENZO(A)PYRENE; 3,4-BENZPYREN; 3,4-BENZ(A)PYRENE; 3,4-BENZPYRENE; 3,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRENE; 4,4-BENZYPYRE

BP; COAL TAR PITCH VOLATILES: BENZO(A)PYRENE **Derivation:** Synthesized from pyrene and succinic anhydride.

General Use: Benzo(a)pyrene is no longer used or produced commercially in the US. In its pure form, benzo(a)pyrene may be used as a research laboratory reagent. It also occurs in combustion products of coal, oil, petroleum, wood and other biological matter; in motor vehicle and other gasoline and diesel engine exhaust; in charcoal-broiled foods; in cigarette smoke and general soot and smoke of industrial, municipal, and domestic origin. It occurs naturally in crude oils, shale oils, coal tars, gases and fly ash from active volcanoes and forest fires.

Section 2 - Composition / Information on Ingredients

Name CAS %

Benzo(a)pyrene 50-32-8 ca 100% wt

Except in laboratories, benzo(a)pyrene is usually mixed with other coal tar pitch chemicals. Consider exposure limits for coal tar pitch volatiles as a guideline. However, because benzo(a)pyrene is considered a probable carcinogen to humans, it is recommended that exposures to carcinogens be limited to the lowest feasible concentration.

OSHA PEL

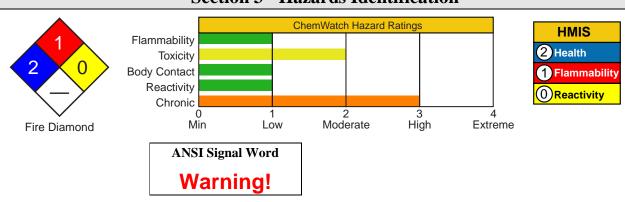
NIOSH REL

TWA: 0.2 mg/m³.

ACGIH TLV

Exposure by all routes should be carefully controlled to levels as low as possible.

Section 3 - Hazards Identification



አልልልል Emergency Overview ልልልልል

Pale yellow, crystalline solid or powder. Irritating to skin, eyes, respiratory tract. Chronic Effects: carcinogen, mutagen. Handle with extreme caution!

Potential Health Effects

Target Organs: Respiratory system, bladder, kidneys, skin.

Primary Entry Routes: Inhalation, ingestion.

Acute Effects

Inhalation: Respiratory tract irritation. Pregnant women may be especially susceptible to exposure effects of benzo(a)pyrene; exposure may damage the fetus. In general, polyaromatic hydrocarbons such as benzo(a)pyrene tend to localize primarily in body fat and fatty tissues (for ex. breasts) and are excreted in breast milk. Benzo(a)pyrene may also affect the male reproductive system (testes and sperm).

Eye: Irritation and/or burns on contact.

Skin: Irritation with burning sensation, rash, and redness; dermatitis on prolonged exposure. Sunlight enhances effects (photosensitization).

Ingestion: None reported.

Carcinogenicity: NTP - Class 2B, Reasonably anticipated to be a carcinogen, sufficient evidence of carcinogenicity from studies in experimental animals; IARC - Group 2A, Probably carcinogenic to humans; OSHA - Not listed; NIOSH - Listed as carcinogen; ACGIH - Class A2, Suspected human carcinogen; EPA - Class B2, Probable human carcinogen based on animal studies; MAK - Class A2, Unmistakably carcinogenic in animal experimentation only.

Medical Conditions Aggravated by Long-Term Exposure: Respiratory system, bladder, kidney, and skin disorders. Chronic Effects: Inhalation: Cough and bronchitis. Eye: Photosensitivity and irritation. Skin: Skin changes such as thickening, darkening, pimples, loss of color, reddish areas, thinning of the skin, and warts. Sunlight enhances effects (photosensitization). Other: Gastrointestinal (GI) effects include leukoplakia (a pre-cancerous condition characterized by thickened white patches of epithelium on mucous membranes, especially of the mouth). Cancer of the lung, skin, kidneys, bladder, or GI tract is also possible. Smoking in combination with exposure to benzo(a)pyrene increases the chances of developing lung cancer. Persons with a high degree of inducibility of the enzyme aryl hydrocarbon hydroxylase may be a high risk population.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of tepid water for at least 15 min. Consult an ophthalmologist if irritation or pain persist.

Skin Contact: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water (less than 15 min). Wash exposed area with soap and water. For reddened or blistered skin, consult a physician.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water to dilute. Inducing vomiting is not necessary since benzo(a)pyrene has a low acute toxicity and therefore, is generally an unnecessary procedure. Consider activated charcoal/cathartic.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Monitor CBC and arterial blood gases, conduct liver, renal, and pulmonary function tests (if respiratory tract irritation is present), and urinalysis. Biological monitoring techniques testing for metabolites in blood or urine, or DNA adducts in blood or tissues are useful for epidemiological studies that determine if exposure has occurred. Because neither normal nor toxic levels have been established, those techniques may not be useful for evaluating individual patients.

Special Precautions/Procedures: Emergency personnel should protect against exposure.

Section 5 - Fire-Fighting Measures

Flash Point: None reported. Benzo(a)pyrene may burn, but does *not* readily ignite.

Autoignition Temperature: None reported.

LEL: None reported. **UEL:** None reported.

Extinguishing Media: For small fires, use dry chemical, sand, water spray, or foam. For large fires, use water spray, fog, or foam.

General Fire Hazards/Hazardous Combustion Products: Carbon monoxide and carbon dioxide.

Fire-Fighting Instructions: Isolate hazard and deny entry. If feasible and without undue risk, move containers from fire hazard area. Otherwise, cool fire-exposed containers with water spray until well after fire is extinguished. Do not release runoff from fire control

2 0

See DOT

ERG

See

DOT

ERG

Fire Diamond

methods to sewers or waterways. Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode and full protective clothing.

Section 6 - Accidental Release Measures

Spill/Leak Procedures: Notify safety personnel of large spills, remove heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against dust inhalation and skin or eye contact. Clean up spills promptly.

See DOT ERG

Small Spills: Carefully scoop up spilled material and place into appropriate containers for disposal. For liquid spills, take up with a noncombustible, inert absorbent and place into appropriate containers for disposal.

Large Spills: For large spills, dike far ahead of liquid spill or contain dry spill for later disposal. Do not release into sewers or waterways. *Do not* dry sweep! Use a vacuum with a HEPA filter or a wet method to reduce dust. After cleanup is complete, thoroughly decontaminate all surfaces. *Do not* reuse contaminated cleaning materials.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Handle with extreme caution and take all necessary measures to avoid exposure to benzo(a)pyrene because it is a carcinogen and mutagen. Follow good personal hygiene procedures and thoroughly wash hands with soap and water after handling. Use safety pipettes for all pipetting.

Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Recommended Storage Methods: Store in tightly closed and properly labeled containers in a cool, well-ventilated area.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use a Class I, Type B, biological safety hood when working with benzo(a)pyrene in a laboratory. Decrease the rate of air extraction, so that benzo(a)pyrene can be handled without powder being blown around the hood. Keep glove boxes under negative pressure. Use vertical laminar-flow, 100% exhaust, biological safety cabinets for containment of in vitro procedures. The exhaust air flow should be sufficient to provide an inward air flow at the face opening of the cabinet. Ensure contaminated air sheaths that are under positive pressure are leak-tight. Never use horizontal laminar-flow hoods or safety cabinets where filtered air is blown across the working area towards the operator. Test cabinets before work begins to ensure they are functioning properly. Provide general or local exhaust ventilation systems to maintain airborne concentrations as low as possible. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: Consider preplacement and periodic medical examinations with emphasis on the oral cavity, bladder, kidneys, skin, and respiratory tract. Conduct urinalysis including specific gravity, albumin, glucose, and microscopic examination of centrifuged sediment for red blood cells. Also, include 14" x 17" chest roentgenogram, FVC + FEV1, and CBC to detect any leukemia or aplastic anemia. It is recommended that this exam be repeated on an annual basis and semiannual basis for employees 45 yr of age or older or with 10 or more years of exposure to coal tar pitch volatiles. Train workers about the hazards of benzo(a)pyrene and the necessary protective measures to prevent exposure. Periodically inspect lab atmospheres, surfaces such as walls, floors, and benches, and interior of fume hoods and air ducts for contamination. Post appropriate signs and labels on doors leading into areas where benzo(a)pyrene is used.

Personal Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. In animal laboratories, wear protective suits (disposable, one-piece and close-fitting at ankles and wrists), gloves, hair covering, and overshoes. In chemical laboratories, wear gloves and gowns. Wear protective eyeglasses or chemical safety, gas-proof goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. The following respirator recommendations are for coal tar pitch volatiles. For any unknown concentration, wear any SCBA with a full facepiece and operated in a pressure-demand or other positive pressure mode, or any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive pressure mode. For escape, wear any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister having a high-efficiency particulate filter, or any appropriate escape-type SCBA. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Other: Shower and change clothes after exposure or at the end of the workshift. Separate contaminated work clothes from street clothes. Launder before reuse. Remove benzo(a)pyrene from your shoes and clean personal protective equipment. Use procedures to ensure laundry personnel are not exposed. Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Pale yellow monoclinic needles with a faint, aromatic odor.

Physical State: Solid

Vapor Pressure (**kPa**): >1 mm Hg at 68 $^{\circ}$ F (20 $^{\circ}$ C)

Formula Weight: 252.30

Specific Gravity (H₂O=1, at 4 °C): 1.351

Boiling Point: >680 °F (>360 °C); 590 °F (310 °C) at 10

mm Hg

Freezing/Melting Point: 354 °F (179 °C)

Water Solubility: Insoluble; 0.0038 mg (+/- 0.00031

mg) in 1 L at 77 °F (25 °C)

Other Solubilities: Ether, benzene, toluene, xylene, concentrated hydrosulfuric acid; sparingly soluble in

alcohol, methanol.

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Benzo(a) pyrene is stable at room temperature in closed containers under normal storage and handling conditions. It undergoes photo-oxidation when exposed to sunlight or light in organic solvents and is also oxidized by chromic acid and ozone. Hazardous polymerization cannot occur. Avoid heat and ignition sources and incompatibles.

Storage Incompatibilities: Strong oxidizers (chlorine, bromine, fluorine) and oxidizing chemicals (chlorates, perchlorates, permanganates, and nitrates).

Hazardous Decomposition Products: Thermal oxidative decomposition of benzo(a)pyrene can produce carbon monoxide and carbon dioxide.

Section 11 - Toxicological Information

Acute Oral Effects:

Rat, oral: 15 mg/kg produced gastrointestinal and musculoskeletal tumors.

Irritation Effects:

Mouse: 14 µg caused mild irritation.

Other Effects:

Rat, oral: 40 mg/kg on the 14th day of pregnancy caused changes in the extra embryonic structures.

Rat, oral: 2 g/kg administered 28 days prior to mating and 1-22 days of pregnancy produced a stillbirth.

Tumorgenicity, mouse, oral: 75 mg/kg administered to the female during the 12-14 day of pregnancy produced biochemical and metabolic effects on the newborn.

Mouse, inhalation: 200 ng/m³/6 hr administered intermittently over 13 weeks produced tumors of the lungs.

Human, HeLa cell: 1500 nmol/L caused DNA inhibition.

Human, lung cell: 1 µmol/L caused DNA damage.

Human, liver cell: 100 nmol/L caused DNA damage.

Rabbit, skin: 17 mg/kg administered intermittently over 57 weeks produced tumors of the skin and appendages.

See RTECS DJ3675000, for additional data.

Section 12 - Ecological Information

Environmental Fate: If released to water, benzo(a)pyrene adsorbs very strongly to particulate matter and sediments, bioconcentrates in aquatic organisms which cannot metabolize it, but does not hydrolyze. Direct photolysis at the water surface, evaporation, or biodegradation may be important, but adsorption may significantly retard these processes. Adsorption to particulates may also retard direct photolysis when benzo(a)pyrene is released to air. Benzo(a)pyrene may be removed from air by reaction with nitrogen dioxide (half-life, 7 days) or ozone (half-life, 37 min), or photochemically produced hydroxyl radicals (estimated half-life, 21.49 hr). It will adsorb very strongly to the soil. Although it is not expected to appreciably leach to the groundwater, groundwater samples indicate that it can be transported there. It is not expected to appreciable biodegradation in soils. It will adsorb very strongly to the soil. Although it is not expected to appreciably leach to the groundwater, groundwater samples indicate that it can be transported there. It is not expected to significantly evaporate or hydrolyze from soils and surfaces. However, it may be subject to appreciable biodegradation in soils.

Ecotoxicity: Oysters, BCF (bioconcentration factor): 3000; rainbow trout, BCF: 920; *Daphnia pulex*, BCF: 13,000. **BCF:** Some marine organisms such as phytoplankton, certain zooplankton, scallops (*Placopecten sp*), snails (*Litternia littorea*), and mussels (*Mytilus edulis*) lack a metabolic detoxification enzyme system to metabolize benzo(a)pyrene and therefore, tend to accumulate benzo(a)pyrene. Humic acid in solution may decrease bioconcentration.

Octanol/Water Partition Coefficient: $\log K_{ow} = 6.04$

Section 13 - Disposal Considerations

Disposal: Small quantities: 10 mL of a solution containing 0.3 mol/L of potassium permanganate and 3 mol/L of sulfuric acid will degrade 5 mg of benzo(a)pyrene. Also, can treat with sodium dichromate in strong sulfuric acid (1-2 days). Benzo(a)pyrene is also a good candidate for fluidized bed incineration at a temperature range of 842 to 1796 °F (450 to 980 °C) or rotary kiln incineration at 820 to 1600 °C. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: Environmentally hazardous substances, solid, n.o.s.

ID: UN3077

Hazard Class: 9 - Miscellaneous hazardous material

Packing Group: III - Minor Danger **Symbols:** G - Technical Name Required

Label Codes: 9 - Class 9

Special Provisions: 8, 146, B54, IB8, N20

Packaging: Exceptions: 155 Non-bulk: 213 Bulk: 240

Quantity Limitations: Passenger aircraft/rail: No limit Cargo aircraft only: No limit

Vessel Stowage: Location: A Other:



EPA Regulations:

RCRA 40 CFR: Listed U022 Toxic Waste

CERCLA 40 CFR 302.4: Listed per RCRA Section 3001, per CWA Section 307(a) 1 lb (0.454 kg)

SARA 40 CFR 372.65: Listed SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.



1171 RiverFront Center, Amsterdam, NY 12010 (518) 842-4111

Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification

CAS Number: 592-01-8

61

Material Name: Calcium Cyanide **Chemical Formula:** C₂CaN₃

Structural Chemical Formula: Ca(CN),

EINECS Number: 209-740-0 ACX Number: X1005026-5

Synonyms: CALCID; CALCIUM CYANIDE; CALCIUM CYANIDE MIXTURE, SOLID; CALCIUM CYANIDE, SOLID; CALCYAN; CALCYANIDE; CYANIDE OF CALCIUM; CYANOGAS; CYANURE DE CALCIUM; CYMAG; DEGESCH CALCIUM CYANIDE A-DUST; EPA PESTICIDE CHEMICAL CODE 074001

Derivation: Produced by fusing calcium cyanamide with sodium chloride to give a crude mixture of calcium cyanide and sodium cyanide or by treating powdered calcium oxide with boiling anhydrous hydrocyanic acid in the presence of an accelerator such as ammonia or water.

General Use: Used as a rodenticide; fumigant for greenhouses, grain, seed, and citrus fruits; for leaching gold and silver ores; as a stabilizer for cements; and in the manufacture of other cyanides and steel.

Section 2 - Composition / Information on Ingredients

CAS % Name

Calcium Cyanide 592-01-8 ca 40-58% wt (commercial preparation)

Trace Impurities: May contain up to 3% calcium carbide.

OSHA PEL NIOSH REL

TWA: 5 mg/m³; skin, as CN. Ceiling: 4.7 ppm, 5 mg/m³; 10 min.

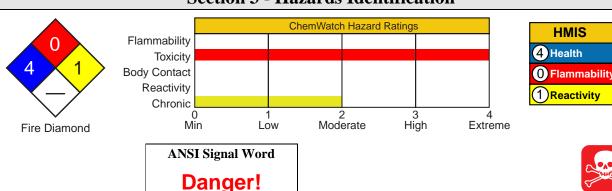
ACGIH TLV

Ceiling: 5 mg/m³; skin.

DFG (Germany) MAK

TWA: 2 mg/m³; PEAK: 2 mg/m³; skin: measured as inhalable fraction of the aerosol.

Section 3 - Hazards Identification





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Colorless crystals or white powder; slight almond odor. Poison. Other Acute Effects: chemical asphyxiant, brightpink skin coloration of the skin, death due to respiratory arrest.

Potential Health Effects

Target Organs: Eyes, skin, blood, thyroid, cardiovascular system, central nervous system.

Primary Entry Routes: Inhalation, eye contact, skin contact/absorption, ingestion.

Acute Effects

Inhalation: Irritation of the respiratory tract, flushing, weakness, headache, confusion, dizziness. Heavy exposures can lead to difficulty breathing, convulsions and cardiac difficulties (hypertension, arrythmias, etc.). Death may occur due to respiratory arrest. Inhalation of 200 to 300 ppm can be rapidly fatal. The maximum exposure with documented survival was 500 mg/m³.

Eye: Irritation.

Skin: Itching, redness, and irritation. Calcium cyanide can be absorbed through the skin in toxic amounts.

Ingestion: Irritation of the gastrointestinal tract, nausea and vomiting, salivation, anxiety, confusion, and dizziness. In severe cases, symptoms may progress to convulsions, paralysis, coma, cardiac arrythmias, and death due to respiratory arrest.

Carcinogenicity: NTP - Not listed; IARC - Not listed; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Not listed; MAK - Not listed.

Medical Conditions Aggravated by Long-Term Exposure: Thyroid disorders.

Chronic Effects: There are reports of enlarged thyroids in workers exposed to cyanide salts. It is thought that the cyanide is metabolized to thiocyanate, which competes with iodine in the body resulting in goiter. Other chronic effects include appetite loss, headache, weakness, vitamin B12 and folate abnormalities, and insomnia.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water for at least 15 min. Consult a physician or ophthalmologist if pain or irritation persist.

Skin Contact: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water. *Do not* induce vomiting. If available, obtain and prepare the Lilly cyanide antidote kit [Eli Lilly Co. (stock No. M76)] for use. Alternately, break an amyl nitrite ampule in a cloth and hold under nose for 15 seconds.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: If the victim is conscious, bradycardia and absence of cyanosis may be key diagnostic signs. Consider administration of amyl nitrite followed by sodium nitrite and sodium thiosulfate. Obtain blood cyanide levels.

Section 5 - Fire-Fighting Measures

Flash Point: Calcium cyanide is nonflammable itself but releases flammable hydrogen cyanide gas upon exposure to heat, water, or acids. Calcium carbide (an impurity in calcium cyanide) also releases flammable acetylene gas on contact with water.

Autoignition Temperature: None reported.

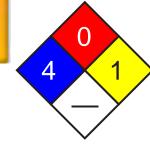
LEL: None reported. **UEL:** None reported.

Flammability Classification: Nonflammable solid.

Extinguishing Media: Use agents suitable for surrounding fire, except water. Water should not be used due to formation of flammable hydrogen cyanide gas.

General Fire Hazards/Hazardous Combustion Products: Carbon and nitrogen oxide(s). Release of flammable hydrogen cyanide gas on contact with heat, water, or acids.

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways. Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Sructural firefighters' protective clothing is *not* effective protection against calcium cyanide exposure.



See

DOT

ERG

See

DOT

ERG

Fire Diamond

Section 6 - Accidental Release Measures

Spill/Leak Procedures: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Shut off all heat and water sources. Cleanup personnel should protect against exposure.

Small Spills: Carefully scoop up or vacuum (with appropriate filter). Do not sweep!

Large Spills: For large spills, dike far ahead of liquid spill for later disposal. *Do not* release into sewers or waterways. Damp mop with calcium or sodium hypochlorite solution.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).



Section 7 - Handling and Storage

Handling Precautions: Use only with sufficient ventilation to prevent hazardous air levels and wear appropriate PPE. Never eat, drink, or smoke in work areas. Practice good personal hygiene after using calcium cyanide, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Recommended Storage Methods: Store in a cool, dry, well-ventilated area away from heat and water sources and incompatibles (Sec. 10).

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Where possible, enclose processes to prevent dispersion of dusts into work area. Provide general or local exhaust ventilation systems to maintain airborne concentrations below the OSHA PEL (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: Consider preplacement and periodic medical exams of exposed workers with emphasis on the central nervous system and thyroid. Educate workers about the hazards of calcium cyanide exposure and train in safe work practices.

Personal Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. One study has shown butyl rubber or polycarbonate to be suitable materials for PPE. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For <= 25 mg/m³, wear any supplied-air respirator or any SCBA with a full facepiece. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Other: Separate contaminated work clothes from street clothes. Launder before reuse. Remove calcium cyanide from your shoes and clean personal protective equipment. Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Colorless crystals or white powder with a slight bitter almond odor (genetically

undetectable by 20 to 60% of the population).

Physical State: Solid

Vapor Pressure (kPa): ~ 0 mm Hg

Formula Weight: 92.12

Specific Gravity (H₂O=1, at $4 \,^{\circ}$ C): 1.853 at 68 $^{\circ}$ F

(20 °C)

Freezing/Melting Point: > 350 °C (decomposes). An estimated M.P. of 640 °C was calculated (extrapolated because of decomposition).

Water Solubility: Soluble (liberates hydrogen cyanide

Other Solubilities: Soluble in alcohol and very weak

Section 10 - Stability and Reactivity

acids.

Stability/Polymerization/Conditions to Avoid: Calcium cyanide is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization does not occur. Exposure to heat, water, and incompatibles.

Storage Incompatibilities: Acids and water (releases flammable hydrogen cyanide gas), magnesium, fluorine, nitrates, nitrites, nitric acid; violent explosion when heated with chlorate or nitrite to 842 °F (450 °C).

Hazardous Decomposition Products: Thermal oxidative decomposition of calcium cyanide can produce carbon and nitrogen oxide(s).

Section 11 - Toxicological Information

Acute Oral Effects:

Rat, oral, LD₅₀: 39 mg/kg.

See RTECS EW0700000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: Sunfish, $TL_m = 0.12$ ppm/96 hr; Cockle, $LC_{50} = > 25$ ppm/48 hr.

Section 13 - Disposal Considerations

Disposal: Calcium cyanide is *not* a good candidate for incineration. Never treat with acid (hydrogen cyanide gas release). Treat with calcium or sodium hypochlorite to pH 10 to 11.5 and let stand for 24 hr. Dilute with water and await disposal. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: Calcium cyanide

ID: UN1575

Hazard Class: 6.1 - Poisonous materials **Packing Group:** I - Great Danger

Symbols:

Label Codes: 6.1 - Poison or Poison Inhalation Hazard if inhalation hazard, Zone A or B

Special Provisions: IB7, IP1, N79, N80

Packaging: Exceptions: None Non-bulk: 211 Bulk: 242

Quantity Limitations: Passenger aircraft/rail: 5 kg Cargo aircraft only: 50 kg

Vessel Stowage: Location: A Other: 26, 40

Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Listed P021

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4), per RCRA Section 3001 10 lb (4.535 kg)

SARA 40 CFR 372.65: Not listed SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.



SAFETY DATA SHEET

Based on Directive 2001/58/EC of the Commission of the European Communities

CHRYSENE

Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Synonyms: none

218-01-9 601-048-00-0 205-923-4 CAS No. EC index No. BCR number BCR-269 : N.D. : 228.30 NFPA code **EINECS No.** Molecular weight : GC0700000 : C18H12 RTECS No. Formula

1.2 Use of the substance or the preparation:
Certified reference material for laboratory use only

1.3 Company/undertaking identification:

Institute for Reference Materials and Measurements

Retieseweg B-2440 Geel

Tel.: +32 14 57 12 11 Fax: +32 14 58 42 73

1.4 Telephone number for emergency: +32 70 245 245 Antigifcentrum

p/a Militair Hospitaal Koningin Astrid, Bruynstraat, B-1120 Brussel

Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS No.	Conc. in %	Hazard symbol	Risks (R-phrases)
chrysene	218-01-9	100	T;N	45-50/53 (1)
	205-923-4			

(1) For R-phrases in full: see heading 16

Hazards identification

- May cause cancer
- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

4. First aid measures

- Consult a doctor/medical service if irritation persists
- Rinse immediately with water

4.2 Skin contact:

- Consult a doctor/medical service if irritation persists
 Wash with water and soap
 Wipe off dry product from skin
 Remove clothing before washing

4.3 After inhalation:

- Consult a doctor/medical service if breathing problems develop
- Remove the victim into fresh air
- Unconscious: maintain adequate airway and respiration

4.4 After ingestion:

- Consult a doctor/medical service if you feel unwell
 Immediately give lots of water to drink
 Never give water to an unconscious person

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Technische Schoolstraat 43 A, B-2440 Geel **2** +32 14 58 45 47 http://www.big.be E-mail: info@big.be

MSDS established Revision date

: 22-03-2002 : 001 Reference number : BIG\18207GB Revision number

Reason for revision : Directive 2001/58/EC

- Do not induce vomiting

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Fire-fighting measures

5.1 Suitable extinguishing media:

- Water spray
- Alcohol foam
- Polymer foam
- ABC powderCarbon dioxide

5.2 Unsuitable extinguishing media:

- Solid water jet ineffective as extinguishing medium

5.3 Special exposure hazards:

- Not easily combustibleUpon combustion CO and CO2 are formed

Instructions:

- Take account of toxic firefighting water
- Use firefighting water moderately and contain it

5.5 Special protective equipment for firefighters:

- Heat/fire exposure: compressed air/oxygen apparatus
- Dust cloud production: compressed air/oxygen apparatus

Accidental release measures

- **6.1 Personal protection/precautions:** see heading 8.1/8.3/10.3
- 6.2 Environmental precautions:
 Prevent soil and water pollution
 Substance must not be discharged into the sewer
 Dam up the solid spill

- 6.3 Methods for cleaning up:
 Stop dust cloud by covering with sand/earth
 Carefully collect the spill/leftovers
 Scoop solid spill into closing containers

 - Spill must not return in its original container Take collected spill to manufacturer/competent authority
 - Clean contaminated surfaces with an excess of water
 - Wash clothing and equipment after handling

Handling and storage

7.1 Handling:

- Observe strict hygiene
- Avoid prolonged and repeated contact with skin
- Avoid raising dust
- Do not discharge the waste into the drain
- Remove contaminated clothing immediately

7.2 Storage:

- Keep container tightly closed. Store only in a limited quantity. Store in a dry area. Store in a dark area.
- Keep away from: heat sources, ignition sources, oxidizing agents, acids

٥C Storage temperature : N.D. Quantity limits : N.D. kg Storage life : N.D.

Materials for packaging

- suitable :no data available :no data available to avoid

7.3 Specific uses:

See information supplied by the manufacturer

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Exposure controls/Personal protection

8.1 Exposure limit values:

TLV-TWA : not listed : not listed
: not listed TLV-STEL TLV-Ceiling : not listed : not listed
: not listed
: not listed OES-STEL MEL-LTEL MEL-STEL MAK : not listed : not listed TRK MAC-TGG 8 h : not listed MAC-TGG 15 min. : not listed
MAC-Ceiling : not listed VME-8 h : not listed : not listed VLE-15 min. GWBB-8 h : not listed GWK-15 min. : not listed
Momentary value : not listed : not listed : not listed EC-STEL

Sampling methods:

-	Chrysene	(Polynuclear	aromatic	Hydrocarbons)	NIOSH	5515
-	Chrysene				OSHA	58
-	Chrysene	(Polynuclear	aromatic	Hydrocarbons)	NIOSH	5506

8.2 Exposure controls:

- 8.2.1 Occupational exposure controls:
 Measure the concentration in the air regularly
 Work under local exhaust/ventilation

8.2.2 Environmental exposure controls: see heading 13

8.3 Personal protection:

respiratory protection:

- Dust production: dust mask with filter type P3
 High dust production: compressed air/oxygen apparatus

8.3.2 hand protection:

Gloves

Suitable materials: No data available

- Breakthrough time: N.D.
- 8.3.3 eye protection:

 - Safety glasses
 In case of dust production: protective goggles

8.3.4 skin protection:

- Protective clothingIn case of dust production: head/neck protection Suitable materials: No data available

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Physical and chemical properties

9.1 General information:

Appearance (at 20°C) : Crystalline solid / Flakes

: Odourless Odour Colour : White

9.2 Important health, safety and environmental information:

```
pH value
Boiling point/boiling range Flashpoint
                                               : 448
: N.D.
                                                                ٥C
                                                                ٥Ĉ
Explosion limits
                                               : N.D.
                                                                vol% (
                                                                           °C)
Vapour pressure (at 20°C)
Vapour pressure (at 50°C)
                                                 N.D.
                                                                hPa
                                               : N.D.
                                                                hPa
Relative density (at 20°C)
Water solubility
                                               : 1.27
                                               : < 0.001
                                                                g/100 ml
Soluble in
                                               : N.D.
Relative vapour density
                                                 N.D.
Viscosity
                                               : N.D.
                                                                Pa.s
Partition coëfficient n-octanol/water
                                              : 5.61/5.73
Evaporation rate
  ratio to butyl acetate
                                               : N.D.
   ratio to ether
```

9.3 Other information:

Melting point/melting range : 256 ٥C Auto-ignition point : N.D. ٥C Saturation concentration : N.D. g/m^3

Stability and reactivity

10.1 Conditions to avoid/reactivity:

- Stable under normal conditions

Toxicological information

11.1 Acute toxicity:

LD50	oral rat	:	N.D.	mg/kg
LD50	dermal rat	:	N.D.	mg/kg
LD50	dermal rabbit	:	N.D.	mg/kg
LC50	inhalation rat	:	N.D.	mg/1/4 h
LC50	inhalation rat	:	N.D.	ppm/4 h

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11.2 Chronic toxicity:

EC carc. cat. : 2 EC muta. cat. **:** 3

EC repr. cat. : not listed

Carcinogenicity (TLV) : A3
Carcinogenicity (MAC) : K
Carcinogenicity (VME) : not listed
Carcinogenicity (GWBB) : not listed

Carcinogenicity (MAK) Mutagenicity (MAK) Teratogenicity (MAK) : 2 : not listed

IARC classification **:** 3

11.3 Routes of exposure:

ingestion, inhalation, eyes and skin Caution! Substance is absorbed through the skin

11.4 Acute effects/symptoms:

AFTER SKIN CONTACT - Slight irritation

11.5 Chronic effects:

- Probably human carcinogenic
- No certainty about human mutagenic properties

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:

- No specific information available

SIMILAR PRODUCTS CAUSE FOLLOWING SYMPTOMS:

- Feeling of weakness
 Photoallergy
 Cracking of the skin
- Skin rash/inflammation
- Skin cancer
- Lung tissue affection/degeneration
- Enlargement/affection of the liver
- Affection of the renal tissue

12. Ecological information

12.1 Ecotoxicity:

- LC50 (24 h) : 0.0007 mg/l (DAPHNIA MAGNA) - LC50 (24 h) : >6.7 mg/l (RANA SP.)

12.2 Mobility:

- Volatile organic compounds (VOC): N.D.%
- Forming sediments in waterAdsorbs into the soilInsoluble in water

For other physicochemical properties see heading 9.

12.3 Persistence and degradability:

- biodegradation BODs N.D.

- water - Not readily biodegradable in water

- soil : $T \frac{1}{2}$: > 77 days

12.4 Bioaccumulative potential:

- log P_{ow} : 5.61/5.73 - BCF : 4440 (LAMELLIBRANCHIATA)

- Highly bioaccumulative

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12.5 Other adverse effects:

(Classification based on the R-phrases in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) $\,$ - WCK

of 17 May 1999)

- Effect on the ozone layer : Not dangerous for the ozone layer (Council Regulation (EC) 3093/94)

- Greenhouse effect : no data available

- Effect on waste water purification : no data available

Disposal considerations 13.

13.1 Provisions relating to waste:
 - Waste material code (91/689/EEC, Council Decision
 - 2001/118/EC, O.J. L47 of 16/2/2001): 16 05 06
 (laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory)
 - Waste material code (Flanders): 001, 045, 691
 - Waste code (Germany): 59302
 - Hazardous waste (91/689/EEC)

13.2 Disposal methods:

- Dissolve or mix with a combustible solvent

Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber
 Do not discharge into surface water (2000/60/EEC, Council

13.3 Packaging/Container:

- Waste material code packaging (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 15 01 10 (packaging containing residues of or contaminated by dangerous substances)

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14. Transport information

- the letters 'LQ'

90 3077

```
14.1 Classification of the substance in compliance with UN Recommendations
                                                         : 3077
      UN number
      CLASS
                                                          : 9
      SUB RISKS
                                                          : III
     PACKING
     PROPER SHIPPING NAME
                                                          : UN 3077, Environmentally
                                                           hazardous substance, solid,
                                                           n.o.s. (chrysene)
14.2 ADR (transport by road)
      CLASS
                                                            9
                                                            III
      PACKING
                                                          :
     DANGER LABEL TANKS
DANGER LABEL PACKAGES
                                                          :
                                                             9
                                                             9
                                                          :
14.3 RID (transport by rail)
     CLASS
                                                          :
      PACKING
                                                          :
                                                             TTT
     DANGER LABEL TANKS
                                                          :
                                                             9
     DANGER LABEL PACKAGES
14.4 ADNR (transport by inland waterways)
                                                             9
      CLASS
                                                          :
     PACKING
                                                          :
                                                             III
     DANGER LABEL TANKS
                                                          :
                                                             9
     DANGER LABEL PACKAGES
                                                             9
14.5 IMDG (maritime transport)
                                                             9
      CLASS
                                                          :
      SUB RISKS
      PACKING
                                                             III
     MFAG
                                                          :
     EMS
                                                          :
     MARINE POLLUTANT
                                                             Ρ
14.6 ICAO (air transport) CLASS
                                                             9
                                                          •
      SUB RISKS
      PACKING
                                                             III
      PACKING INSTRUCTIONS PASSENGER AIRCRAFT
      PACKING INSTRUCTIONS CARGO AIRCRAFT
14.7 Special precautions in connection with
                                                             none
      transport
14.8 Limited quantities (LQ)
     When substances and their packaging meet the conditions established by ADR/RID/ADNR in chapter 3.4, only the following prescriptions shall be
      complied with:
      each package shall display a diamond-shaped figure with the following
      inscription:
- 'UN 3077'
```

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or, in the case of different goods with different identification numbers within a single package:

15. Regulatory information

Enumerated in substance list Annex I of directive 67/548/EEC et sequens





Toxic

Dangerous for the

R45 R50/53	May cause cancerVery toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
S53	: Avoid exposure - obtain special instructions before use
S45	: In case of accident or if you feel unwell, seek medical advice (show the label where possible)
S60	: This material and/or its container must be disposed of as hazardous waste
S61	: Avoid release to the environment. Refer to special instructions/safety data sheets.

16. Other information

The information provided on this MSDS 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 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.

N.A. = NOT APPLICABLE
N.D. = NOT DETERMINED

* = INTERNAL CLASSIFICATION

Full text of any R-phrases referred to under heading 2:

R45 : May cause cancer

R50/53 : Very toxic to aquatic organisms, may cause long-term adverse effects in the

aquatic environment

Exposure limits:

TLV : Threshold Limit Value - ACGIH USA 2000

OES : Occupational Exposure Standards - United Kingdom 1999

MEL : Maximum Exposure Limits - United Kingdom 1999

MAK : Maximale Arbeitsplatzkonzentrationen - Germany 2001

TRK : Technische Richtkonzentrationen - Germany 2001

MAC : Maximale aanvaarde concentratie - The Netherlands 2002

MAC : Maximale aanvaarde concentratie - The Netherlands 2002
VME : Valeurs limites de Moyenne d'Exposition - France 1999
VLE : Valeurs limites d'Exposition à court terme - France 1999
GWBB : Grenswaarde beroepsmatige blootstelling - Belgium 1998
GWK : Grenswaarde kortstondige blootstelling - Belgium 1998

EC : Indicative occupational exposure limit values - directive 2000/39/EC

Chronic toxicity:

 ${f K}$: List of the carcinogenic substances and processes - The Netherlands 2002

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (irritant, sensitizer).

CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC.

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:

CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001)

CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001)

CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States]

TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)]

TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland]

TWA: 50 (ppm) [Norway]

Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:

Easily soluble in diethyl ether.

Very slightly soluble in cold water or practically insoluble in water.

Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene.

Insoluble in Ammonia.

Slightly soluble in Chloroform.

Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizing materials.

Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC.

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of ingestion, of inhalation.

Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:

Lethal Dose/Conc 50% Kill:

LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg

Lowest Published Lethal Dose/Conc:

LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data.

May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate.

May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Can cause mild skin irritation. It can be absorbed through intact skin.

Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm, it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS)

Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987).

Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Ethylbenzene

Illinois toxic substances disclosure to employee act: Ethylbenzene

Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene

Rhode Island RTK hazardous substances: Ethylbenzene

Pennsylvania RTK: Ethylbenzene

Minnesota: Ethylbenzene

Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene

New Jersey: Ethylbenzene

New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene

California Director's List of Hazardous Substances: Ethylbenzene

TSCA 8(b) inventory: Ethylbenzene

TSCA 4(a) proposed test rules: Ethylbenzene

TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97

SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R11- Highly flammable.

R20- Harmful by inhalation.

S16- Keep away from sources of ignition - No

smoking.

S24/25- Avoid contact with skin and eyes.

S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References:

- -Manufacturer's Material Safety Data Sheet.
- -Fire Protection Guide to Hazardous Materials, 13th ed., Nationial Fire Protection Association (NFPA)
- -Registry of Toxic Effects of Chemical Substances (RTECS)
- -Chemical Hazard Response Information System (CHRIS)
- -Hazardous Substance Data Bank (HSDB)
- -New Jersey Hazardous Substance Fact Sheet
- -Ariel Global View
- -Reprotext System

Other Special Considerations: Not available.

Created: 10/09/2005 05:28 PM

Last Updated: 11/06/2008 12:00 PM

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Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification

CAS Number: 86-73-7

Material Name: Fluorene Chemical Formula: C₁₃H₁₀ EINECS Number: 201-695-5 ACX Number: X1003048-3

Synonyms: 2,3-BENZINDENE; O-BIPHENYLENEMETHANE; O-BIPHENYLMETHANE; ALPHA-

DIPHENYLENEMETHANE; DIPHENYLENEMETHANE; ALPHA-DIPHENYLENEMETHANE-9H-FLUORENE;

9H-FLUORENE; FLUORENE; METHANE, DIPHENYLENE-; 2,2'-METHYLENEBIPHENYL

Derivation: Fluorene is derived from coal tar; from acetylene and hydrogen in a red-hot tube; from charcoal by boiling and fuming with HNO₃; from 2,2'-dibromodiphenylmethane on boiling with hydrazine hydrate in the presence of palladium; or by reduction of diphenylene ketone with zinc.

General Use: Fluorene is used in the formation of polyradicals for resins, and in resinous products and dyestuffs. Derivatives of fluorene show activity as herbicides and growth regulators.

Section 2 - Composition / Information on Ingredients

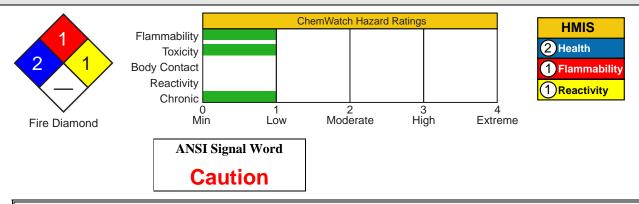
Name CAS %
Fluorene 86-73-7 ca 98% wt

OSHA PEL

NIOSH REL

ACGIH TLV

Section 3 - Hazards Identification



፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟ Emergency Overview ፟፟፟፟፟፟፟፟፟፟፟፟፟

Dazzling white leaflets or flakes, fluorescent when impure. Irritating to eyes/skin/respiratory tract. Chronic effects: mutation effects. Combustible.

Potential Health Effects

Target Organs: Skin, eyes, respiratory system

Primary Entry Routes: Inhalation and skin/eye contact

Acute Effects The toxicological properties of fluorene have not been thoroughly investigated. The following effects are for those of polycyclic aromatic hydrocarbons (PAHs) in general.

Inhalation: Causes irritation to the respiratory system.

Eye: Contact causes irritation. Skin: Contact causes irritation. Ingestion: Causes irritation.

Carcinogenicity: NTP - Not listed; IARC - Group 3, Not classifiable as to carcinogenicity to humans; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Class D, Not classifiable as to human carcinogenicity; MAK - Not listed.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Chronic Effects: Include photosensitivity and irritation of the eyes; irritation of the respiratory system with cough, bronchitis, and chance of bronchogenic cancer; leukoplakia and cancers of the lip and oral cavity; dermal burns, "coal tar warts" (precancerous lesions enhanced by UV light exposure), erythema, acneiform lesions, and irritation; mild hepatoxicity; hematuria; and an increased chance of cancer of the skin, kidney, bladder, lung and gastrointestinal tract. Fluorinated PAHs may cross the placenta.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer 100% humidified supplemental oxygen with assisted ventilation as required. If bronchospasm and wheezing occur, consider treatment with inhaled sympathomimetic agents.

Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water for at least 15 min. Consult a physician or ophthalmologist if pain, irritation, swelling, lacrimation or photophobia persist.

Skin Contact: Quickly remove contaminated clothing. Rinse with flooding amounts of water. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. Treat dermal irritation or burns with a standard topical therapy. Patients developing dermal hypersensitivity reactions may require treatment with systemic or topical corticosteroids or antihistamines. Avoid direct exposure of affected skin to sunlight and UV sources.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water. *Do not* induce vomiting. Gastric lavage and routine use of cathartics are not recommended.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Chronic effects, particularly cancer, are more common than acute toxicity. Acute respiratory effects in persons are typically due to other toxic agents at the worksite. Carefully observe patients with inhalation exposure for the development of any systemic signs or symptoms and administer symptomatic treatment as necessary. Monitor arterial blood gases, pulmonary function, and chest x-ray for patients with significant exposure.

Section 5 - Fire-Fighting Measures

Flash Point: Data not found; combustible Autoignition Temperature: Data not found.

LEL: Data not found. UEL: Data not found.

Extinguishing Media: Extinguish with water spray, carbon dioxide, dry chemical or appropriate foam.

General Fire Hazards/Hazardous Combustion Products: When heated to decomposition it emits acrid smoke and toxic fumes of carbon monoxide and carbon dioxide.

Fire-Fighting Instructions: *Do not* breathe the dust. *Do not* release runoff from fire control methods to sewers or waterways. Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Wear protective clotly

2 1

Fire Diamond

facepiece operated in pressure-demand or positive-pressure mode. Wear protective clothing including rubber boots and heavy rubber gloves to prevent contact with skin and eyes.

Section 6 - Accidental Release Measures

Spill/Leak Procedures: Notify safety personnel, evacuate all unnecessary personnel, remove heat and ignition sources. Isolate and ventilate area, deny entry, stay upwind. Cleanup personnel should protect against exposure (Sec. 8).

Small Spills: If in solid form, *do not* sweep! Avoid raising dust. Carefully scoop up or vacuum (with a HEPA filter). Absorb liquid spill with an inert, noncombustible absorbent such as sand or vermiculite. Wash spill site after material pickup is complete.

Large Spills: For large spills, dike far ahead of liquid spill for later disposal. *Do not* release into sewers or waterways.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Wear personal protective clothing and equipment to prevent dust inhalation and contact of solid or liquid with skin or eyes (Sec. 8).

Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Recommended Storage Methods: Store in tightly closed containers in a cool, well-ventilated area away from heat, light, ignition sources, and incompatibles.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Where feasible, enclose operations to avoid dust dispersion into the work area. Provide local exhaust ventilation systems to maintain airborne concentrations as low as possible. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: Educate workers about the health and safety hazards associated with this material. Train in work practices which minimize exposure. Consider preplacement and periodic medical exams including a complete blood count, hepatic and renal function test, dermal assessments, chest x-ray and pulmonary function tests.

Personal Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not protective eye devices. Appropriate eye protection must be worn instead of, or in conjunction with, contact lenses.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For 'normal' uses an airpurifying toxic dust* mask for particulates, and an organic vapor with toxic dust* pre-filters for vapors, dusts, and mists (* = purple or magenta color cartridge). Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. Warning! Airpurifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Other: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment. Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Section 9 - Physical and Chemical Properties

Appearance/General Info: White. Fluorescent when impure.

Physical State: Solid; crystalline powder or small crystalline plates; leaflets or flakes from alcohol.

Sublimes easily in high vacuum.

Vapor Pressure (kPa): 0.013 mm Hg at 68 °F (20 °C)

Formula Weight: 166.21 Density: 1.202 g/mL

Specific Gravity (H₂O=1, at $4 \,^{\circ}$ C): 1.203 at $0 \,^{\circ}$ C/4 $^{\circ}$ C

Boiling Point: 563 °F (295 °C) (decomposes)

Freezing/Melting Point: 237 to 241 $^{\circ}$ F (114 to 116 $^{\circ}$ C)

Ionization Potential (eV): 7.89 +/-0.2 eV **Water Solubility:** Insoluble; 1.98 mg/kg

Other Solubilities: Freely soluble in glacial acetic acid; soluble in hot 95% ethanol, acetone, benzene, carbon disulfide, carbon tetrachloride, ether, pyridine, and

toluene.

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Fluorene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Avoid contact with chemical incompatibles, heat, and sources of ignition. Avoid heating to decomposition.

Storage Incompatibilities: Include strong oxidizing agents.

Hazardous Decomposition Products: Thermal oxidative decomposition of fluorene can produce acrid smoke and toxic fumes of carbon monoxide and carbon dioxide.

Section 11 - Toxicological Information

Other Effects:

Genetic Effects: Mouse, lymphocyte, 150 µmol/L induced DNA damage.

Mouse, lymphocyte, 19500 nmol/L (+S9) induced mutations in microorganisms.

Mouse, lymphocyte, 584 µmol/L induced mutations in mammalian somatic cells.

Hamster, lung, 25 mg/L induced cytogenetic analysis.

Mouse, mammary gland, 1 µg/L induced morphological transformation.

Mouse, intraperitoneal, LD₅₀: >2 g/kg. See *RTECS* LL5670000, for additional data.

Section 12 - Ecological Information

Environmental Fate: If released to the atmosphere, fluorene will exist primarily in the vapor phase where it will degrade readily by photochemically produced hydroxyl radicals (estimated half-life of 29 hr). If released to soil or water, fluorene will biodegrade readily (aerobically) in the presence of acclimated microbes; microbial adaptation is an important fate process. Biodegradation can be slow in pristine soils or waters (or under conditions of limited oxygen). Strong adsorption to soil and water sediment is an important transport process. Log K_{ow}: 4.18 to 4.38

Ecotoxicity: TL_m Neanthes arenaceodentata LC₅₀/1.0 ppm/96 hr at 72 °F (22 °C) in a static bioassay, seawater

Henry's Law Constant: 0.0001 BCF: 1288 (fathead minnow)

Soil Sorption Partition Coefficient: $K_{oc} = log 3.70 to 4.21$

Section 13 - Disposal Considerations

Disposal: Dissolve or mix fluorene with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. The particle-bound portion of polycyclic aromatic hydrocarbons (PAH) can be removed by sedimentation, flocculation, and filtration processes. The remaining dissolved polynuclear aromatic hydrocarbons usually require oxidation for partial removal/transformation. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations. Handle empty containers carefully as hazardous residues may still remain. Triple rinse containers and dispose of wash wastewater appropriately.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: Not specifically listed.

Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 307(a) 5000 lb (2268 kg)

SARA 40 CFR 372.65: Not listed SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

SAFETY DATA SHEET

Based on Directive 2001/58/EC et seq. of the Commission of the European Communities

FLUORANTHENE

Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Synonyms:

1,2-benzacenaphthene, benzo(jk)fluorene : 206-44-0 BCR number : : N.A. NFPA code : CAS No. EC index No. BCR-160R N.A. 205-912-4 N.D. 202.26 Molecular weight **EINECS No.** : LL4025000 RTECS No. Formula

1.2 Use of the substance or the preparation:
 Certified reference material for laboratory use only

1.3 Company/undertaking identification:

Institute for Reference Materials and Measurements

Retieseweg B-2440 Geel

Tel.: +32 14 57 12 11 Fax: +32 14 58 42 73

1.4 Telephone number for emergency: +32 70 245 245 Antigifcentrum

p/a Militair Hospitaal Koningin Astrid, Bruynstraat, B-1120 Brussel

Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS No.	Conc. in %	Hazard symbol	Risks (R-phrases)
fluoranthene	206-44-0	100	Xn;N	22-36-51/53-68 (1)
	205-912-4			

(1) For R-phrases in full: see heading 16

Hazards identification

- Harmful if swallowed Irritating to eyes
- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
- Possible risk of irreversible effects

First aid measures

4.1 Eye contact:

- Consult a doctor/medical service
- Rinse immediately with plenty of water
 Do not apply neutralizing agents
- 4.2 Skin contact:

 - Consult a doctor/medical service Wash immediately with lots of water -- Do not apply (chemical) neutralizing agents
- 4.3 After inhalation:
 - Consult a doctor/medical service Remove the victim into fresh air

 - Unconscious: maintain adequate airway and respiration
- 4.4 After ingestion:
 - Consult a doctor/medical service

Printing date 07-2002

Compiled by Brandweerinformatiecentrum voor Gevaarlijke Stoffen vzw (BIG)

Technische Schoolstraat 43 A, B-2440 Geel

2 +32 14 58 45 47 http://www.big.be E-mail: info@big.be

: 11-03-2002 : 001 MSDS established Revision date Reference number : BIG\18206GB Revision number

Reason for revision : Directive 2001/58/EC

FLUORANTHENE

- Never give water to an unconscious person

Printing date : 07-2002 2 / 8

FLUORANTHENE

Fire-fighting measures

5.1 Suitable extinguishing media:

- Water spray
- Alcohol foam Polymer foam ABC powder
- Carbon dioxide

5.2 Unsuitable extinguishing media:

- No data available

- It's dust is explosive with airUpon combustion CO and CO2 are formed

5.4 Instructions:

- Take account of toxic firefighting water Use firefighting water moderately and contain it

- 5.5 Special protective equipment for firefighters:

 Heat/fire exposure: compressed air/oxygen apparatus
 Dust cloud production: compressed air/oxygen apparatus

Accidental release measures

- **6.1** Personal protection/precautions: see heading 8.1/8.3/10.3

- 6.3 Methods for cleaning up:

 Stop dust cloud by covering with sand/earth
 Carefully collect the spill/leftovers
 Scoop solid spill into closing containers
 Clean contaminated surfaces with an excess of water
 - Wash clothing and equipment after handling

Handling and storage

7.1 Handling:

- Observe strict hygiene
- Avoid prolonged and repeated contact with skin Avoid raising dust Do not discharge the waste into the drain

- Clean contaminated clothing

7.2 Storage:

- Keep container tightly closed Store in a dry area Store in a dark area Meet the legal requirements. Keep away from: heat sources, oxidizing agents

Storage temperature Quantity limits Storage life Materials for packaging ٥C : N.D. kg N.D.

- suitable :qlass
- to avoid :no data available

7.3 Specific uses: N.D.

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Exposure controls/Personal protection

8.1 Exposure limit values:

: not listed
: not listed
: not listed TLV-TWA TLV-STEL TLV-Ceiling : not listed
: not listed OES-LTEL OES-STEL MEL-LTEL : not listed MEL-STEL : not listed : not listed MAK : not listed TRK

MAC-TGG 8 h : not listed MAC-TGG 15 min. : not listed MAC-Ceiling : not listed

: not listed VME-8 h VLE-15 min. : not listed : not listed
: not listed GWBB-8 h GWK-15 min. Momentary value : not listed

Sampling methods:

- Fluoranthene (Polynuclear aromatic hydrocarbon) NIOSH 5506 OSHA CSI NIOSH 5515 - Fluoranthene - Fluoranthene (Polynuclear aromatic hydrocarbon)

8.2 Exposure controls:

8.2.1 Occupational exposure controls:

- Measure the concentration in the air regularly
 Work under local exhaust/ventilation

8.2.2 Environmental exposure controls: see heading 13

8.3 Personal protection:

8.3.2 hand protection:

- Gloves

Suitable materials: Rubber

- Breakthrough time: N.D.

eye protection:

- Safety glasses In case of dust production: protective goggles

8.3.4 skin protection:

- Protective clothingIn case of dust production: head/neck protection Suitable materials: Rubber

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Physical and chemical properties

9.1 General information:

Appearance (at 20°C) : Crystalline solid / Needles : N.D. Odour : Colourless to light-yellow Colour

9.2 Important health, safety and environmental information:

```
pH value
Boiling point/boiling range Flashpoint
                                               : 384
: 198
                                                                ٥C
                                                                ٥Ĉ
                                               : N.D.
                                                               vol% (
Explosion limits
                                                                          °C)
Vapour pressure (at 20°C)
Vapour pressure (at 50°C)
                                                 < 0.01
                                                               hPa
                                               : N.D.
                                                               hPa
Relative density (at 20°C)
Water solubility
                                                 1.30
                                                 0.00002
                                                               g/100 ml
Soluble in
                                               : Ethanol, ether, chloroform, acetic
                                                  acid, carbondisulfide
Relative vapour density
                                                N.D.
Viscosity
                                               : N.D.
                                                               Pa.s
Partition coëfficient n-octanol/water
                                              : 5.33
Evaporation rate
  ratio butyl acetate
                                               : N.D.
  ratio ether
                                               : N.D.
```

9.3 Other information:

Melting point/melting range : 110 ٥C Auto-ignition point ٥C : N.D. Saturation concentration g/m^3 : N.D.

10. Stability and reactivity

10.1 Conditions to avoid/reactivity:

No data available

10.2 Materials to avoid:

- Keep away from: heat sources, oxidizing agents

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11. Toxicological information

11.1 Acute toxicity:

```
LD50 oral rat
LD50 dermal rat
LD50 dermal rabbit
LC50 inhalation rat
LC50 inhalation rat
                                                                   : 2000
: N.D.
: 3180
: N.D.
: N.D.
                                                                                                                                       mg/kg
                                                                                                                                       mg/kg
                                                                                                                                       mg/kg
mg/l/4 h
ppm/4 h
```

11.2 Chronic toxicity:

```
EC carc. cat.
                                                      : not listed
EC muta. cat.
EC repr. cat.
                                                     : not listed
                                                     : not listed
Carcinogenicity (TLV) : not listed Carcinogenicity (MAC) : not listed Carcinogenicity (VME) : not listed Carcinogenicity (GWBB) : not listed
Carcinogenicity (MAK)
Mutagenicity (MAK)
Teratogenicity (MAK)
                                                     : not listed
: not listed
: not listed
```

IARC classification

ingestion, inhalation, eyes and skin 11.3 Routes of exposure:

11.4 Acute effects/symptoms:

- AFTER EYE CONTACT
- Irritation of the eye tissue

11.5 Chronic effects:

- Possible risks of irreversible effects
- Not classified as toxic to reproduction (EC)
- SIMILAR PRODUCTS CAUSE FOLLOWING SYMPTOMS:
- Tingling/irritation of the skin
- Nausea
- Accelerated heart action
- Disturbances of heart rateEnlargement/affection of the liver
- Risk of lung oedema

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12. Ecological information

12.1 Ecotoxicity:

fluoranthene:

LC50 (96 h): LC50 (48 h):

4 mg/l (LEPOMIS MACROCHIRUS) 320 mg/l (DAPHNIA MAGNA) 54 mg/l (SELENASTRUM CAPRICORNUTUM)

12.2 Mobility:

- Volatile organic compounds (VOC): 0%
- Forming sediments in water Insoluble in water
- Substance sinks in water

For other physicochemical properties see heading 9.

12.3 Persistence and degradability:

- biodegradation BOD₅ N.D. % ThOD

- N.D.

days - soil : T ½: N.D.

12.4 Bioaccumulative potential:

- log P_{ow} : 5.33 : h:

3981 (PIMEPHALES PROMELAS)

- Highly bioaccumulative

12.5 Other adverse effects:

- WCK (Classification based on the R-phrases in compliance with

Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS)

of 17 May 1999)

- Effect on the ozone layer : Not dangerous for the ozone layer (Council Regulation (EC) No

3093/94, O.J. L333 of 22/12/94)

 Greenhouse effect : no data available

- Effect on waste water purification : no data available

Disposal considerations

- 13.1 Provisions relating to waste:
 Waste material code (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 16 05 06 (laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory)
 Waste material code (Flanders): 001, 045, 691
 Waste code (Germany): 59302
 Hazardous waste (91/689/EEC)

13.2 Disposal methods:

- Do not discharge into surface water (2000/60/EEC, Council Decision 2455/2001/EC, O.J. L331 of 15/12/2001)
 Remove to an authorized incinerator equipped with an afterburner and a flue
- qas scrubber

13.3 Packaging/Container:

Waste material code packaging (91/689/EEC, Council Decision 2001/118/EC, 0.J. L47 of 16/2/2001): 15 01 10 (packaging containing residues of or contaminated by dangerous substances)

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14. Transport information

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```
14.1 Classification of the substance in compliance with UN Recommendations
                                                      : 3077
     UN number
     CLASS
                                                      : 9
     SUB RISKS
                                                      : III
     PACKING
     PROPER SHIPPING NAME
                                                      : UN 3077, Environmentally
                                                        hazardous substance, solid,
                                                        n.o.s. (fluoranthene)
14.2 ADR (transport by road)
     CLASS
                                                        9
                                                        III
     PACKING
                                                      :
     DANGER LABEL TANKS
DANGER LABEL PACKAGES
                                                      :
                                                         9
                                                         9
                                                      :
14.3 RID (transport by rail)
     CLASS
                                                      :
     PACKING
                                                      :
                                                         TTT
     DANGER LABEL TANKS
                                                      :
                                                         9
     DANGER LABEL PACKAGES
14.4 ADNR (transport by inland waterways)
                                                         9
     CLASS
                                                      :
                                                         III
     PACKING
                                                      :
     DANGER LABEL TANKS
                                                      :
                                                         9
     DANGER LABEL PACKAGES
                                                      :
                                                         9
14.5 IMDG (maritime transport)
                                                         9
     CLASS
                                                      :
     SUB RISKS
     PACKING
                                                         III
     MFAG
                                                      :
     EMS
                                                      :
     MARINE POLLUTANT
                                                         Ρ
14.6 ICAO (air transport) CLASS
                                                         9
                                                      •
     SUB RISKS
     PACKING
                                                         III
     PACKING INSTRUCTIONS PASSENGER AIRCRAFT
     PACKING INSTRUCTIONS CARGO AIRCRAFT
14.7 Special precautions in connection with
                                                      : none
     transport
```

When substances and their packaging meet the conditions established by ADR/RID/ADNR in chapter 3.4, **only** the following prescriptions shall be complied with: each package shall display a diamond-shaped figure with the following inscription: - 'UN 3077' or, in the case of different goods with different identification numbers within a single package: - the letters 'LQ'

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Regulatory information

Not listed in Annex I of directive 67/548/EEC et sequens. Labelling established on the basis of the available data.





Harmful

Dangerous for the environment

R22	:	Harmful if swallowed
R36	:	Irritating to eyes
R51/53	:	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R68	:	Possible risk of irreversible effects
S(02)	:	(Keep out of reach of children)
S22	:	Do not breathe dust
S26	:	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S36/37	:	Wear suitable protective clothing and gloves
S46		If swallowed, seek medical advice immediately and show this container or label

: Avoid release to the environment. Refer to special

instructions/safety data sheets.

16. Other information

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The information provided on this MSDS 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 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.

= NOT APPLICABLE = NOT DETERMINED

= INTERNAL CLASSIFICATION

Full text of any R-phrases referred to under heading 2:

R22 : Harmful if swallowed R36 Irritating to eyes R51/53

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

R68 : Possible risk of irreversible effects

Exposure limits:

Threshold Limit Value - ACGIH USA 2000 TLV

Occupational Exposure Standards - United Kingdom 1999 OES

MEL Maximum Exposure Limits - United Kingdom 1999 Maximale Arbeitsplatzkonzentrationen - Germany 2001

Technische Richtkonzentrationen - Germany 2001 Maximale aanvaarde concentratie - The Netherlands 2002 TRK VME Valeurs limites de Moyenne d'Exposition - France 1999 VLE Valeurs limites d'Exposition à court terme - France 1999 Grenswaarde beroepsmatige blootstelling - Belgium 1998 Grenswaarde kortstondige blootstelling - Belgium 1998 Indicative occupational exposure limit values - directive 2000/39/EC GWBB GWK

EC

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MATERIAL SAFETY DATA SHEET

PRODUCT NAME: HYDROGEN SULFIDE

1. Chemical Product and Company Identification

BOC Gases,
Division of
BOC Gases
Division of

The BOC Group, Inc.

575 Mountain Avenue

Murray Hill, NJ 07974

BOC Canada Limited

5975 Falbourne Street, Unit 2

Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (908) 464-8100 **TELEPHONE NUMBER:** (905) 501-1700

24-HOUR EMERGENCY TELEPHONE NUMBER: 24-HOUR EMERGENCY TELEPHONE NUMBER:

CHEMTREC (800) 424-9300 (905) 501-0802

EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: HYDROGEN SULFIDE **CHEMICAL NAME:** Hydrogen Sulfide

COMMON NAMES/SYNONYMS: Dihydrogen Sulfide, Sulfur Hydride

TDG (Canada) CLASSIFICATION: 2.3 (2.1)

WHMIS CLASSIFICATION: A, B1, D1A, D2A, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700

PREPARATION DATE: 6/1/95

REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA ¹	TLV-ACGIH ²	LD ₅₀ or LC ₅₀ Route/Species
Hydrogen Sulfide FORMULA: H₂S CAS: 7783-06-4 RTECS#: MX1225000	> 99.0	20 ppm Ceiling	10 ppm TWA 15 ppm STEL	LC ₅₀ 444 ppm (rat)

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

3. Hazards Identification

EMERGENCY OVERVIEW

Irritating to the eyes, mucous membranes and respiratory system. Inhaled gas inhibits cellular respiration resulting in pulmonary paralysis, sudden collapse and death. Extremely flammable.

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² As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

PRODUCT NAME: HYDROGEN SULFIDE

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	Yes

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization			
Yes	Yes	No			
Teratogen	Reproductive Hazard	Mutagen			
Yes	Yes	No			
Synergistic Effects					
None Reported					

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:

Low concentrations will generally cause irritation to the conjunctiva. Repeated exposure to low concentrations is reported to cause conjunctivitis, photo phobia, corneal bullae, tearing, pain and blurred vision.

SKIN EFFECTS:

May irritate the skin upon contact.

INGESTION EFFECTS:

Ingestion is unlikely. Hydrogen sulfide will irritate the mucous membranes causing a burning feeling with excess salivation likely. Irritation of the gastrointestinal tract may also occur.

INHALATION EFFECTS:

Hydrogen sulfide reacts with enzymes in the bloodstream and inhibits cellular respiration resulting in pulmonary paralysis, sudden collapse and death. Continuous exposure to low (15-50 ppm) concentrations will generally cause irritation to mucous membranes, and may also cause headache, dizziness or nausea. Higher concentrations (200-300 ppm) may result in respiratory arrest leading to coma or unconsciousness. Exposures for more than 30 minutes at concentrations greater than 700 ppm have been fatal.

Continuous inhalation of low concentrations may cause olfactory fatigue or paralysis of the sense of smell. Thus, detection of hydrogen sulfide by its odor is not effective.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Blood disorders.

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 4 Flammability: 4	Health: 4 Flammability: 4	0 = No Hazard 1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate Hazard 3 = Serious Hazard 4 = Severe Hazard

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4. First Aid Measures

EYES:

PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eyes with large amounts of water for at least 15 minutes. Part eyelids with fingers to ensure complete flushing. If irritation persists, seek medical attention immediately.

SKIN:

Flush affected area with water. If irritation persists, consult a physician.

INGESTION:

Treat in a manner similar to inhalation exposure. Seek medical attention as soon as possible.

INHALATION:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND SHOULD RECOGNIZE THE HAZARDS OF OVEREXPOSURE DUE TO OLFACTORY FATIGUE. An extreme fire hazard exists when rescuing semiconscious or unconscious persons due to the flammability hazard. Avoid use of rescue equipment which may contain ignition sources or cause static discharge. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen or a mixture of 5% carbon dioxide in oxygen. Keep victim calm and warm. Further treatment should be symptomatic and supportive. Seek medical assistance immediately.

5. Fire Fighting Measures

Conditions of Flammability: Flammable						
Flash point:	Method: Not Applicable		Autoignition			
Not Available			Temperature: 554°F (290°C)			
LEL(%): 4.0		UEL(%): 44.0				
Hazardous combustion products:	Sulfur Compounds	}				
Sensitivity to mechanical shock: None						
Sensitivity to static discharge: No	Sensitivity to static discharge: None					

FIRE AND EXPLOSION HAZARDS:

Hydrogen sulfide is heavier than air and may accumulate in low areas and may travel a considerable distance to a source of ignition. Should flame be extinguished and flow of gas continue, increase ventilation to prevent flammable mixture formation in low areas or pockets. Product may explode or burn over a wide range of mixtures in air.

EXTINGUISHING MEDIA:

Water, carbon dioxide, dry chemicals.

FIRE FIGHTING INSTRUCTIONS:

If possible, stop the flow of hydrogen sulfide. Use water spray to cool surrounding containers. Fire fighters should use self-contained breathing apparatus.

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6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Earth-ground and bond all lines and equipment associated with the Hydrogen Sulfide system. All electrical equipment should be non-sparking or explosion proof.

Do not rely on the olfactory sense to detect the presence of hydrogen sulfide. Analytical devices and instrumentation are readily available for this purpose. Perform frequent analytical tests to be certain that the TWA is not exceeded. Many metals corrode rapidly with wet hydrogen sulfide. Anhydrous hydrogen sulfide can be handled in carbon steel, aluminum Inconel ®, Stellite ® and 304 and 316 stainless steels. Avoid hard steels which are highly stressed since they may be susceptible to hydrogen embrittlement from hydrogen sulfide.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<750 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the system.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "NO SMOKING OR OPEN FLAMES" signs in the storage area or use area. There should be no sources of ignition in the storage or use area.

For additional storage recommendations, consult Compressed Gas Association Pamphlets P-1 and G-12.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Hydrogen Sulfide FORMULA: H₂S CAS: 7783-06-4 RTECS #: MX1225000	> 99.0	20 ppm Ceiling	10 ppm TWA 15 ppm STEL	LC ₅₀ 444 ppm (rat)

Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

ENGINEERING CONTROLS:

Hood with forced ventilation. Use local exhaust to prevent accumulation above exposure limit.

EYE/FACE PROTECTION:

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² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

PRODUCT NAME: HYDROGEN SULFIDE

Gas tight chemical goggles or full-face piece respirator.

SKIN PROTECTION:

Protective gloves: Neoprene, butyl rubber, PVC, polyethylene.

RESPIRATORY PROTECTION:

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:

Safety shoes, safety shower, eyewash "fountain".

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Vapor	
Vapor pressure	: 267 (1840 kPa)	psia
Vapor density at STP (Air = 1)	: 1.21	
Evaporation point	: Not Available	
Boiling point	: -76	°F
	: -60	$^{\circ}\mathrm{C}$
Freezing point	: -117.8	°F
	: -82.2	$^{\circ}\mathrm{C}$
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Soluble	
Odor threshold	: Not Available	
Odor and appearance	: Colorless vapor with ro	otten egg odor.

10. Stability and Reactivity

STABILITY:

Stable

INCOMPATIBLE MATERIALS:

Dangerously reactive when mixed with concentrated nitric acid or other strong oxidizing agents. Vapors will ignite spontaneously when mixed with vapors of chlorine, oxygen difluoride or nitrogen trifluoride.

HAZARDOUS DECOMPOSITION PRODUCTS:

Oxides of sulfur.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. Toxicological Information

REPRODUCTIVE:

Toxic effects observed in newborn rats after exposure of pregnant female to 20 ppm Hydrogen Sulfide.

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12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Hydrogen Sulfide, liquefied	Hydrogen Sulfide, liquefied
HAZARD CLASS:	2.3	2.3 (2.1)
IDENTIFICATION NUMBER:	UN 1053	UN 1053
SHIPPING LABEL:	POISON GAS, FLAMMABLE GAS	POISON GAS, FLAMMABLE GAS

Additional Marking Requirement: "Inhalation Hazard"

If net weight of product > 100 pounds, the container must be also marked with the letters "RQ".

Additional Shipping Paper Description Requirement: "Poison-Inhalation Hazard, Zone B" If net weight of product ≥ 100 pounds, the shipping papers must be also marked with the letters "RQ".

15. Regulatory Information

Hydrogen sulfide is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

Hydrogen sulfide is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA).

The presence of hydrogen sulfide in quantities in excess of the threshold planning quantity (TPQ) of 100 pounds requires certain emergency planning activities to be conducted.

Releases of hydrogen sulfide in quantities equal to or greater than the reportable quantity (RQ) of 100 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

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SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard Chronic Health Hazard Fire Hazard Sudden Release of Pressure Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER INGREDIENT NAME PERCENT BY VOLUME

7783-06-4 Hydrogen sulfide > 99.0

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

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Health	1
Fire	2
Reactivity	1
Personal Protection	Ε

Material Safety Data Sheet Iron Metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Iron Metal

Catalog Codes: SLI2047, SLI1996

CAS#: 7439-89-6

RTECS: NO4565500

TSCA: TSCA 8(b) inventory: Iron Metal

CI#: Not applicable.

Synonym:

Chemical Name: Iron

Chemical Formula: Fe

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Iron Metal, powder	7439-89-6	100

Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to liver, cardiovascular system, upper respiratory tract, pancreas. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of heat.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Chlorine Trifluoride reacts with iron with incandescence.

Powdered iron reacts with fluorine below redness with incandescence.

Reduced iron decomposes with nitrogen dioxide @ ordinary temperature with incandescence.

Reacting mass formed by mixture of phosphorus and iron can become incandescent when heated. This material is flammable in powder form only.

Special Remarks on Explosion Hazards: Material in powdered form can explode when exposed to heat or flame

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water

on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Do not ingest. Do not breathe dust. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Moisture sensitive.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder.)

Odor: Odorless.

Taste: Tasteless.

Molecular Weight: 55.85 g/mole

Color: Black to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 3000°C (5432°F)

Melting Point: 1535°C (2795°F)

Critical Temperature: Not available.

Specific Gravity: Density: 7.86 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, ignition sources, incompatible materials, water/moisture, air, dust generation.

Incompatibility with various substances:

Reactive with oxidizing agents, acids. Slightly reactive to reactive with moisture.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:

Hot iron(wire) burns in Chlorine gas.

Violent decompositon of hydrogen peroxide (53% by weight or greater) may be caused by contact with iron.

Readily oxidizes in moist air forming rust.

Reactive with halogens.

Incompatible with acetaldehyde, ammonium peroxodisulfate, chloroformamidinum, chloric acid, ammonium nitrate, dinitorgen tetroxide, nitryl fluoride, polystyrene, sodium acetylide, potassium dichromate, peroxyformic acid, sulfuric acid, sodium carbide.

Readily attacked by dilute mineral acids and or attacked or dissolved by organic acids. Not appreciably attacked by cold sulfuric acid, or nitric acid, but is attacked by hot acids.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 30000 mg/kg [Rat].

Chronic Effects on Humans: May cause damage to the following organs: liver, cardiovascular system, upper respiratory

tract, pancreas.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin:

Iron metal filings or dust: May cause skin irritation by mechanical action.

Iron metal wire: Not likely to cause skin irritation

Eves:

Iron metal filings or dust: Can irritate eyes by mechanical action.

Iron metal wire: No hazard. Will not cause eye irritation.

Inhalation:

Iron dust: Can irritate the respiratory tract by mechanical action.

Iron metal wire or filings: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count.

Ingestion:

Iron metal wire: Not an ingestion hazard:

Iron metal filings or dust: The amount of ingested iron which constitutes a toxic dose is not well defined. Proposed toxic doses of elemental iron are 20 mg/kg for gastrointestinal irritation to greater than 60 mg/kg for systemic toxicity. Gastrointestinal effects are the first signs to appear, with hemorrhagic vomiting and diarrhea, hematochezia, abdominal pain, lethargy, metabolic acidosis, coagulaopathy, shock, coma and convulsions developing from 0 to 6 hours after ingestion. Leukocytosis may also occur. An asymptomatic phase may ensue at 6 to 12 hours postingestion, followed by hypoglycemia or hyperglycemia, hepatic and renal failure, severe acidosis, cyanosis, fever, CNS depression (lethargy, restlessness and/or confusion seizures), hypotension, and cardiovascular collapse/cardiac failure in 12 to 48 hours. Hepatic cirrhosis, gastrointestinal scarring and/or strictures may arise in 2 to 6 weeks. It may also cause an anaphylactoid reaction. Non-cardiogenic pulmonary edema also develop in severe cases of iron intoxication.

Chronic Potential Health Effects:

Inhalation: Chronic inhalation of iron dust can lead to accumulation in the lungs and a characteristic stippled appearance on X-rays. This condition, called SIDEROSIS, is considered benign in that it does not interfere with lung function and does not predispose to other disease. Chronic inhalation of iron dust may also cause fibrosis in the lungs.

Ingestion: Clinical signs of iron overload appear when the total body iron is 5 to 10 times higher than normal. Neurobehavioral defects including depression, decreased activity, habituation, reflex startle, and conditioned avoidance response performance may occur. However, similiar effects were also seen in iron defficiency. It is therefore likely that these behavioral effects are secondary to general toxicity. High serum iron levels may be associated with an increased risk of fatal acute myocardial infarction (MI).

Skin: Prolonged or repeated contact may cause hypersensivity.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Metal powder, flammable, n.o.s. (Iron metal powder) UNNA: 3089 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California Director's List of Hazardous Substances: Iron Metal

TSCA 8(b) inventory: Iron Metal

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS B-4: Flammable solid.

DSCL (EEC):

R11- Highly flammable.

S16- Keep away from sources of ignition - No

smoking.

S22- Do not breathe dust.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 2

Reactivity: 1

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 2

Reactivity: 1

Specific hazard:

Protective Equipment:

Gloves Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator

when ventilation is inadequate.

Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:52 PM

Last Updated: 11/06/2008 12:00 PM

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LIQUINOX MSDS

Section 1: PRODUCT AND COMPANY IDENTIFICATION

Chemical family: Detergent. Manufacturer: Alconox, Inc.

30 Glenn St. Suite 309

White Plains, NY 10603.

Manufacturer emergency 800-255-3924.

phone number: 813-248-0585 (outside of the United States).

Supplier: Same as manufacturer.

Product name: Liquinox

Section 2: INGREDIENT INFORMATION

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155- 30-0	10-30	SODIUM DODECYLBENZENESULFONATE	AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3: HAZARD IDENTIFICATION

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of acute exposure

Eye contact: May cause irritation.

Skin contact: Prolonged and repeated contact may cause irritation.

Inhalation: May cause headache and nausea. Ingestion: May cause vomiting and diarrhea. May cause gastric distress.

Effects of chronic See effects of acute exposure.

Section 4: FIRST AID MEASURES

Skin contact: Remove contaminated clothing.

Wash thoroughly with soap and water. Seek medical attention if irritation persists.

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Wear personal protective equipment appropriate to task.

Wash thoroughly after handling. Keep out of reach of children.

Avoid contact with skin, eyes and clothing.

Avoid extreme temperatures.

Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.

Keep containers closed when not in use.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Precautionary Measures

Gloves/Type:



Wear appropriate gloves.

Respiratory/Type: None required under normal use.

Eye/Type:



Safety glasses recommended.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.

Emergency shower should be in close proximity.

Ventilation requirements:Local exhaust at points of emission.

Exposure limit of Not available.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Liquid.

Appearance & odor: Odourless.

Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure @ 20°C (68°F).

(mmHg): 17

Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C): 100 (212F)

Freezing point (°C): Not available.

pH: 8.5

Specific gravity @ 20 °C: (water = 1).

1.083

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WHMIS classification: Not controlled.

DSL status: Not available.

USA Regulatory <u>Information</u>

SARA hazard catagories Immediate (Acute) Health Hazard: No. sections 311/312: Delayed (Chronic) Health Hazard: No.

Fire Hazard: No.

Sudden Release of Pressure: No.

Reactive: No.

SARA Section 313: None

TSCA inventory: All components of this product are listed on the TSCA inventory.

NFPA

Health Hazard: 1 Flammability: 0 Physical hazard: 0

Section 16: OTHER INFORMATION

Supplier MSDS date: 2005/02/24

Data prepared by: Global Safety Management

3340 Peachtree Road, #1800

Atlanta, GA 30326

Phone: 877-683-7460 Fax: (877) 683-7462

Web: www.globalsafetynet.com Email: info@globalsafetynet.com.

General note: This material safety data sheet was prepared from information

obtained from various sources, including product suppliers and

the Canadian Center for Occupational Health and Safety.







Material Safety Data Sheet 1-Methylnaphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: 1-Methylnaphthalene

Catalog Codes: SLM3592

CAS#: 90-12-0

RTECS: QJ9630000

TSCA: TSCA 8(b) inventory: 1-Methylnaphthalene

CI#: Not available.

Synonym: alpha-Methylnaphthalene

Chemical Name: 1-Methylnaphthalene

Chemical Formula: C10-H7-C-H3

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

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Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
{1-}Methylnaphthalene	90-12-0	100

Toxicological Data on Ingredients: 1-Methylnaphthalene: ORAL (LD50): Acute: 1840 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant, lung sensitizer). Slightly hazardous in case of skin contact (sensitizer, permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Combustible.

Auto-Ignition Temperature: 529°C (984.2°F)

Flash Points: CLOSED CUP: 82°C (179.6°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat.

Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Combustible material.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Finish cleaning by spreading

water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:

Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 142.2 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not applicable.

Boiling Point: 244.6°C (472.3°F) range: 240 - 245 °C

Melting Point: -22°C (-7.6°F)

Critical Temperature: Not available.

Specific Gravity: 1.0202 (Water = 1)

Vapor Pressure: 0 kPa (@ 25°C)

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: 0.02 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.9

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:

Soluble in diethyl ether.

Insoluble in cold water, hot water. Soluble in alcohol, benzene.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (sparks, flames), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 1840 mg/kg [Rat].

Chronic Effects on Humans: MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant, lung sensitizer).

Slightly hazardous in case of skin contact (sensitizer, permeator).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose:

LDL [Rabbit] - Route: Skin; Dose: 7500 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes Skin irritation. May cause photosensitization.

Eyes: Causes eye irritation.

Inhalation: Cause respiratory tract irritaiton.

Ingestion: May be harmful if swallowed. Causes digestive tract irritation.

Chronic Potential Health Effects:

Ingestion: Prolonged or repeated ingestion may affect metabolism.

The toxicological properties of this substance have not been fully investigated.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: 1-Methylnaphthalene Massachusetts RTK: 1-Methylnaphthalene TSCA 8(b) inventory: 1-Methylnaphthalene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):

R22- Harmful if swallowed.

R36/37/38- Irritating to eyes,

respiratory system and skin.

R42/43- May cause sensitization by

inhalation and skin contact.

S7- Keep container tightly closed.

S26- In case of contact with eyes, rinse

immediately with plenty of water and seek

medical advice.

S36/37/39- Wear suitable protective clothing,

gloves and eye/face protection.

S60- This material and its container must be disposed of as hazardous waste.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/06/2008 12:00 PM

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Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C10H8

Contact Information:

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For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].

The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes,

gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable solid.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure

build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Flammable solid.

Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

Israel: TWA: 10 (ppm)

TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m3) from ACGIH [1995]

Australia: STEL: 15 (ppm)

Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:

Partially dispersed in hot water, methanol, n-octanol.

Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

Solubility:

Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 490 mg/kg [Rat].

Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].

The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of ingestion.

Hazardous in case of inhalation.

Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Rhode Island RTK hazardous substances: Naphthalene

Pennsylvania RTK: Naphthalene

Florida: Naphthalene Minnesota: Naphthalene

Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene

TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87

SARA 313 toxic chemical notification and release reporting: Naphthalene: 1%

CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-4: Flammable solid.

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R36- Irritating to eyes.

R40- Possible risks of irreversible

effects.

R48/22- Harmful: danger of serious damage to health by prolonged

exposure if swallowed.

R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or

equivalent. Wear appropriate respirator

when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Material Safety Data Sheet Phenanthrene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Phenanthrene

Catalog Codes: SLP1318

CAS#: 85-01-8

RTECS: SF7175000

TSCA: TSCA 8(b) inventory: Phenanthrene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C14H10

Contact Information:

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International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Phenanthrene	85-01-8	100

Toxicological Data on Ingredients: Phenanthrene: ORAL (LD50): Acute: 700 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: OPEN CUP: 171°C (339.8°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water

on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 178.22 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 340°C (644°F)

Melting Point: 101°C (213.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.179 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 6.14 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 700 mg/kg [Mouse].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant, sensitizer), of ingestion, of inhalation.

Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Phenanthrene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):

R36/38- Irritating to eyes and skin. R43- May cause sensitization by skin contact.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or

equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 11:16 AM

Last Updated: 11/06/2008 12:00 PM

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Material Safety Data Sheet Pyrene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Pyrene

Catalog Codes: SLP3868

CAS#: 129-00-00

RTECS: UR2450000

TSCA: TSCA 8(b) inventory: Pyrene

CI#: Not available.

Synonym: Benzo(D,E,F)phenanthrene

Chemical Name: Pyrene

Chemical Formula: C16-H10

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Pyrene	129-00-00	100

Toxicological Data on Ingredients: Pyrene: ORAL (LD50): Acute: 2700 mg/kg [Rat]. 800 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:

Slightly flammable to flammable in presence of heat, of combustible materials.

Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Slightly explosive in presence of heat.

Non-explosive in presence of open flames and sparks.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F). Preferably refrigerate.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Synthetic apron. Gloves (impervious).

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid. Powdered solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 202.26 g/mole

Color: Yellow.

pH (1% soln/water): Not applicable.

Boiling Point: 404°C (759.2°F)

Melting Point: 151.2°C (304.2°F)

Critical Temperature: Not available.

Specific Gravity: 1.271 @ 23 C (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 4.9

Ionicity (in Water): Not available.

Dispersion Properties:

Is not dispersed in cold water, hot water.

See solubility in diethyl ether.

Solubility:

Soluble in diethyl ether.

Insoluble in cold water, hot water.

Pyrene is fairly soluble in organic solvents.

It is soluble in alcohol, benzene, carbon disulfide, ether, petroleum ether, and toluene

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 800 mg/kg [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

Other Toxic Effects on Humans:

Hazardous in case of ingestion, of inhalation.

Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenic).

May cause cancer (tumorigenic) according to animal data.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: May cause skin irritation. May be absorbed through skin.

Eyes: May cause eye irritation. Conjunctival irritation may be noted.

Inhalation: May cause respiratory tract irritaiton.

Ingestion: May cause gastrointestinal tract irritation. May affect behavior/Central Nervous System (excitation and muscel spasicity), liver and urinary system, and immune system, and blood.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 1.8 mg/l 48 hours [Water flea].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut carcinogen reporting list.: Pyrene

Illinois chemical safety act: Pyrene New York release reporting list: Pyrene

Pennsylvania RTK: Pyrene Massachusetts RTK: Pyrene Massachusetts spill list: Pyrene

New Jersey: Pyrene

New Jersey spill list: Pyrene

Louisiana ŘTK reporting list: Pyrene Louisiana spill reporting: Pyrene

California Director's list of Hazardous Substances: Pyrene

TSCA 8(b) inventory: Pyrene TSCA 8(a) CAIR: Pyrene

TSCA 8(d) H and S data reporting: Pyrene: June 1, 1987-June 1, 1997 SARA 302/304/311/312 extremely hazardous substances: Pyrene CERCLA: Hazardous substances.: Pyrene: 5000 lbs. (2268 kg)

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):

R20/21/22- Harmful by inhalation, in contact with skin and if swallowed. S2- Keep out of the reach of children.

S36/37- Wear suitable protective clothing and

gloves.

\$46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: C

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves (impervious). Synthetic apron. Not applicable. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Material Safety Data Sheet Sodium Cyanide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium Cyanide

Catalog Codes: SLS2314, SLS3736

CAS#: 143-33-9

RTECS: VZ7525000

TSCA: TSCA 8(b) inventory: Sodium Cyanide

CI#: Not available.

Synonym:

Chemical Name: Sodium Cyanide

Chemical Formula: NaCN

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Sodium Cyanide	143-33-9	100

Toxicological Data on Ingredients: Sodium Cyanide: ORAL (LD50): Acute: 6.44 mg/kg [Rat]. DERMAL (LD50): Acute: 10.4 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to skin, eyes, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of acids, of moisture.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Dangerous on contact with acids, acid fumes, water or stream. It will produce toxic and flammable vapors of CN-H and sodium oxide.

Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas.

When heated to decomposition it emits toxic fumes hydgrogen cyanide and oxides of nitrogen

Special Remarks on Explosion Hazards: Fusion mixtures of metal cyanides with metal chlorates, perchlorated or nitrates causes a violent explosion

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Corrosive solid. Poisonous solid.

Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

STEL: 5 (mg/m3) from ACGIH (TLV) [United States] SKIN

CEIL: 4.7 from NIOSH

CEIL: 5 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Granular solid. Flakes solid.)

Odor:

Faint almond-like odor.

Odorless when perfectly dry. Emits odor of

hydrogen cyanide when damp.

Taste: Not available.

Molecular Weight: 49.01 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 1496°C (2724.8°F)

Melting Point: 563°C (1045.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.595 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Vapor Density of Hydrogen Cyanide gas: 0.941

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:

Soluble in cold water. Slightly soluble in Ethanol

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, moisture, incompatibles.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity:

Corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Violent reaction with fluorine gas, magnesium, nitrates, nitric acid.

Dangerous on contact with acids, acid fumes, water or stream. It wil produce toxic and flammable vapors of CN-H and sodium oxide.

Cyanide may react with CO2 in ordinary air to form toxic hydrogen cyanide gas.

Strong oxidizers such as acids, acid salts, chlorates, and nitrates.

Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas.

Special Remarks on Corrosivity: Corrosive to aluminum

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD50): 6.44 mg/kg [Rat]. Acute dermal toxicity (LD50): 10.4 mg/kg [Rabbit].

Chronic Effects on Humans: May cause damage to the following organs: skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May cause adverse reproductive effects (maternal and paternal fertility) based on animal data.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health effects:

Skin: May cause itching and irritation. May be fatal if absorbed through injured skin with symtpoms similar to those noted for inhalation and ingestion.

Eyes: May cause eye irritation and eye damage.

Inhalation: May cause respiratory tract irritation. May be fatal if inhaled. The substance inhibits cellular respiration causing metabolic asphyxiation. May cause headache, weakness, dizziness, labored breathing, nausea, vomiting. May be followed by cardiovascular effects, unconciousness, convulsions, coma, and death Ingestion: May be fatal if swallowed. May cause gastrointestinal tract irritation with nausea, vomiting. May affect behavior and nervous systems(seizures, convulsions, change in motor activity, headache, dizziness, confusion, weakness stupor, aniexity, agitation, tremors), cardiovascular system, respiration (hyperventilation, pulmonary edema, breathing difficulty, respiratory failure), cardiovascular system (palpitations, rapid heart beat, hypertension, hypotension). Massive doses by produce sudden loss of conciousness and prompt death from respiratory arrest. Smaller but still lethal doses

on the breath or vomitus.

Chronic Potential Health Effects:

Central Nervous system effects (headaches, vertigo, insomnia, memory loss, tremors, fatigue), fatigue, metabolic effects (poor appetite), cardiovascular effects (chest discomfort, palpitations), nerve damage to the eyes, or dermatitis, respiratory tract irritation, eye irritation, or death can occur.

may prolong the illness for 1 or more hours. A bitter almond odor may be noted

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material. **Identification:** : Sodium cyanide UNNA: 1689 PG: I

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut carcinogen reporting list.: Sodium Cyanide

Illinois chemical safety act: Sodium Cyanide New York release reporting list: Sodium Cyanide

Rhode Island RTK hazardous substances: Sodium Cyanide

Pennsylvania RTK: Sodium Cyanide

Minnesota: Sodium Cyanide

Massachusetts RTK: Sodium Cyanide Massachusetts spill list: Sodium Cyanide

New Jersey: Sodium Cyanide

New Jersey spill list: Sodium Cyanide

Louisiana ŘTK reporting list: Sodium Cyanide Louisiana spill reporting: Sodium Cyanide

California Director's List of Hazardous Substances: Sodium Cyanide

TSCA 8(b) inventory: Sodium Cyanide TSCA 4(a) final test rules: Sodium Cyanide

TSCA 8(a) PAIR: Sodium Cyanide

TSCA 8(d) H and S data reporting: Sodium Cyanide TSCA 12(b) one time export: Sodium Cyanide

SARA 302/304/311/312 extremely hazardous substances: Sodium Cyanide CERCLA: Hazardous substances.: Sodium Cyanide: 10 lbs. (4.536 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-6: Reactive and very flammable material.

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).

CLASS E: Corrosive solid.

DSCL (EEC):

R27/28- Very toxic in contact with skin

and if swallowed.

R41- Risk of serious damage to eyes.

S1/2- Keep locked up and out of the reach of

children.

S26- In case of contact with eyes, rinse

immediately with plenty of water and seek

medical advice.

S28- After contact with skin, wash immediately

with plenty of water

S36/37- Wear suitable protective clothing and gloves.

\$39- Wear eye/face protection.

S45- In case of accident or if you feel unwell, seek medical advice immediately (show the

label where possible).

S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Synthetic apron.

Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:58 PM

Last Updated: 11/06/2008 12:00 PM

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Material Safety Data Sheet Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide;

Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat.

Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide;

concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States]

TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States]

TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone. Practically insoluble in cold water.

Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide.

Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride.

Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C.

Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 636 mg/kg [Rat].

Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit].

Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose:

LDL [Human] - Route: Oral; Dose: 50 mg/kg

LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite.

Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects:

Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis.

Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may

arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene

California prop. 65 (no significant risk level): Toluene: 7 mg/day (value)

California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value)

California prop. 65: This product contains the following ingredients for which the State of California has found to

cause birth defects which would require a warning under the statute: Toluene

Connecticut hazardous material survey.: Toluene

Illinois toxic substances disclosure to employee act: Toluene

Illinois chemical safety act: Toluene New York release reporting list: Toluene

Rhode Island RTK hazardous substances: Toluene

Pennsylvania RTK: Toluene

Florida: Toluene Minnesota: Toluene

Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene

New Jersey: Toluene

New Jersey spill list: Toluene Louisiana spill reporting: Toluene

California Director's List of Hazardous Substances.: Toluene

TSCA 8(b) inventory: Toluene

TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92

SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable.

R20- Harmful by inhalation.

S16- Keep away from sources of ignition - No

smoking.

S25- Avoid contact with eyes.

S29- Do not empty into drains.

S33- Take precautionary measures against

static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator

when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/06/2008 12:00 PM

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(518) 842-4111

Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification

CAS Number: 108-38-3

Material Name: m-Xylene **Chemical Formula:** C₂H₁₀

Structural Chemical Formula: C₆H₄(CH₃)₂

EINECS Number: 203-576-3 **ACX Number:** X1001540-4

Synonyms: BENZENE,1,3-DIMETHYL-; 1,3-DIMETHYLBENZENE; M-DIMETHYLBENZENE; M-METHYLTOLUENE; 1,3-XYLENE; M-XYLENE; M-XY

General Use: Used as a general solvent in the manufacture of paints, varnishes, lacquers, thinners, inks, rubber,

pesticides, herbicides and paint strippers.

Section 2 - Composition / Information on Ingredients

 Name
 CAS
 %

 m-xylene
 108-38-3
 >95

OSHA PEL NIOSH REL DFG (Germany) MAK

TWA: 100 ppm; 435 mg/m³.

TWA: 100 ppm (435 mg/m³);

STEL: 150 ppm (655 mg/m³).

TWA: 100 ppm; PEAK: 200 ppm; skin.

ACGIH TLV
TWA: 100 ppm; STEL: 150 ppm.

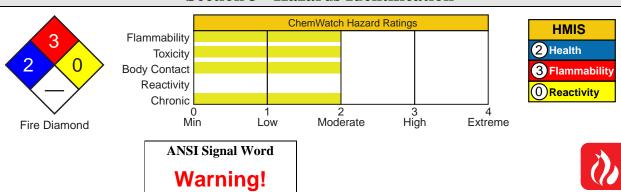
EU OEL

STEL: 150

IDLH Level
900 ppm.

TWA: 50 ppm; STEL: 100 ppm.

Section 3 - Hazards Identification



አልልል Emergency Overview ልልልልል

Clear, sweet smelling liquid. Irritating to eyes/skin/respiratory tract. Other Acute Effects: dizziness, nausea, drowsiness. Chronic Effects: dermatitis, kidney/liver/peripheral nerve damage. May cause birth defects (animal data). Flammable.

Potential Health Effects

Target Organs: central nervous system (CNS), eyes, gastrointestinal (GI) tract, liver, kidneys, skin **Primary Entry Routes:** inhalation, skin absorption (slight), eye contact, ingestion

Acute Effects

Inhalation: Xylene is a central nervous system depressant. The vapor is discomforting to the upper respiratory tract and may be harmful if inhaled.

Inhalation hazard is increased at higher temperatures.

Toxic effects are increased by consumption of alcohol.

Acute effects from inhalation of high concentrations of vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination.

If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.

Headache, fatigue, lassitude, irritability and gastrointestinal disturbances (e.g., nausea, anorexia and flatulence) are the most common symptoms of xylene overexposure. Injury to the heart, liver, kidneys and nervous system has also been noted amongst workers. Transient memory loss, renal impairment, temporary confusion and some evidence of disturbance of liver function was reported in three workers overcome by gross exposure to xylene (10000 ppm). One worker died and autopsy revealed pulmonary congestion, edema, and focal alveolar hemorrhage.

Volunteers inhaling xylene at 100 ppm for 5 to 6 hours showed changes in manual coordination, reaction time and slight ataxia. Tolerance developed during the workweek but was lost over the weekend. Physical exercise may antagonize this effect. Xylene body burden in humans exposed to 100 or 200 ppm xylene in air depends on the amount of body fat with 4% to 8% of total absorbed xylene accumulating in human adipose tissues.

Eye: The liquid is highly discomforting to the eyes and is capable of causing a mild, temporary redness of the conjunctiva (similar to wind-burn), temporary impairment of vision and/or other transient eye damage/ulceration. The vapor is highly discomforting to the eyes.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Corneal changes have been reported in furniture polishers exposed to xylene.

Skin: The liquid is highly discomforting to the skin and may cause drying of the skin, which may lead to dermatitis and it is absorbed by the skin.

Toxic effects may result from skin absorption.

Open cuts, abraded or irritated skin should not be exposed to this material.

The material may accentuate any pre-existing skin condition.

The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic).

This form of dermatitis is often characterized by skin redness (erythema) and swelling (edema) which may progress to vesiculation, scaling and thickening of the epidermis.

Histologically there may be intercellular edema of the spongy layer (spongiosis) and intracellular edema of the epidermis.

Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.

Ingestion: Considered an unlikely route of entry in commercial/industrial environments.

The liquid is highly discomforting and toxic if swallowed.

Ingestion may result in nausea, pain, vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

Carcinogenicity: NTP - Not listed; IARC - Group 3, Not classifiable as to carcinogenicity to humans; OSHA - Not listed; NIOSH - Not listed; ACGIH - Class A4, Not classifiable as a human carcinogen; EPA - Class D, Not classifiable as to human carcinogenicity; MAK - Not listed.

Chronic Effects: Prolonged or continuous skin contact with the liquid may cause defatting with drying, cracking, irritation and dermatitis following.

Small excess risks of spontaneous abortion and congenital malformation was reported among women exposed to xylene in the first trimester of pregnancy. In all cases however the women had also been exposed to other substances. Evaluation of workers chronically exposed to xylene has demonstrated a lack of genotoxicity. Exposure to xylene has been associated with increased risks of hemopoietic malignancies but, again simultaneous exposure to other substances (including benzene) complicate the picture. A long-term gavage study of mixed xylenes (containing 17% ethyl benzene) found no evidence of carcinogenic activity in rats and mice of either sex.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If available, administer medical oxygen by trained personnel.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor, without delay.



Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately remove all contaminated clothing, including footwear (after rinsing with water). Wash affected areas thoroughly with water (and soap if available).

Seek medical attention in event of irritation.

Ingestion: Contact a Poison Control Center.

Do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to xylene:

1. Gastrointestinal absorption is significant with ingestions.

For ingestions exceeding 1-2 mL (xylene)/kg, intubation and lavage with cuffed endotracheal tube is recommended. The use of charcoal and cathartics is equivocal.

- 2. Pulmonary absorption is rapid with about 60-65% retained at rest.
- 3. Primary threat to life from ingestion and/or inhalation is respiratory failure.
- 4.Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO₂ <50 mm Hg or pCO₂ >50 mm Hg) should be intubated.
- 5.Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
- 6.A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.
- 7. Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.

Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

<u>Determinant</u> <u>Index</u> <u>Sampling Time</u> <u>Comments</u>

Methylhippuric 1.5 gm/gm acids in urine creatinine

2 mg/min Last 4 hrs of shift.

Section 5 - Fire-Fighting Measures

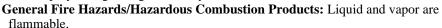
End of shift

Flash Point: 27 °C Closed Cup **Autoignition Temperature:** 527 °C

LEL: 1.1% v/v **UEL:** 7.0% v/v

Extinguishing Media: Foam, dry chemical powder, BCF (where regulations permit), carbon dioxide.

Water spray or fog - Large fires only.



Moderate fire hazard when exposed to heat or flame.

Vapor forms an explosive mixture with air.

Moderate explosion hazard when exposed to heat or flame.

Vapor may travel a considerable distance to source of ignition.

Heating may cause expansion or decomposition leading to violent rupture of containers.

On combustion, may emit toxic fumes of carbon monoxide (CO).

Other combustion products include carbon dioxide (CO₂).

Fire Incompatibility: Avoid contamination with strong oxidizing agents as ignition may result.

Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or waterways.

If safe, switch off electrical equipment until vapor fire hazard removed.

Use water delivered as a fine spray to control fire and cool adjacent area.

Avoid spraying water onto liquid pools.

Do not approach containers suspected to be hot.

Cool fire-exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

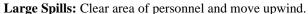
Section 6 - Accidental Release Measures

Small Spills: Remove all ignition sources. Clean up all spills immediately.

Avoid breathing vapors and contact with skin and eyes.

Control personal contact by using protective equipment.

Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.



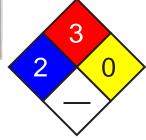
Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or waterways.

No smoking, bare lights or ignition sources. Increase ventilation.

Stop leak if safe to do so. Water spray or fog may be used to disperse/absorb vapor. Contain spill with sand, earth or vermiculite.





Fire Diamond



Use only spark-free shovels and explosion proof equipment.

Collect recoverable product into labeled containers for recycling.

Absorb remaining product with sand, earth or vermiculite.

Collect solid residues and seal in labeled drums for disposal.

Wash area and prevent runoff into drains.

If contamination of drains or waterways occurs, advise emergency services.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Avoid all personal contact, including inhalation.

Wear protective clothing when risk of overexposure occurs.

Use in a well-ventilated area. Prevent concentration in hollows and sumps.

DO NOT enter confined spaces until atmosphere has been checked.

Avoid smoking, bare lights or ignition sources.

Avoid generation of static electricity. DO NOT use plastic buckets.

Ground all lines and equipment. Use spark-free tools when handling.

Avoid contact with incompatible materials.

When handling, DO NOT eat, drink or smoke.

Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling.

Work clothes should be laundered separately.

Use good occupational work practices. Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

Recommended Storage Methods: Metal can; metal drum. Packing as recommended by manufacturer.

Check all containers are clearly labeled and free from leaks.

Plastic containers may only be used if approved for flammable liquids.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area. Local exhaust ventilation may be required for safe working, i. e., to keep exposures below required standards; otherwise, PPE is required.

CARE: Use of a quantity of this material in confined space or poorly ventilated area, where rapid build-up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear.

General exhaust is adequate under normal operating conditions.

Local exhaust ventilation may be required in specific circumstances.

If risk of overexposure exists, wear NIOSH-approved respirator.

Correct fit is essential to obtain adequate protection.

Provide adequate ventilation in warehouse or closed storage areas.

In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus.

Personal Protective Clothing/Equipment:

Eyes: Safety glasses with side shields; or as required, chemical goggles.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Barrier cream with polyethylene gloves; Butyl rubber gloves or Neoprene gloves or PVC gloves. Safety footwear.

Do NOT use this product to clean the skin.

Respiratory Protection:

Exposure Range >100 to <900 ppm: Air Purifying, Negative Pressure, Half Mask

Exposure Range 900 to unlimited ppm: Self-contained Breathing Apparatus, Pressure Demand, Full Face

Cartridge Color: black

Other: Overalls. Impervious protective clothing.

Evewash unit.

Ensure there is ready access to an emergency shower.

Glove Selection Index:

PVA Best selection VITON Best selection

Section 9 - Physical and Chemical Properties

Appearance/General Info: Clear, colorless flammable liquid with aromatic odor. Miscible in most organic solvents.

Odor threshold: 0.2 to 2 ppm. Vapor is heavier than air.

Physical State: Liquid Vapor Density (Air=1): 3.66 at 15 °C

Odor Threshold: 4.00 x10¹³ mol/cc Formula Weight: 106.18

Vapor Pressure (kPa): 0.5 at 15 °C Specific Gravity (H₂O=1, at 4 °C): 0.87 at 15 °C

Evaporation Rate: 0.7 Bu Ac=1 Freezing/Melting Point: -47.8 °C (-54.04 °F)

Volatile Component (% Vol): 100 **pH:** Not applicable

pH (1% Solution): Not applicable. Water Solubility: Slight

Boiling Point: 139.3 °C (283 °F)

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur. **Storage Incompatibilities:** Avoid storage with oxidizers.

Section 11 - Toxicological Information

Toxicity

Oral (rat) LD₅₀: 5000 mg/kg

Intraperitoneal (mouse) LD_{so}: 1739 mg/kg Dermal (rabbit) LD₅₀: 14100 mg/kg

Effects on fertility, specific developmental abnormalities (craniofacial) recorded.

Irritation

Skin (rabbit): 0.01 mg/24h(open)

SEVERE

Skin (rabbit): 20 mg/24h - mod Eye (rabbit): 5 mg/24h - SEVERE See RTECS ZE 2275000, for additional data.

Section 12 - Ecological Information

Environmental Fate: Most is released into the atmosphere where it may photochemically degrade by reaction with hydroxyl radicals (half-life 1-10 hr). The dominant removal process in water is volatilization. It is moderately mobile in soil and may leach into groundwater where it is known to persist for several years despite some evidence that it biodegrades in both soil and groundwater. Bioconcentration is not expected to be significant.

Ecotoxicity: LC₅₀ Poecilia reticulata (guppy) 38 ppm/14 days /Conditions of bioassay not specified; LC₁₀₀ Tetrahymena pyriformis (ciliate) 3.77 mmole/1/24 hr /Conditions of bioassay not specified; LC₅₀ Crangon franciscorum (shrimp) 3.7 ppm/96 hr /Conditions of bioassay not specified; LD₅₀ Goldfish 16 mg/l/24 hr /Modified ASTM D 1345 method; LC₅₀ Morone saxatilis (striped bass) 9.2 ppm/96 hr /Conditions of bioassay not specified; LC₅₀ Cancer magister (crab larvaestage I) 12 ppm/96 hr /Conditions of bioassay not specified

Henry's Law Constant: 0.314

BCF: eels 1.37

Biochemical Oxygen Demand (BOD): 0 lb/lb, 5 days Octanol/Water Partition Coefficient: $log K_{ow} = 3.20$

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options and recycle where possible.

Follow applicable federal, state, and local regulations.

Incinerate residue at an approved site.

Recycle containers where possible, or dispose of in an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Note: This material has multiple possible HMT entries. Choose the appropriate one based on state and condition of specific material when shipped.

Shipping Name and Description: Xylenes

ID: UN1307

Hazard Class: 3 - Flammable and combustible liquid

Packing Group: II - Medium Danger

Symbols:

Label Codes: 3 - Flammable Liquid Special Provisions: IB2, T4, TP1

Exceptions: 150 Non-bulk: 202 Bulk: 242 **Packaging:**

Quantity Limitations: Passenger aircraft/rail: 5 L Cargo aircraft only: 60 L



Vessel Stowage: Location: B Other:

Shipping Name and Description: Xylenes

ID: UN1307

Hazard Class: 3 - Flammable and combustible liquid

Packing Group: III - Minor Danger

Symbols:

Label Codes: 3 - Flammable Liquid **Special Provisions:** B1, IB3, T2, TP1

Packaging: Exceptions: 150 Non-bulk: 203 Bulk: 242

Ouantity Limitations: Passenger aircraft/rail: 60 L Cargo aircraft only: 220 L

Vessel Stowage: Location: A Other:

Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4), per RCRA Section 3001 1000 lb (453.5 kg)

SARA 40 CFR 372.65: Listed SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

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(518) 842-4111

Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification

CAS Number: 95-47-6

Material Name: o-Xylene **Chemical Formula:** C_oH₁₀

Structural Chemical Formula: C₆H₄(CH₃)₂

EINECS Number: 202-422-2 **ACX Number:** X1001538-4

Synonyms: BENZENE,1,2-DIMETHYL-; 1,2-DIMETHYLBENZENE; O-DIMETHYLBENZENE; O-METHYLTOLUENE; 1,2-XYLENE; O-XYLENE; 2-XYLENE; O-XYLENE; O-

pesticides, herbicides and paint strippers.

Section 2 - Composition / Information on Ingredients

 Name
 CAS
 %

 o-xylene
 95-47-6
 >95

OSHA PEL NIOSH REL DFG (Germany) MAK

TWA: 100 ppm; 435 mg/m³.

TWA: 100 ppm (435 mg/m³);

STEL: 150 ppm (655 mg/m³).

TWA: 100 ppm; PEAK: 200 ppm; skin.

ACGIH TLV
TWA: 100 ppm; STEL: 150 ppm.

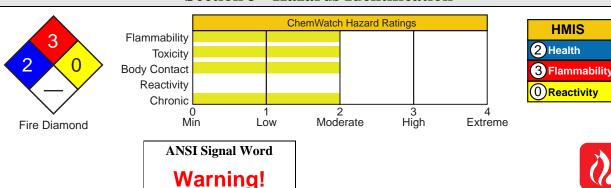
EU OEL

STEL: 150

IDLH Level
900 ppm.

TWA: 50 ppm; STEL: 100 ppm.

Section 3 - Hazards Identification



አልልልል Emergency Overview ልልልልል

Clear, sweet smelling liquid. Irritating to eyes/skin/respiratory tract. Other Acute Effects: dizziness, nausea, drowsiness. Chronic Effects: dermatitis, kidney/liver/peripheral nerve damage. May cause birth defects based on animal data. Flammable.

Potential Health Effects

Target Organs: central nervous system (CNS), eyes, gastrointestinal (GI) tract, liver, kidneys, skin **Primary Entry Routes:** inhalation, skin absorption (slight), eye contact, ingestion

Acute Effects

Inhalation: Xylene is a central nervous system depressant. The vapor is discomforting to the upper respiratory tract and may be harmful if inhaled.

Inhalation hazard is increased at higher temperatures.

Toxic effects are increased by consumption of alcohol.

Acute effects from inhalation of high concentrations of vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination.

If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.

Headache, fatigue, lassitude, irritability and gastrointestinal disturbances (e.g., nausea, anorexia and flatulence) are the most common symptoms of xylene overexposure. Injury to the heart, liver, kidneys and nervous system has also been noted among workers. Transient memory loss, renal impairment, temporary confusion and some evidence of disturbance of liver function was reported in three workers overcome by gross exposure to xylene (10000 ppm). One worker died and autopsy revealed pulmonary congestion, edema, and focal alveolar hemorrhage.

Volunteers inhaling xylene at 100 ppm for 5 to 6 hours showed changes in manual coordination, reaction time and slight ataxia. Tolerance developed during the workweek but was lost over the weekend. Physical exercise may antagonize this effect. Xylene body burden in humans exposed to 100 or 200 ppm xylene in air depends on the amount of body fat with 4% to 8% of total absorbed xylene accumulating in human adipose tissues.

Eye: The liquid is highly discomforting to the eyes and is capable of causing a mild, temporary redness of the conjunctiva (similar to wind-burn), temporary impairment of vision and/or other transient eye damage/ulceration. The vapor is highly discomforting to the eyes.

Corneal changes have been reported in furniture polishers exposed to xylene.

Skin: The liquid is highly discomforting to the skin and may cause drying of the skin, which may lead to dermatitis and it is absorbed by the skin.

Toxic effects may result from skin absorption.

Open cuts, abraded or irritated skin should not be exposed to this material.

The material may accentuate any pre-existing skin condition.

Ingestion: Considered an unlikely route of entry in commercial/industrial environments.

The liquid is highly discomforting and toxic if swallowed.

Ingestion may result in nausea, pain, vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

Carcinogenicity: NTP - Not listed; IARC - Group 3, Not classifiable as to carcinogenicity to humans; OSHA - Not listed; NIOSH - Not listed; ACGIH - Class A4, Not classifiable as a human carcinogen; EPA - Class D, Not classifiable as to human carcinogenicity; MAK - Not listed.

Chronic Effects: Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes.

Prolonged or continuous skin contact with the liquid may cause defatting with drying, cracking, irritation and dermatitis following.

Small excess risks of spontaneous abortion and congenital malformation was reported among women exposed to xylene in the first trimester of pregnancy. In all cases however the women had also been exposed to other substances. Evaluation of workers chronically exposed to xylene has demonstrated a lack of genotoxicity. Exposure to xylene has been associated with increased risks of hemopoietic malignancies but, again simultaneous exposure to other substances (including benzene) complicate the picture. A long-term gavage study of mixed xylenes (containing 17% ethyl benzene) found no evidence of carcinogenic activity in rats and mice of either sex.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If available, administer medical oxygen by trained personnel.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor, without delay.

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately remove all contaminated clothing, including footwear (after rinsing with water). Wash affected areas thoroughly with water (and soap if available).

Seek medical attention in event of irritation.

Ingestion: Contact a Poison Control Center. Do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to xylene:

1.Gastrointestinal absorption is significant with ingestions.

For ingestions exceeding 1-2 mL (xylene)/kg, intubation and lavage with cuffed endotracheal tube is recommended. The use of charcoal and cathartics is equivocal.

- 2. Pulmonary absorption is rapid with about 60-65% retained at rest.
- 3. Primary threat to life from ingestion and/or inhalation is respiratory failure.
- 4. Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO $_2$ <50 mm Hg or pCO $_2$ >50 mm Hg) should be intubated.
- 5. Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.



6. A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.

7. Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.

Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

<u>Determinant</u> <u>Index</u> <u>Sampling Time</u> <u>Comments</u>

Methylhippuric 1.5 gm/gm End of shift

acids in urine creatinine

2 mg/min Last 4 hrs of shift.

Section 5 - Fire-Fighting Measures

Flash Point: 32 °C Closed Cup **Autoignition Temperature:** 463 °C

LEL: 1.0% v/v **UEL:** 7% v/v

 $\textbf{Extinguishing Media:} \ \ \textbf{Foam, dry chemical powder, BCF (where regulations)}$

permit), carbon dioxide.

Water spray or fog - Large fires only.

General Fire Hazards/Hazardous Combustion Products: Liquid and vapor are

flammable.

Moderate fire hazard when exposed to heat or flame.

Vapor forms an explosive mixture with air.

Moderate explosion hazard when exposed to heat or flame.

Vapor may travel a considerable distance to source of ignition.

Heating may cause expansion or decomposition leading to violent rupture of containers.

On combustion, may emit toxic fumes of carbon monoxide (CO).

Other combustion products include carbon dioxide (CO₂).

Fire Incompatibility: Avoid contamination with strong oxidizing agents as ignition may result.

Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or waterways.

If safe, switch off electrical equipment until vapor fire hazard removed.

Use water delivered as a fine spray to control fire and cool adjacent area.

Avoid spraying water onto liquid pools.

Do not approach containers suspected to be hot.

Cool fire-exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

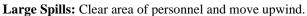
Section 6 - Accidental Release Measures

Small Spills: Remove all ignition sources. Clean up all spills immediately.

Avoid breathing vapors and contact with skin and eyes.

Control personal contact by using protective equipment.

Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.



Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or waterways.

No smoking, bare lights or ignition sources. Increase ventilation.

Stop leak if safe to do so. Water spray or fog may be used to disperse/absorb vapor. Contain spill with sand, earth or vermiculite.

Use only spark-free shovels and explosion proof equipment.

Collect recoverable product into labeled containers for recycling.

Absorb remaining product with sand, earth or vermiculite.

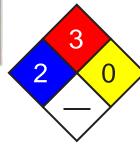
Collect solid residues and seal in labeled drums for disposal.

Wash area and prevent runoff into drains.

If contamination of drains or waterways occurs, advise emergency services.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).





Fire Diamond

See

DOT

ERG

Section 7 - Handling and Storage

Handling Precautions: Avoid all personal contact, including inhalation.

Wear protective clothing when risk of overexposure occurs.

Use in a well-ventilated area. Prevent concentration in hollows and sumps.

DO NOT enter confined spaces until atmosphere has been checked.

Avoid smoking, bare lights or ignition sources.

Avoid generation of static electricity. DO NOT use plastic buckets.

Ground all lines and equipment. Use spark-free tools when handling.

Avoid contact with incompatible materials.

When handling, DO NOT eat, drink or smoke.

Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling.

Work clothes should be laundered separately.

Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

Recommended Storage Methods: Metal can; metal drum. Packing as recommended by manufacturer.

Check all containers are clearly labeled and free from leaks.

Plastic containers may only be used if approved for flammable liquids.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area. Local exhaust ventilation may be required for safe working, i. e., to keep exposures below required standards; otherwise, PPE is required.

CARE: Use of a quantity of this material in confined space or poorly ventilated area, where rapid build-up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear.

General exhaust is adequate under normal operating conditions.

Local exhaust ventilation may be required in specific circumstances.

If risk of overexposure exists, wear NIOSH-approved respirator.

Correct fit is essential to obtain adequate protection.

Provide adequate ventilation in warehouse or closed storage areas.

In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus.

Personal Protective Clothing/Equipment:

Eyes: Safety glasses with side shields; or as required, chemical goggles.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Barrier cream with polyethylene gloves; Butyl rubber gloves or Neoprene gloves or PVC gloves.

Safety footwear.

Do NOT use this product to clean the skin.

Other: Overalls. Impervious protective clothing.

Eyewash unit.

Ensure there is ready access to an emergency shower.

Glove Selection Index:

PVA Best selection VITON Best selection

Section 9 - Physical and Chemical Properties

Appearance/General Info: Clear, colorless flammable liquid with aromatic odor. Miscible in most organic solvents.

Odor threshold: 0.2 to 2 ppm.

Physical State: Liquid

Odor Threshold: 0.05 ppm

Vapor Pressure (kPa): 0.5 at 15 °C

Vapor Density (Air=1): 3.66 at 15 °C

Formula Weight: 106.18

Specific Gravity (H₂O=1, at $4 \,^{\circ}$ C): 0.87 at 15 $^{\circ}$ C

Evaporation Rate: 0.7 Bu Ac=1

pH: Not applicable

pH (1% Solution): Not applicable.

Boiling Point: 144.4 °C (292 °F) at 760 mm Hg

Freezing/Melting Point: -25 °C (-13 °F) Volatile Component (% Vol): 100 Water Solubility: 0.02% by weight

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur. **Storage Incompatibilities:** Avoid storage with oxidizers.

Section 11 - Toxicological Information

Toxicity

Inhalation (human) LC_{Lo}: 6125 ppm/12h Intraperitoneal (mouse) LD_{so}: 1364 mg/kg Paternal effects recorded.

Irritation

Nil reported

See RTECS ZE 2450000, for additional data.

Section 12 - Ecological Information

Environmental Fate: Most is released into the atmosphere where it may photochemically degrade by reaction with hydroxyl radicals (half-life 1.5-15 hr). The dominant removal process in water is volatilization. It is moderately mobile in soil and may leach into groundwater where it has been known to be detectable for several years, although there is some evidence that it biodegrades in both soil and groundwater. Bioconcentration is not expected to be significant.

Ecotoxicity: LC₅₀ Poecilia reticulata (guppy) 35 ppm/7 days /Conditions of bioassay not specified; LC₅₀ Morone saxatilis (bass) 11.0 ppm/96 hr /Conditions of bioassay not specified; LC₅₀ Cancer magister (crab larvae stage I) 6 ppm/96 hr /Conditions of bioassay not specified; LC₅₀ Crangon franciscorum (shrimp) 1.3 ppm/96 hr /Conditions of bioassay not specified

Henry's Law Constant: 5.1 x10⁻³

BCF: eels 1.33

Biochemical Oxygen Demand (BOD): 0 lb/lb, 5 days **Octanol/Water Partition Coefficient:** $log K_{ow} = 3.12$ **Soil Sorption Partition Coefficient:** $K_{oc} = soils 48$ to 68

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options and recycle where possible.

Follow applicable federal, state, and local regulations.

Incinerate residue at an approved site.

Recycle containers where possible, or dispose of in an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Note: This material has multiple possible HMT entries. Choose the appropriate one based on state and condition of specific material when shipped.

Shipping Name and Description: Xylenes

ID: UN1307

Hazard Class: 3 - Flammable and combustible liquid

Packing Group: II - Medium Danger

Symbols:

Label Codes: 3 - Flammable Liquid **Special Provisions:** IB2, T4, TP1

Packaging: Exceptions: 150 Non-bulk: 202 Bulk: 242

Quantity Limitations: Passenger aircraft/rail: 5 L Cargo aircraft only: 60 L

Vessel Stowage: Location: B Other:

Shipping Name and Description: Xylenes

ID: UN1307

Hazard Class: 3 - Flammable and combustible liquid

Packing Group: III - Minor Danger

Symbols:

Label Codes: 3 - Flammable Liquid **Special Provisions:** B1, IB3, T2, TP1

Packaging: Exceptions: 150 Non-bulk: 203 Bulk: 242

Quantity Limitations: Passenger aircraft/rail: 60 L Cargo aircraft only: 220 L

Vessel Stowage: Location: A Other:





Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4), per RCRA Section 3001 1000 lb (453.5 kg)

SARA 40 CFR 372.65: Listed SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information
Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

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(518) 842-4111

Issue Date: 2006-06

Section 1 - Chemical Product and Company Identification

Material Name: p-Xylene CAS Number: 106-42-3

Chemical Formula: C₈H₁₀

Structural Chemical Formula: $C_6H_4(CH_3)_2$

EINECS Number: 203-396-5 **ACX Number:** X1001539-1

Synonyms: BENZENE,1,4-DIMETHYL-; CHROMAR; 1,4-DIMETHYLBENZENE; P-DIMETHYLBENZENE; P-METHYLTOLUENE; SCINTILLAR; 1,4-XYLENE; P-XYLENE; 4-XYLENE; P-XYLENE; P-X

XYLOL

General Use: Used as a general solvent.

Section 2 - Composition / Information on Ingredients

Name CAS % p-xylene 106-42-3 100

OSHA PEL NIOSH REL DFG (Germany) MAK

TWA: 100 ppm; 435 mg/m³.

TWA: 100 ppm (435 mg/m³);

STEL: 150 ppm (655 mg/m³).

TWA: 100 ppm; PEAK: 200 ppm; skin.

ACGIH TLV
TWA: 100 ppm; STEL: 150 ppm.

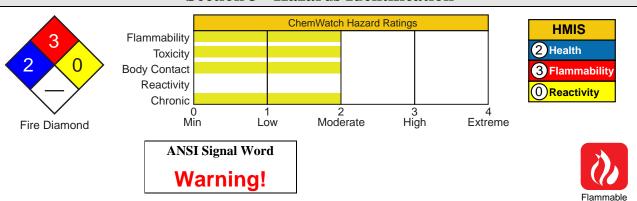
EU OEL

STEL: 150

IDLH Level
900 ppm.

TWA: 50 ppm; STEL: 100 ppm.

Section 3 - Hazards Identification



አልልልል Emergency Overview ልልልልል

Clear, sweet smelling liquid. Irritating to eyes/skin/respiratory tract. Other Acute Effects: dizziness, nausea, drowsiness. Chronic Effects: dermatitis, kidney/liver/peripheral nerve damage, may cause birth defects (animal data). Flammable.

Potential Health Effects

Target Organs: central nervous system (CNS), eyes, gastrointestinal (GI) tract, liver, kidneys, skin **Primary Entry Routes:** inhalation, skin absorption (slight), eye contact, ingestion

Acute Effects

Inhalation: Xylene is a central nervous system depressant. The vapor is discomforting to the upper respiratory tract and may be harmful if inhaled.

Inhalation hazard is increased at higher temperatures.

Toxic effects are increased by consumption of alcohol.

Acute effects from inhalation of high concentrations of vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination.

If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.

Headache, fatigue, lassitude, irritability and gastrointestinal disturbances (e.g., nausea, anorexia and flatulence) are the most common symptoms of xylene overexposure. Injury to the heart, liver, kidneys and nervous system has also been noted among workers. Transient memory loss, renal impairment, temporary confusion and some evidence of disturbance of liver function was reported in three workers overcome by gross exposure to xylene (10000 ppm). One worker died and autopsy revealed pulmonary congestion, edema, and focal alveolar hemorrhage.

Volunteers inhaling xylene at 100 ppm for 5 to 6 hours showed changes in manual coordination, reaction time and slight ataxia. Tolerance developed during the workweek but was lost over the weekend. Physical exercise may antagonize this effect. Xylene body burden in humans exposed to 100 or 200 ppm xylene in air depends on the amount of body fat with 4% to 8% of total absorbed xylene accumulating in human adipose tissues.

Eye: The liquid is highly discomforting to the eyes and is capable of causing a mild, temporary redness of the conjunctiva (similar to wind-burn), temporary impairment of vision and/or other transient eye damage/ulceration. The vapor is highly discomforting to the eyes.

Corneal changes have been reported in furniture polishers exposed to xylene.

Skin: The liquid is highly discomforting to the skin and may cause drying of the skin, which may lead to dermatitis and it is absorbed by the skin.

Toxic effects may result from skin absorption.

Open cuts, abraded or irritated skin should not be exposed to this material.

The material may accentuate any pre-existing skin condition.

Ingestion: Considered an unlikely route of entry in commercial/industrial environments.

The liquid is highly discomforting and toxic if swallowed.

Ingestion may result in nausea, pain, vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

Carcinogenicity: NTP - Not listed; IARC - Group 3, Not classifiable as to carcinogenicity to humans; OSHA - Not listed; NIOSH - Not listed; ACGIH - Class A4, Not classifiable as a human carcinogen; EPA - Class D, Not classifiable as to human carcinogenicity; MAK - Not listed.

Chronic Effects: Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes.

Prolonged or continuous skin contact with the liquid may cause defatting with drying, cracking, irritation and dermatitis following.

Small excess risks of spontaneous abortion and congenital malformation was reported among women exposed to xylene in the first trimester of pregnancy. In all cases however the women had also been exposed to other substances. Evaluation of workers chronically exposed to xylene has demonstrated a lack of genotoxicity. Exposure to xylene has been associated with increased risks of hemopoietic malignancies but, again simultaneous exposure to other substances (including benzene) complicate the picture. A long-term gavage study of mixed xylenes (containing 17% ethyl benzene) found no evidence of carcinogenic activity in rats and mice of either sex.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If available, administer medical oxygen by trained personnel.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor, without delay.

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately remove all contaminated clothing, including footwear (after rinsing with water). Wash affected areas thoroughly with water (and soap if available).

Seek medical attention in event of irritation.

Ingestion: Contact a Poison Control Center. Do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to xylene:

1. Gastrointestinal absorption is significant with ingestions.

For ingestions exceeding 1-2 mL (xylene)/kg, intubation and lavage with cuffed endotracheal tube is recommended. The use of charcoal and cathartics is equivocal.

- 2. Pulmonary absorption is rapid with about 60-65% retained at rest.
- 3. Primary threat to life from ingestion and/or inhalation is respiratory failure.
- 4.Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO $_2$ <50 mm Hg or pCO $_2$ >50 mm Hg) should be intubated.
- 5. Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.



6.A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.

7. Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.

Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

<u>Determinant</u> <u>Index</u> <u>Sampling Time</u> <u>Comments</u>

Methylhippuric 1.5 gm/gm End of shift

acids in urine creatinine

2 mg/min Last 4 hrs of shift.

Section 5 - Fire-Fighting Measures

Flash Point: 27 °C Closed Cup **Autoignition Temperature:** 528 °C

LEL: 1.1% v/v **UEL:** 7.0% v/v

 $\textbf{Extinguishing Media:} \ \ \textbf{Foam, dry chemical powder, BCF (where regulations)}$

permit), carbon dioxide.

Water spray or fog - Large fires only.

General Fire Hazards/Hazardous Combustion Products: Liquid and vapor are

flammable.

Moderate fire hazard when exposed to heat or flame.

Vapor forms an explosive mixture with air.

Moderate explosion hazard when exposed to heat or flame.

Vapor may travel a considerable distance to source of ignition.

Heating may cause expansion or decomposition leading to violent rupture of containers.

On combustion, may emit toxic fumes of carbon monoxide (CO).

Other combustion products include carbon dioxide (CO₂).

Fire Incompatibility: Avoid contamination with strong oxidizing agents as ignition may result.

Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or waterways.

If safe, switch off electrical equipment until vapor fire hazard removed.

Use water delivered as a fine spray to control fire and cool adjacent area.

Avoid spraying water onto liquid pools.

Do not approach containers suspected to be hot.

Cool fire-exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

Section 6 - Accidental Release Measures

Small Spills: Remove all ignition sources. Clean up all spills immediately.

Avoid breathing vapors and contact with skin and eyes.

Control personal contact by using protective equipment.

Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.

Large Spills: Clear area of personnel and move upwind.

Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or waterways.

No smoking, bare lights or ignition sources. Increase ventilation.

Stop leak if safe to do so. Water spray or fog may be used to disperse/absorb vapor. Contain spill with sand, earth or vermiculite.

Use only spark-free shovels and explosion proof equipment.

Collect recoverable product into labeled containers for recycling.

Absorb remaining product with sand, earth or vermiculite.

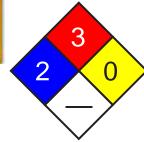
Collect solid residues and seal in labeled drums for disposal.

Wash area and prevent runoff into drains.

If contamination of drains or waterways occurs, advise emergency services.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).





Fire Diamond

See

DOT

ERG

Section 7 - Handling and Storage

Handling Precautions: Avoid all personal contact, including inhalation.

Wear protective clothing when risk of overexposure occurs.

Use in a well-ventilated area. Prevent concentration in hollows and sumps.

DO NOT enter confined spaces until atmosphere has been checked.

Avoid smoking, bare lights or ignition sources.

Avoid generation of static electricity. DO NOT use plastic buckets.

Ground all lines and equipment. Use spark-free tools when handling.

Avoid contact with incompatible materials.

When handling, DO NOT eat, drink or smoke.

Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling.

Work clothes should be laundered separately.

Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

Recommended Storage Methods: Metal can; metal drum. Packing as recommended by manufacturer.

Check all containers are clearly labeled and free from leaks.

Plastic containers may only be used if approved for flammable liquids.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area. Local exhaust ventilation may be required for safe working, i. e., to keep exposures below required standards; otherwise, PPE is required.

CARE: Use of a quantity of this material in confined space or poorly ventilated area, where rapid build-up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear.

General exhaust is adequate under normal operating conditions.

If risk of overexposure exists, wear NIOSH-approved respirator.

Correct fit is essential to obtain adequate protection.

Provide adequate ventilation in warehouse or closed storage areas.

In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus.

Personal Protective Clothing/Equipment:

Eyes: Safety glasses with side shields; or as required, chemical goggles.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Barrier cream with polyethylene gloves; Butyl rubber gloves or Neoprene gloves or PVC gloves.

Safety footwear.

Do NOT use this product to clean the skin.

Respiratory Protection:

Exposure Range >100 to <900 ppm: Air Purifying, Negative Pressure, Half Mask

Exposure Range 900 to unlimited ppm: Self-contained Breathing Apparatus, Pressure Demand, Full Face

Cartridge Color: black

Other: Overalls. Impervious protective clothing.

Eyewash unit.

Ensure there is ready access to an emergency shower.

Glove Selection Index:

PVA Best selection
VITON Best selection

Section 9 - Physical and Chemical Properties

Appearance/General Info: Clear, colorless liquid with sweet, aromatic odor. Miscible in most organic solvents. Odor

threshold 0.05 ppm.

Physical State: Liquid pH: Not applicable

Odor Threshold: Detection 0.05 ppm Vapor Pressure (kPa): 0.90 at 20 °C Vapor Density (Air=1): 3.66 at 15 °C

Formula Weight: 106.18

Specific Gravity (H₂O=1, at 4 $^{\circ}$ C): 0.86

Evaporation Rate: 9.9 Ether=1

pH (1% Solution): Not applicable.

Boiling Point: 138.37 °C (281 °F)

Freezing/Melting Point: 13.3 °C (55.94 °F)

Volatile Component (% Vol): 100 Water Solubility: Insoluble in water

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: Avoid storage with oxidizers.

Section 11 - Toxicological Information

Toxicity

Oral (rat) LD₅₀: 5000 mg/kg Inhalation (rat) LC₅₀: 4550 ppm/4h

Irritation

Nil reported

See RTECS ZE 2625000, for additional data.

Section 12 - Ecological Information

Environmental Fate: Most is released into the atmosphere where it may photochemically degrade by reaction with hydroxyl radicals (half-life 1.7-18 hr). The dominant removal process in water is volatilization. It is moderately mobile in soil and may leach into groundwater where it is known to persist for several years despite some evidence that it biodegrades in both soil and groundwater. Bioconcentration is not expected to be significant.

Ecotoxicity: LC_{50} Poecilia reticulata (guppy) 35 ppm/7 day /Conditions of bioassay not specified; LC_{50} Morone saxatilis (bass) 2.0 ppm/96 hr /Conditions of bioassay not specified; LC_{100} Tetrahymena pyriformis (ciliate) 3.77 mmole/l/24 hr /Conditions of bioassay not specified; LD_{50} Goldfish 18 mg/l/24 hr /Modified ASTM D 1345 method; LC_{50} Crangon franciscorum (shrimp) 2.0 ppm/96 hr /Conditions of bioassay not specified

Henry's Law Constant: 0.314

BCF: eels 1.37

Biochemical Oxygen Demand (BOD): 0 lb/lb, 5 days **Octanol/Water Partition Coefficient:** $\log K_{ow} = 3.15$ **Soil Sorption Partition Coefficient:** $K_{oc} = 3.15$

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options and recycle where possible.

Follow applicable federal, state, and local regulations.

Incinerate residue at an approved site.

Recycle containers where possible, or dispose of in an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Note: This material has multiple possible HMT entries. Choose the appropriate one based on state and condition of specific material when shipped.

Shipping Name and Description: Xylenes

ID: UN1307

Hazard Class: 3 - Flammable and combustible liquid

Packing Group: II - Medium Danger

Symbols:

Label Codes: 3 - Flammable Liquid **Special Provisions:** IB2, T4, TP1

Packaging: Exceptions: 150 Non-bulk: 202 Bulk: 242

Quantity Limitations: Passenger aircraft/rail: 5 L Cargo aircraft only: 60 L

Vessel Stowage: Location: B Other:

Shipping Name and Description: Xylenes

ID: UN1307

Hazard Class: 3 - Flammable and combustible liquid

Packing Group: III - Minor Danger

Symbols:

Label Codes: 3 - Flammable Liquid **Special Provisions:** B1, IB3, T2, TP1

Packaging: Exceptions: 150 Non-bulk: 203 Bulk: 242

Quantity Limitations: Passenger aircraft/rail: 60 L Cargo aircraft only: 220 L

Vessel Stowage: Location: A Other:





Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4), per RCRA Section 3001 100 lb (45.35 kg)

SARA 40 CFR 372.65: Listed SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information
Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.







Material Safety Data Sheet Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

Chemical Name: Xylenes (o-, m-, p- isomers)

Chemical Formula: C6H4(CH3)2

Contact Information:

Sciencelab.com, Inc. 14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system

(CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat.

Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:

Vapors may form explosive mixtures with air.

Containers may explode when heated.

May polymerize explosively when heated.

An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 100 (ppm) [Canada] TWA: 435 (mg/m3) [Canada]

TWA: 434 STEL: 651 (mg/m3) from ACGIH (TLV) [United States] TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States]

Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water.

Miscible with absolute alcohol, ether, and many other organic liquids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 2119 mg/kg [Mouse].

Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals:

Lowest Lethal Dose:

LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal.

May cause adverse reproductive effects (male and femael fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: Causes skin irritation. Can be absorbed through skin.

Eyes: Causes eye irritation.

Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves.

Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/kidneys. May cause effects similar to those of acute inhalation.

Chronic Potential Health Effects:

Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may alsocause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Xylenes

Illinois chemical safety act: Xylenes

New York acutely hazardous substances: Xylenes Rhode Island RTK hazardous substances: Xylenes

Pennsylvania RTK: Xylenes

Minnesota: Xylenes

Michigan critical material: Xylenes Massachusetts RTK: Xylenes Massachusetts spill list: Xylenes

New Jersey: Xylenes New Jersey spill list: Xylenes Louisiana spill reporting: Xylenes

California Director's List of Hazardous Substances: Xylenes

TSCA 8(b) inventory: Xylenes

SARA 302/304/311/312 hazardous chemicals: Xylenes

SARA 313 toxic chemical notification and release reporting: Xylenes CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R10- Flammable.

R21- Harmful in contact with skin.

R36/38- Irritating to eyes and skin.

S2- Keep out of the reach of children.

S36/37- Wear suitable protective clothing and

gloves.

S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/06/2008 12:00 PM

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Attachment D Activity Hazard Analysis Forms



Field Activities

Project Name:	Project Number:	JSA Number:	Issue Date:
Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570	E10921-02.05	001	1/28/2022
Location:	Contractor:	Analysis by:	Analysis Date:
New Rochelle, New York	Anchor QEA, LLC	Pia Tapiawala	1/28/2022
Work Operation:	Superintendent/Competent Person:	Revised by:	Revised Date:
Field activities	Scott Andrews		
Required Personal Protective Equipment (PPE):		Reviewed by:	Reviewed Date:
 Modified Level D—Long pants, long sleeve 	s, and steel-toed footwear conforming to	Matt Cavas	
 ASTM International (ASTM) F2412-05/ASTM Depending on activity, the following PPE m goggles, hard hat, nitrile outer gloves and I Guard-approved personal flotation device (weather PFD information) 	ay also be required: safety glasses/splash atex inner gloves, and, if boating, U.S. Coast	Approved by:	Approved Date:

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
If boating		Follow the Job Safety Analysis (JSA) for boating activities.	
Outdoor, physical activity	Slips, trips, and falls	 Avoid walking while writing or texting—maintain a heads-up posture. Be aware of potentially slippery surfaces and tripping hazards. Use handrails where available. Wear footwear that has sufficient traction. Maintain good housekeeping practices. Clean up all spills immediately. Be aware of weather effects on the work area, including wet and/or frozen ground. Jumping, running, and horseplay are prohibited. Keep all areas clean and free of debris to prevent any trips and falls. Be aware of and limit loose clothing or untied shoelaces that may contribute to slips, trip, and falls. Notify the field team members of any unsafe conditions. 	Routinely inspect work area for unsafe conditions.

ANCHOR QEA

Field Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor, physical activity (continued)	Heat stress	 Adjust work schedules, as necessary, to avoid the hottest part of the day. Take rest breaks as warranted. Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. Maintain body fluids at normal levels. Train workers to recognize the symptoms of heat-related illness. 	 Review weather forecast prior to field work. Monitor workers' physical conditions. Monitor outside temperature versus worker activity.
	Cold stress	 Provide shelter (enclosed, heated environment) to protect personnel during rest periods. Educate workers to recognize the symptoms of frostbite and hypothermia. Use appropriate cold-weather gear, up to and including Mustang-type bib coveralls or jacket/bib combinations. Consider additional precautions if working near water in cold weather. Have a dry change of clothing available. Train workers to recognize the symptoms of cold-related illness. 	 Review weather forecast prior to field work. Monitor workers' physical conditions and PPE. Monitor outside and water temperature versus worker activity and PPE.
	Rain or snow	 Wear appropriate PPE (rain gear). Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. If extremely cold conditions are forecast, consider additional precautions or postponing work activity. 	 Review weather forecast prior to field work. Inspect PPE daily prior to use. Routinely inspect work area for deteriorating conditions.
	Sunshine	 Have sunscreen available for ultraviolet protection. Have abundant water available to prevent dehydration. Consider wearing wide-brimmed headwear and light-colored, lightweight, sunblocking clothing. 	Ensure that sunscreen and water are available.
	Lightning	 Do not begin or continue work until lightning subsides for at least 30 minutes. Disconnect and do not use or touch electronic equipment. Immediately head for shore if on the water and lightning is observed. If not able to get to shore, disconnect and do not use or touch the major electronic equipment, including the radio, throughout the duration of the storm. 	Obtain weather forecast and updates as needed.





Field Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor, physical activity (continued)	High winds	Wear goggles or safety glasses if dust or debris are visible.	 Review weather forecast prior to field work. Ensure that goggles or safety glasses are available.
	Biological hazards (flora [e.g., poison ivy and poison oak] and fauna [e.g., ticks, bees, spiders, mosquitoes, and snakes])	 Be aware of likely biological hazards in the work area. Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, boots, and Tyvek coveralls, as appropriate), and apply insect repellant. Wear hand and arm protection when clearing plants or debris from the work area. Be aware of potential wildlife and defensive behavior (e.g., nesting birds, or animals with young). 	 Ensure that insect repellent is available. Inspect clothing and skin for insects (e.g., ticks) after working in insect-prone areas.
	Noise exposure	Wear hearing protection in high noise environments or when working around heavy machinery or equipment (action level of 85 decibels averaged over an 8-hour day).	Ensure that hearing protection is available.

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- If boating is involved, and a professional captained vessel is not in use, boat operators must take the appropriate state or provincial boater safety courses.
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.





Groundwater Sampling

Project Name:	Project Number:	AHA Number:	Issue Date:
Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570	E10921-02.05	002	1/28/2022
Location:	Contractor:	Analysis by:	Analysis Date:
New Rochelle, New York	Anchor QEA, LLC	Pia Tapiawala	1/28/2022
Work Operation:	Superintendent/Competent Person:	Revised by:	Revised Date:
Groundwater sampling	Scott Andrews		
Required Personal Protective Equipment (PPE):		Reviewed by:	Reviewed Date:
 Modified Level D—Long pants, long sleev 	res, and steel-toed footwear conforming to	Matthew Cavas, PG	
 ASTM International (ASTM) F2412-05/ASTM F2413-05 Safety glasses/splash goggles, hard hat, nitrile outer gloves and latex inner gloves, and, if boating, U.S. Coast Guard-approved personal flotation device (PFD; see cold stress section for cold-weather PFD information) 		Approved by:	Approved Date:

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
If using glassware		Follow the JSA for handling glassware.	
Groundwater sample retrieval	Slips, trips, and falls	 Avoid walking while writing or texting—maintain a heads-up posture. Be aware of potentially slippery surfaces, riprap, thick mud, and tripping hazards. Use handrails where available. Wear footwear that has sufficient traction. Maintain good housekeeping practices. Clean up all spills immediately. Be aware of weather effects on the work area, including wet and/or frozen ground. Jumping, running, and horseplay are prohibited. Keep all areas clean and free of debris to prevent any trips and falls. Notify the field team members of any unsafe conditions. 	Routinely inspect work area for unsafe conditions.
Groundwater sample retrieval (continued)	Ingestion of contaminants, or skin or eye contact with contaminants	 Wear appropriate PPE to prevent or reduce exposure. Contact 911 if necessary, and perform cardiopulmonary resuscitation (CPR) if breathing stops. Move the exposed person away from the source of contamination and rinse their mouth. If skin exposure occurs, promptly wash the contaminated skin using soap or mild detergent and water. If eye exposure occurs, rinse the eyes with large amounts of water. Follow decontamination procedures as outlined in the Health and Safety Plan (HASP). 	 Ensure that decontamination procedures are on hand and are reviewed. Ensure that PPE and rinsing water are available.



Groundwater Sampling

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Pinch points	Maintain a safe distance from closing mechanisms and moving parts on sampling gear.	
	Biological hazards (flora [e.g., poison ivy and poison oak] and fauna [e.g., ticks, bees, spiders, mosquitoes, and snakes])	 Be aware of likely biological hazards in the work area. Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, and boots as appropriate). Wear hand and arm protection when clearing plants or debris from the work area. 	Inspect clothing and skin for insects (e.g., ticks) after working in insect-prone areas.
	Muscle strain or injuries from improper lifting	 Use proper lifting techniques or ask for assistance with heavy objects, buckets, or other unwieldy equipment. 	Evaluate weight and center of gravity of heavier items prior to lifting or moving.
	Noise exposure	• Wear hearing protection in high noise environments or when working around heavy machinery or equipment (action level of 85 decibels averaged over an 8-hour day).	• Ensure that hearing protection is available.
	Heat stress	 Adjust work schedules, as necessary, to avoid the hottest part of the day. Take rest breaks as warranted. Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. Maintain body fluids at normal levels. Train workers to recognize the symptoms of heat-related illness. 	 Review weather forecast prior to field work. Monitor workers' physical conditions. Monitor outside temperature versus worker activity.
Working outdoors	Cold stress	 Provide shelter (enclosed, heated environment) to protect personnel during rest periods. Educate workers to recognize the symptoms of frostbite and hypothermia. Use appropriate cold-weather gear. Consider additional precautions if working near water in cold weather. Have a dry change of clothing available. Train workers to recognize the symptoms of cold-related illness. 	 Review weather forecast prior to field work. Monitor workers' physical conditions and PPE. Monitor outside and water temperature versus worker activity and PPE.
	Rain or snow	 Wear appropriate PPE (rain gear). Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. If extremely cold conditions are forecast, consider additional precautions or postponing work activity. 	 Review weather forecast prior to field work. Inspect PPE daily prior to use. Routinely inspect work area for deteriorating conditions.





Groundwater Sampling

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Sunshine	 Have abundant water available to prevent dehydration. Consider wearing wide-brimmed headwear and light-colored, lightweight, sunblocking clothing. 	•
	Lightning	 Do not begin or continue work until lightning subsides for at least 30 minutes. Disconnect and do not use or touch electronic equipment. Immediately head for shore if on the water and lightning is observed. If not able to get to shore, disconnect and do not use or touch the major electronic equipment, including the radio, throughout the duration of the storm. 	Obtain weather forecast and updates as needed.
	High winds	Wear goggles or safety glasses if dust or debris are visible.	 Review weather forecast prior to field work. Ensure that goggles or safety glasses are available.

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- If boating is involved, and a professional captained vessel is not in use, boat operators must take the appropriate state boater safety courses.
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.





Decontamination Activities

Project Name:	Project Number:	JSA Number:	Issue Date:
Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570	E10921-02.05	003	1/28/2022
Location:	Contractor:	Analysis by:	Analysis Date:
New Rochelle, New York	Anchor QEA, LLC	Pia Tapiawala	1/28/2022
Work Operation:	Superintendent/Competent Person:	Revised by:	Revised Date:
Decontamination activities	Scott Andrews		
Required Personal Protective Equipment (PPE):		Reviewed by:	Reviewed by:
High-visibility safety vest		Matthew Cavas, PG	
 Hard hat where overhead hazards and/or heavy equipment are present U.S. Coast Guard-approved personal flotation device (PFD), if boating (see cold stress section for cold-weather PFD information) 		Approved by: Fill in	Approved Date: Fill in

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
If boating		Follow the Job Safety Analysis (JSA) for boating activities.	
Decontamination area set up	Vehicle, heavy equipment traffic, or boat traffic in work area	 Wear high-visibility safety vest and hard hat PPE. Be alert when working around heavy equipment and/or other boats, especially if wearing hearing protection. 	Ensure that safety vests are available for staff and visitors.
	Muscle strain or injuries from improper lifting	 Use proper lifting techniques or ask for assistance with heavy objects. If boating, avoid carrying objects directly onto or off of the boat; rather, load/unload objects while on the boat to/from the pier/shore. 	Evaluate weight and center of gravity of heavier items prior to lifting or moving.
	Biological hazards (flora [e.g., poison ivy, and poison oak] and fauna [e.g., ticks, bees, spiders, mosquitoes, and snakes])	 Be aware of likely biological hazards in the work area. Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, boots, and Tyvek coveralls, as appropriate), and apply insect repellent. Wear hand and arm protection when clearing plants or debris from the work area. 	 Ensure that insect repellent is available. Inspect clothing and skin for insects (e.g., ticks) after working in insect-prone areas.



Decontamination Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Decontamination activities	Injury from hand and power tool operation (e.g., spatula or drill)	 Be aware of sharp edges on hand tools (e.g., spatulas, knives, drill bits, and saw blades). Be aware of electrical connections and water hazards when working with electric- or battery-operated tools. Ensure that all tools are working properly; repair or replace defective tools. Repair when unplugged and off. Keep guards on power tools when not in use. 	 Inspect tools to ensure that they are in good working order. Inspect electrical connections (if applicable). Inspect tools periodically to ensure dry and clean operation.
	Noise exposure	• Wear hearing protection in high noise environments or when working around heavy machinery or equipment (action level of 85 decibels averaged over an 8-hour day).	 Ensure that hearing protection is available.
	Slips, trips, and falls	 Avoid walking while writing or texting—maintain a heads-up posture. Be aware of potentially slippery surfaces and tripping hazards. Use handrails where available. Wear footwear that has sufficient traction. Maintain good housekeeping practices. Clean up all spills immediately. Be aware of weather effects on the work area, including wet and/or frozen ground. Jumping, running, and horseplay are prohibited. Keep all areas clean and free of debris to prevent any trips and falls. Notify the field team members of any unsafe conditions. 	Routinely inspect work area for unsafe conditions.
	Ingestion of contaminants or decontamination fluids, or skin or eye contact with contaminants or decontamination fluids	 Wear appropriate PPE to prevent/reduce exposure. Contact 911, as necessary; perform CPR if breathing stops. Move exposed person away from source of contamination, and rinse mouth. If exposure to skin occurs, promptly wash contaminated skin using soap or mild detergent and water. Rinse eyes with large amounts of water. Follow decontamination procedures as outlined in the Health and Safety Plan (HASP). 	 Ensure that decontamination procedures are on hand and are reviewed. Ensure that PPE and rinsing water are available.
Working outdoors	Heat stress	 Adjust work schedules, as necessary, to avoid the hottest part of the day. Take rest breaks as warranted. Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. Maintain body fluids at normal levels. Train workers to recognize the symptoms of heat-related illness. 	 Review weather forecast prior to field work. Monitor workers' physical conditions. Monitor outside temperature versus worker activity.



Decontamination Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working outdoors (continued)	Cold stress	 Provide shelter (enclosed, heated environment) to protect personnel during rest periods. Educate workers to recognize the symptoms of frostbite and hypothermia. Use appropriate cold-weather gear, up to and including Mustang-type bib coveralls or jacket/bib combinations. Consider additional precautions if working near water in cold weather. Have a dry change of clothing available. Train workers to recognize the symptoms of cold-related illness. 	 Review weather forecast prior to field work. Monitor workers' physical conditions and PPE. Monitor outside and water temperature versus worker activity and PPE.
	Rain or snow	 Wear appropriate PPE (rain gear). Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. If extremely cold conditions are forecast, consider additional precautions or postponing work activity. 	 Review weather forecast prior to field work. Inspect PPE daily prior to use. Routinely inspect work area for deteriorating conditions.
	Sunshine	 Have sunscreen available for ultraviolet protection. Have abundant water available to prevent dehydration. Consider wearing wide-brimmed headwear and light-colored, lightweight, sunblocking clothing. 	Ensure that sunscreen and water are available.
	Lightning	Do not begin or continue work until lightning subsides for at least 30 minutes. Disconnect and do not use or touch electronic equipment.	Obtain weather forecast and updates as needed.
	High winds	Wear goggles or safety glasses if dust or debris are visible.	 Review weather forecast prior to field work. Ensure that goggles or safety glasses are available.

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).





Decontamination Activities

- If boating is involved, and a professional captained vessel is not in use, boat operators must take the appropriate state or provincial boater safety courses.
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.



Project Name:	Project Number:	JSA Number:	Issue Date:
Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570	E10921-02.05	004	1/28/2022
Location:	Contractor:	Analysis by:	Analysis Date:
New Rochelle, New York	Anchor QEA, LLC	Pia Tapiawala	1/28/2022
Work Operation:	Superintendent/Competent Person:	Revised by:	Revised Date:
Anchor QEA motor vehicle operation	Vehicle Driver		
Required Personal Protective Equipment (PPE):		Reviewed by:	Reviewed Date:
Wear seat belt at all times		Matthew Cavas, PG	
Make sure that clothing will not interfere with driving		Approved by:	Approved Date:

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Anchor QEA motor vehicle operation	Unfamiliar with the vehicle	 Allow yourself some time to get familiar with an Anchor QEA vehicle, a rental vehicle, or one not used often. Test the lights, windshield wipers, hazard lights, horn, parking brake, and other important functions. Review the dashboard controls, steering radius, and overhead and side clearances. Allow extra side, front, and back space around the vehicle while driving or parking an unfamiliar vehicle. Adjust mirrors and the seat while the vehicle is in park. Drive slowly in confined locations, as in a parking garage, parking lots, or industrial settings. Confirm adequate clearances by sight before turning or backing up in tight or unfamiliar locations. Use a second person to be a spotter outside the vehicle if needed in tight spaces. 	 Inspect fluid levels and air pressure in tires, adjust mirrors and seat positions appropriately, monitor the fuel level, and fill up when the fuel level is low



Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Speed and braking	 Fasten and properly adjust the seat belt. Obey all posted and designated speed limits. Radar detectors are prohibited in all company-owned, leased, or rented vehicles. Reduce travel speed during hazardous conditions (e.g., rain, fog, or snow). Identify whether your vehicle has Anti-Lock Brakes (ABS). If it does, DO NOT pump the brakes to stop when the vehicle has begun to skid. Apply steady pressure to the brakes. If the vehicle does not have ABS, pump the brakes to stop during slippery conditions. 	 Seatbelt Identify designated speed limits Determine if vehicle has ABS
Anchor QEA motor vehicle operation (continued) • Continually check your rear and side view mirrors. • Use the 3-second rule to keep a safe distance between vehicles. • Increase the 3-second rule as necessary during hazardous travel core. • Regularly scan the area you will be entering in the next 10 to 12 second rule as necessary during hazardous travel core. • Always leave yourself an "out" during travel. • When stopping, make sure that you leave enough distance between front of you. You should be able to see the rear tires of the vehicle in stopped. • Obey the speed limit and traffic regulations. • When at a red light and it turns green, use the "delayed start" techn to three before you take your foot off the brake.	 Use the 3-second rule to keep a safe distance between vehicles. Increase the 3-second rule as necessary during hazardous travel conditions. Regularly scan the area you will be entering in the next 10 to 12 seconds. Always leave yourself an "out" during travel. When stopping, make sure that you leave enough distance between you and the car in front of you. You should be able to see the rear tires of the vehicle in front when stopped. Obey the speed limit and traffic regulations. When at a red light and it turns green, use the "delayed start" technique, by counting 	• Seatbelt	
	Skids	 If the vehicle has begun to skid out of control, turn the steering wheel in the direction of the skid and re-adjust the wheel, as necessary. Reduce speed during hazardous travel conditions. Use 4-wheel drive, if available, when driving vehicles off-road, on steep inclines, or in muddy conditions. Do not take vehicles off-road if they cannot be operated safely in such conditions. 	Seatbelt
	Blind spots	 Become familiar with any blind spots associated with your vehicle. Adjust mirrors to give the maximum viewing area. Use your directional devices to signal all turns and when changing lanes; check rear and side view mirror and glance over your shoulder to check that the lane is clear. Avoid other driver's blind spots; slow down and let the other vehicle pass. If parked for an extended period and staying in the vehicle, be sure to inspect the area for changed conditions (e.g., a car that moved in behind you) before leaving. 	SeatbeltMirrors





Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Backing	 Back into parking spaces upon arrival whenever possible. Perform a 360-degree walk around the vehicle before backing to identify any new conditions or obstructions. Use a spotter when backing whenever possible. Understand hand signals. Sound the horn prior to backing. Check the rear and side view mirrors prior to backing. Back slowly in areas of obstructed vision. Anticipate others who may be backing out into your pathway and adjust accordingly. 	SeatbeltMirrors
Anchor QEA motor vehicle operation (continued)	Distractions (e.g., cell phones, reading maps or directions, eating)	 Do not engage in distracted driving—focus on operating the vehicle, and on your surroundings (e.g., road conditions and other drivers). Obey state or local laws regarding cell phone use, at a minimum. Certain clients prohibit cell phone use regardless of the state you are operating in—know your client's policy. Use hands-free devices (not hand-held cellular phones) while driving. Pull over to the side of the road when making a call or checking directions. 	 Seatbelt Hands-free devices connected and ready for use
	Accidents	 In the event of an accident, use the following procedures: Stop, call for medical assistance, notify police, and complete an accident report and submit it to your supervisor. Notify the Project Manager (PM) and Field Lead (FL). Complete the appropriate incident investigation reports. Contact Sara Weiskotten, Operations Liaison, at (857) 445-4987. Contact Diana Reynolds, Insurance Liaison, at (302) 236-8403. 	Seatbelt
	Influenced by drugs or alcohol	 NEVER DRIVE UNDER THE INFLUENCE OF DRUGS OR ALCOHOL. Keep in mind that the person in another vehicle may be under the influence of controlled substances, and be prepared for erratic or sudden driving changes on their part. 	Seatbelt
	Driver attitude	 Do not operate any vehicle when abnormally tired, temporarily disabled (i.e., injured), or under the influence of drugs or alcohol. Keep an even temper when driving. Do not let the actions of others affect your attitude. Do not allow yourself to become frustrated, rushed, distracted, or drowsy. 	Seatbelt





Anchor QEA Motor Vehicle Operation

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Fatigue	 Stop and rest if fatigued. Exit the road and enter a safe area. Rest until fully refreshed. Be aware that certain medications (such as cold or allergy medicines) may make you drowsy when driving a vehicle. 	Seatbelt
	Vehicle loading	 DO NOT OVERLOAD the vehicle. Secure all equipment and supplies within the body of the vehicle using proper tiedowns. Do not block side view mirrors with the load. Do not transport U.S. Department of Transportation (DOT)-manifested hazardous materials. Dispatch all equipment and personnel with proper forms and identification. 	Seatbelt
Anchor QEA motor vehicle operation (continued)	Equipment failure	 Perform daily inspections of your vehicle. Maintain vehicle safety equipment (e.g., mirrors, alarms, horns, wipers, lights, and brakes). Maintain the vehicle (e.g., tire pressure and fluid levels). Any vehicle with mechanical defects that may endanger the safety of the driver, passengers, or the public shall not be used. Ensure that appropriate safety equipment is in the vehicle. Safety equipment should include a spare tire, jack, first-aid kit, fire extinguisher, and flashlight. Flares and/or reflective triangles should be available in larger trucks. Ensure that the proper documentation is in the vehicle. Documentation should include an operations manual for the vehicle, insurance card, vehicle registration, and accident forms. 	Inspect and maintain the vehicle

Training Requirements:

- All drivers are required to have a valid driver's license, and all vehicles must have appropriate state vehicle registration and inspection stickers. The use of hand-held wireless devices is prohibited while driving any vehicle for business use at any time, for personal use during business hours, and as defined by law.
- If operating a vehicle or vehicle and trailer with a capacity greater than 10,000 pounds, U.S. Department of Transportation regulations may apply. Contact the PM prior to any travel in this configuration.





- All assigned employees are required to read, familiarize themselves with the contents of this Job Safety Analysis, and sign the signature page before the operation of an Anchor QEA vehicle, and review it with their supervisor during their daily safety meeting.
- All assigned employees are required to enroll and complete the Smith System Virtual Driving training programs (*Distracted Driving* and *Small Vehicle Forward Five Keys to Safe Driving*) prior to driving an Anchor QEA vehicle.



Anchor QEA Motor Vehicle Operation

Vehicle Operation Job Safety Analysis Acknowledgement Form

The Anchor QEA Motor Vehicle Operation Job Safety Analysis must be read, understood, and signed before the operation of any Anchor QEA vehicle. My signature below certifies that I have read and understand the procedures presented in the Anchor QEA Motor Vehicle Operation Job Safety Analysis and have completed the Smith System Virtual Driving Distracted Driving and Small Vehicle Forward - Five Keys to Safe Driving training programs.

Date	Name (print)	Signature



Date	Name (print)	Signature



Sample and Laboratory Glassware Handling

Project Name:	Project Number:	JSA Number:	Issue Date:
Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570	E10921-02.05	005	1/28/2022
Location:	Contractor:	Analysis by:	Analysis Date:
New Rochelle, New York	Anchor QEA, LLC	Pia Tapiawala	1/28/2022
Work Operation:	Superintendent/Competent Person:	Revised by:	Revised Date:
Sample and laboratory glassware handling	Scott Andrews		
Required Personal Protective Equipment (PPE):		Reviewed by:	Reviewed Date:
 Modified Level D—Long pants, long sleeve 	3	Matthew Cavas, PG	
 ASTM International (ASTM) F2412-05/ASTM F2413-05 Depending on activity, the following PPE may also be required: safety glasses/splash goggles, hard hat, nitrile outer gloves and latex inner gloves, and, if boating, U.S. Coast Guard-approved personal flotation device (PFD) 		Approved by: Fill in	Approved Date: Fill in

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Transporting and using glassware	Breakage of containers during field activities	 Use appropriately sized tubs or bottle carriers with dividers to prevent bottle-to-bottle contact during transport. Consider using coated glassware, if practicable. Carry oversize bottles in tubs or bottle carriers using both hands during transfer to the sampling vessel and whenever the vessel is underway. 	Ensure dividers are sufficient and will remain in place during transport.
	Faulty glassware	Replace any glassware that is chipped, nicked, or cracked.	• Inspect glassware before use.
	Impact with equipment and other objects	 Use care when loading and unloading sampling equipment. Minimize the handling of individual containers to the extent possible. 	
Filling sample containers	Over-tightening of bottle lids causing breakage	 Avoid use of excessive force to tighten bottle caps (i.e., finger tight). Secure lids with clear tape to prevent opening during transport. 	
	Breakage during sample collection	 Place containers in plastic tubs between aliquots to limit contact with hard surfaces. Place containers on a stable and non-slip surface during collection. Use the buddy system as needed to hold bottles during filling. 	





Sample and Laboratory Glassware Handling

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Filling sample containers (continued)	Contact with sample preservatives (generally HCL or H ₂ SO ₄ to lower pH to less than 2)	 Wear nitrile gloves and protective eyewear to prevent skin and eye contact if a container is damaged. Do not open preserved bottles until necessary. 	
Packing samples for shipment	Breakage during packing and shipment	 Use bottle wraps, foam sleeves, or bubble wrap to prevent bottle contact in the cooler. Pack coolers snugly, but do not over pack. 	Ensure glass bottles do not touch to minimize potential breakage during transport.

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including, but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.



Attachment E
Consolidated Edison Corporate
Environmental Health and Safety
Procedures

CORPORATE ENVIRONMENTAL, HEALTH AND SAFETY PROCEDURE

CEHSP A32.00 – Rules We Live By Revision Date: 03/18/2021 Effective Date: 5/20/2021

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RULES WE LIVE BY TABLE

1.0 PURPOSE

This procedure establishes a consistent approach to communicating and reinforcing the importance of following critical safety work practices designed to protect employees, contractors, and the public.

2.0 APPLICABILITY

This Environmental, Health and Safety Procedure (CEHSP) applies to all Con Edison employees (management and union) and contractor employees working for Con Edison.

3.0 INTRODUCTION

There are safety and operational procedures specifically designed to protect against the potential for significant injury due to energy (e.g., electricity, gas, steam, or falling from elevation) that must be controlled. Operating groups that work with such sources of energy have identified Rules We Live By. These rules are defined as a work procedure or safety requirement that, if not followed, could result in a severe injury or fatality, or place other individuals (employees or members of the public) at significant risk. At The Learning Center, the RWLB associated with a given activity of an operating department apply.

4.0 COMPLIANCE REQUIREMENTS

4.1 RULES WE LIVE BY IDENTIFICATION, TRAINING, AND REPORTING

4.1.1 IDENTIFICATION

Where work tasks require the safe control of energy sources such as electricity, gas, steam, or work at elevation, the operating organization must identify key procedures required to control or mitigate the effect or impact to the employee, fellow employees, contractor employees or the public. Lessons learned from previous incidents must be considered in the identification process.

An organization must notify EH&S, Health and Safety, of any change to a Rule.

4.1.2 TRAINING AND COMMUNICATION

An organization's Rules We Live By and associated procedures must be reinforced in applicable skills training.

Each employee in the organization must receive OJT training on the Rules We Live By identified by the organization.

Rules We Live By must be reinforced, as applicable, in job briefings.

Rules We Live By must be incorporated into the scope of safety field observations and inspections.

Where contractor work practices involve Rules We Live By, contractor employees will be trained on the applicable Rules We Live By, reporting procedure, and consequences. The operating organization must communicate the applicable Rules to contractor management and ensure the Rules are incorporated in the eHASP. The contractor supervisor will be required to train their affected employees and subcontractor employees before they begin work.

4.1.3 REPORTING AND INVESTIGATION

If a supervisor observes a Rule We Live By being violated, or is notified of a potential violation, the work task involved in the observation must be stopped immediately.

If an employee, not a supervisor, believes a Rule We Live By may have been violated, he/she must stop the work task involved in the observation immediately and report the situation to the supervisor of the employee who committed the alleged violation.

The Operating Supervisor must contact the EH&S representative to obtain assistance in resolving the alleged violation. The EH&S representative will respond in person to the location of the alleged violation.

- The EH&S representative will act as the authority (expert) related to health, safety, and environmental rules, regulations, and procedures and will decide the merits of the alleged violation or contact a Subject Matter Expert (SME) from other areas of the company, including Engineering, EH&S, or Operations.
- In general, the number of people involved in the investigation should be kept to the
 minimum required to resolve the issue. The employee who observed the alleged violation
 should be included in the discussions to the extent necessary to ensure there is a clear
 understanding of the facts involved.
- Once the EH&S representative understands all the issues involved in the alleged violation, a determination of the validity of the violation shall be made. The EH&S representative's determination is final.
- If the EH&S representative cannot be reached, the job cannot continue until EH&S has addressed the issue. The EH&S Control Desk can be contacted to reach another EH&S representative who can respond to the location to resolve the alleged violation.

 A close-out discussion with all parties involved, led by the EH&S representative, must be to ensure good three-way communication and understanding of the determination.

4.2 VIOLATION OF A RULE WE LIVE BY

A violation of a Rule We Live By will result in significant consequences.

Any employee who witnesses a violation of a Rule We Live By and does not stop the work as noted in Section 4.1.3 and report the violation will also be considered to have violated the Rule.

A violation by a contractor company or by a sub-contractor must be reported via an action line by the operating organization with contractor oversight.

The organization must notify EH&S after action has been taken as a result of the violation.

4.3 DEFINITIONS

Con Edison employee: This includes all management and union employees.

Contractor employee: This includes all per-diem contractor employees and those employees working for a contractor company hired by Con Edison.

REVISION HISTORY

Revision Date	Revision #	Summary of Change	<u>Author</u>
1/21/14	2013 Annual Review	CEHSP A32.00.01 RWLB - Table: Permits, Electric Ops – Added language to clarify that entry for work in structures containing d-faulted feeders is permissible after associated source equipment has been de-energized.	G. Slintak
4/23/14	2013, Revision 1	CEHSP A32.00.01 RWLB - Table: Adjusted high hazard PPE rule as applied to Gas Operations in response to 4/22 request. Change clarifies the attachment point for use of PPE (previously associated with "blowing gas," a subjective term).	G. Slintak
5/16/14	Combined 'CEHSP A32.00 – Rules We Live By' and 'CEHSP A32.00.01 – Rules We Live By Table' into one document. The table will be an attachment to the procedure.		S. Ng
12/31/14	2014 Annual Review Rev. 3	Edits to reflect organization changes. Minor changes to clarify rules.	W. Capune
12/21/15	2015 Annual Review Rev. 4	Edits to reflect organizational changes in Shared Services. Customer Operations adopted the same language as Electric Operations for High Hazard PPE.	W. Capune
04/06/18	Annual Review Rev. 5	No changes requested. Removed the year (2016) from the RWLB Table. Additional editorial comments added by G.Slintak.	W. Capune
03/18/21	6	Removed reference to the Time Out procedure and outlined the determination process	McFarland

RULES WE LIVE BY

Hazard	Electric Operations	Central Operations	Gas Operations	Customer Operations	Utility Shared Services
Verify Dead/Lockout-Tag Out	Properly test or spear to ensure that electric equipment, cable, or wire is "dead" as required regardless of voltage, before beginning dead work activities.	Properly test or verify that equipment is de-energized, isolated and protected prior to initiating dead work activities.			Properly lock out/tag out equipment before beginning work on the equipment. (when not intentionally live and PPE is required)
Permits (Operating, D-faults)	Enter D-Fault tagged structures only when authorized by the operating authority to perform feeder processing, or to perform work after all D-faults have been identified and de-energized.	 Only perform work that is within the authorized scope of work as listed on the work permit. Do not change the status of a piece of equipment that has a Stop Tag applied to it. Follow the sequence of an operating order. 		Do not enter a structure that has been classified and tagged as a D-fault.	Only perform work that is within the authorized scope of work as listed on the work permit
Atmospheric Testing	 Perform air monitoring and ventilate as required for entry and work in an enclosed space or a permit-required confined space. For excavations greater than 4 feet in depth the atmosphere shall be tested prior to entry or when the excavation is not already occupied. 	 Perform air monitoring and ventilate as required for entry and work in an enclosed space or a permit-required confined space. For excavations greater than 4 feet in depth the atmosphere shall be tested prior to entry or when the excavation is not already occupied. 	 Perform air monitoring and ventilate as required for entry and work in an enclosed space or a permit-required confined space. For excavations greater than 4 feet in depth the atmosphere shall be tested prior to entry or when the excavation is not already occupied. 	Perform air monitoring and ventilate as required for entry and work in an enclosed space or a permit-required confined space.	Perform air monitoring and ventilate as required for entry and work in an enclosed space or a permit-required confined space.
Rescue/Retrieval	Entrant and attendant are required to wear rescue harness when working in enclosed spaces.	Entrant and attendant are required to wear rescue harness when working in enclosed spaces.	Entrant and attendant working in enclosed spaces shall wear rescue harnesses, when required.	Entrant and attendant are required to wear rescue harness when working in enclosed spaces.	Entrant and attendant are required to wear rescue harness when working in enclosed spaces
High Hazard Energy PPE	 Use fall protection equipment as required. Use appropriate rubber gloves with protective gauntlets, rubber sleeves, fire retardant clothing and eye/protection face shield as required for the electrical hazard. 	 Use fall protection equipment as required. Use appropriate rubber gloves, rubber sleeves, fire retardant clothing, and eye protection/face shield as required for the electrical hazard. In Steam Distribution, use appropriate water resistant coveralls and face shields before disconnecting any piping from the dead side of the trap valve up to and including the trap inlet valves and trap bypass valve. These coveralls and face shields must be worn until all piping is reconnected. 	 Use fall protection equipment as required. Wear airline respirator, FR coveralls, Fr hood & FR gloves or liners as required by IP-42 	 Use fall protection equipment as required. Use appropriate rubber gloves with protective gauntlets, rubber sleeves, fire retardant clothing, and eye protection/face shield as required for electrical hazard. Do not come into contact or move a downed or low hanging utility wire while performing Site Safety or Damage Assessment work. 	Use fall protection equipment as required Use the appropriate rubber gloves, rubber sleeves, fire retardant clothing, and eye protection/face shield as required for the electrical hazard
Sheeting/Shoring		Ensure that excavations five feet or deeper are properly sheeted and shored before anyone enters.	Ensure that excavations five feet or deeper are properly sheeted and shored before anyone enters.	V	
Gas Piping Integrity Test			Perform an integrity test before a customer turn-on.	Perform an integrity test before a customer turn-on.	
Securing Loads			222.00110110111011		Reels over 5,000lbs (individually or when bundled together) are secured per NYS Metal Coil requirements

RULES WE LIVE BY

Attachment F COVID-19 Management Plan



Date: February 2022

Project No: E10921-01.01

Project Name: Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570

In response to the global situation regarding Coronavirus Disease 2019 (COVID-19), Anchor QEA, PLLC, has compiled the following guidance to support our ongoing field efforts, whether sediment sampling efforts, wetland delineations, groundwater evaluation, site visits, or construction management. Anchor QEA strongly encourages all staff to be fully vaccinated when they are eligible in the location where they reside. Anchor QEA also requests that, while not required, staff upload a record of their vaccination into the WorkCare screening portal.

This Field Program COVID-19 Management Plan (Plan) is an addendum to the existing project-specific Health and Safety Plan (HASP) for field activities and shall remain a portion of the HASP until superseded by other notification. All personnel who have previously signed acknowledging the HASP must sign off acknowledging this Plan. Acknowledgement of this Plan will be included with future acknowledgements of the overall HASP.

We must keep in mind that our underlying social distancing requirements and responsibilities are the foundation of all our activities. Do not come to work if you are feeling sick, and contact your Manager immediately if you have symptoms consistent with COVID-19, have tested positive for COVID-19, and/or suspect you have been exposed. We also need to be cognizant of changing state and local orders and directives (or removal of restrictions) associated with COVID-19. Specific field efforts will require discussions between the Project Manager, field staff, and client to address availability, travel, and other considerations. If necessary, specific state, local, or project-specific orders and directives can be included with this Plan after review by Health and Safety.

- 1. Field programs will follow this Field Program COVID-19 Management Plan unless the client, prime contractor, federal, state, or local government establish more restrictive measures, in which case the more restrictive measures will be followed.
- 2. For projects that do not have an established daily screening, the WorkCare screening portal is to be used.
- 3. Updated information can be found at the U.S. Centers for Disease Control and Prevention (CDC) website (https://www.cdc.gov/), as well as state and local health agency websites.
- 4. Staff traveling to certain locations may need to comply with specific testing or vaccination requirements. The company will coordinate with staff as appropriate to meet these requirements, realizing that staff selection for a specific project may be determined by these factors.
- 5. Nationwide, our community defense is to slow the spread of COVID-19, which may include not traveling between impacted areas and less impacted areas. Therefore, we will evaluate limiting

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travel for field work on a case-by-case basis consistent with this community defense approach and following appropriate national, state, and local guidance. We expect that this situation will be fluid as conditions change in the country.

6. Field project schedules, modifications, and regulatory requirements will be discussed with the client representatives.

The objective of this Plan is to provide additional operational guidelines to the team that address the challenges presented by COVID-19 and ensure consistency in our response actions across the project team. These guidelines are consistent with and based on recommendations from the CDC, with multiple links provided throughout. All personnel have Stop Work Authority. If you should have questions or concerns, please direct those to your Field Lead, Staff Manager, or Project Manager.

Some site owners or prime contractors may conduct temperature screening prior to entering a site, which is in accordance with some current guidance. Some site owners or prime contractors may want to record actual temperature readings, test results, or information other than general yes or no questions related to travel, symptoms, vaccination status, etc. If you choose not to participate in the recording of screening information, the site owner or prime contractor may not allow you to access the site. You should immediately contact your Field Lead, Staff Manager, or your Project Manager to discuss alternative work and available options.

The following describes minimum measures to be followed by the project team:

Prior to Coming to the Site

- Travel is allowed.
- Understand the community exposure and travel history of all staff. If a staff member has traveled to an affected country outside the United States or has had close contact with an infected individual within the United States, we require that they be cleared by WorkCare.
 - The following link provides the CDC list of countries with Travel Health Notices in Place: https://wwwnc.cdc.gov/travel/notices
 - The following link provides CDC information on cases within the United States: https://www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html
- If masks (i.e., N 95) are used, they should be used in accordance with OSHA 1910.120, stating, in part, that the user must be fit-tested and in a surveillance program.
- Prior to departing for the site, the Site Safety Officer should obtain enough supply of
 U.S. Environmental Protection Agency (EPA)-registered disinfectants, wipes, hand sanitizers,
 and gloves.
- Some projects may require temperature readings prior to entry to a project site. Anchor QEA supports privacy concerns, and if a temperature reading or vaccination status is recorded

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(vs. a green light/red light approach based on a temperature threshold) we will take steps to document the confidentiality of that information. However, in some cases Anchor QEA cannot control the procedure nor document confidentiality. In these situations, Anchor QEA staff will need to acknowledge that if they choose to not comply in the future that is their right. If a staff member chooses to not comply, the Project Manager, Regional Lead, and Human Resources should be consulted.

- Some projects may require procedures to document a 14-day look-back period that is absent of symptoms consistent with COVID-19.
- Staff should be self-isolated, as necessary, prior to coming to the site in accordance with current federal, state, and local orders. Any staff member who has been exposed to any household member (including healthcare professionals) exhibiting COVID-19 symptoms or has tested positive for COVID-19 will not report to the site for work unless they have met the guidelines contained in this Plan.
- Exposure to, or close contact with, means being within 6 feet of an individual for 15 minutes or greater in a 24-hour period or being exposed to their cough or sneeze.
- If you meet the criteria listed for Primary or Secondary Exposure, listed below, do not report to work; contact your Manager, contact the Health and Safety representatives, and stay home until the appropriate return to work criteria are met.
- Regardless of vaccination status, if staff feel that they are sick or showing symptoms,
 they are required to stay home and not report to work (office or field). They should call
 their Manager immediately and notify them that they are sick. Showing up to work with
 symptoms will result in the staff being asked to leave to avoid potentially exposing others to
 the virus.
- If staff are showing symptoms, they are to contact WorkCare and their healthcare provider for medical advice. If staff feel the need to visit a medical professional, it is recommended that the medical office be contacted first to determine when it is appropriate to visit.
- If staff show any symptoms while on site, they will be asked to leave and not return until they have been cleared by WorkCare. They may be requested submit a physician's note, by WorkCare, releasing them back to work. The exception to this would be if their primary physician recommends more restrictive measures.
 - https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html?CDC AA refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019
 -ncov%2Fspecific-groups%2Fguidance-business-response.html

Fully Vaccinated

The CDC defines "fully vaccinated" as greater than or equal to 2 weeks following the final dose in a two-dose series or following the initial dose in a single-dose vaccine.

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Anchor QEA will follow CDC and Occupational Safety and Health Administration (OSHA) recommendations regarding fully vaccinated staff being able to forgo the face covering and social distancing requirements both in the office and field. For field work, reference the latest version of this Plan. Fully vaccinated staff must comply with the following guidelines:

- Complete an acknowledgement in Bamboo regarding the updated requirements as well as
 consent to share with Project Managers, Field Leads, Office Leads, and Staff Managers (who
 have a need to know) information related to being fully vaccinated if that information has
 been in accordance with the updated requirements.
- Vaccination information is uploaded into the WorkCare portal. This is to help us meet various state requirements for the employer to determine if the staff member is fully vaccinated.
- Staff who are fully vaccinated, even if information is uploaded to WorkCare, may still use face coverings and follow social distancing if they desire.
- Out of respect, all staff will have face coverings available and fully vaccinated staff will use face coverings if requested by others in close contact situations.
- Fully vaccinated staff are not required to use face coverings or follow social distancing during meetings, meals, or other close contact situations unless requested.
- All staff will still be required to complete the WorkCare daily screening or other projectspecific screening.
- All laws, regulations, client requirements, field work requirements, building requirements, and other company requirements apply to all staff (e.g., air travel requirements).
- Fully vaccinated staff that have notified the company may sit together without social distancing or face coverings for meals.
- Food and beverages are allowed to be brought to the project site for sharing, if they are individually packaged.
- Travel is allowed to include sharing vehicles with others who are fully vaccinated.
- Staff must be considerate of others.
- If asymptomatic following close contact with a Primary Exposure, staff do not need to isolate but do need to follow up with WorkCare.

Staff are not required to obtain the vaccination or to notify the company if they have been vaccinated unless they wish to follow the above process. Fully vaccinated staff who have had close contact with a Primary Exposure or who have symptoms consistent with COVID-19 must be cleared to return to work following the processes outlined in the Case Response section below.

Not Fully Vaccinated

The CDC defines "fully vaccinated" as greater than or equal to 2 weeks following the final dose in a two-dose series or following the initial dose in a single-dose vaccine.

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Anchor QEA will follow CDC and OSHA recommendations for staff who are not fully vaccinated regarding face covering and social distancing requirements both in the office and field. For field work, reference the latest version of this Plan. Staff who are not fully vaccinated must comply with the following guidelines:

- All staff will still be required to complete the WorkCare daily screening or project-specific screening.
- All laws, regulations, client requirements, field work requirements, building requirements, and other company requirements apply to all staff (e.g., air travel requirements).
- Avoid close contact (i.e., handshakes or other physical contact) and practice social distancing (stay at least 6 feet away from others).
- Meetings are allowed; however, those who are not fully vaccinated must adhere to social distancing requirements.
- If there is a chance that an unvaccinated staff member might have close contact with someone, such as being within 6 feet of an individual for 15 minutes or greater in a 24-hour period, or being exposed to their cough or sneeze, the staff member must wear a face covering in accordance with CDC guidance.
- Common areas (i.e., kitchens, break areas, conference rooms, entryways, restrooms, and copier and printer stations) are to be avoided to the greatest extent possible and social distancing must be observed by those not fully vaccinated.
- The use of communal coffee pots, microwaves, refrigerators, and similar items are allowed.
- Food and beverages are allowed to be brought to the project site for sharing, if they are individually packaged.
- Travel is allowed.
- Travel is preferred to be in individual vehicles.
- Staff should wear cloth face coverings in public settings, in addition to social distancing measures, including travel to the site or office, grocery stores, and picking up to-go food.
- Avoid restaurants if open; use drive-in or take-out services.
- The CDC recommends wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies) especially in areas of significant community-based transmission.
- Staff must be considerate of others.

Staff are not required to obtain the vaccination or to notify the company if they have been vaccinated unless they wish to follow the process for fully vaccinated staff.

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Visitors

- Visitors are allowed but must complete a WorkCare visitor screening or project-specific screening. They additionally must sign an affirmation statement if they wish to forgo the face covering and social distancing requirements.
- Meetings with outside parties should take place virtually, when possible.
- Delivery personnel should not remain in indoor settings for longer than 15 minutes without completing the visitor screening.
- For visitors to forgo the face covering and social distancing requirement, they must attest that they are fully vaccinated when signing in.
- All laws, regulations, client requirements, field work requirements, building requirements, and other company requirements apply to all visitors (e.g., air travel requirements).

On-Site Preventative Measures and Cleaning Requirements

- All staff who work on the site will be required to undergo a site safety orientation (tailgate meeting), which will include information on specific measures to be followed to address efforts to prevent the spread of COVID-19. All field staff are required to vocalize concerns and ensure that protective measures that will slow the spread of COVID-19 are employed.
- Follow the site-specific HASP Personal Protective Equipment (PPE) requirements.
- One step to control spread of the virus at the project job site is focused on hygiene. All staff and management staff will follow CDC guidance regarding hand washing.
 - https://www.cdc.gov/handwashing/index.html
 - Hand wash stations and/or sanitizing wipes/sanitizing gel will be made readily available around the job site and within project office trailers. If these supplies are insufficient, work should be stopped until additional supplies are procured.
- Office trailers will also be cleaned at least twice a day using disinfectant to wipe all surfaces
 that may be touched by hand including desk and table surfaces. In addition, office trailer
 personnel (as directed by the Field Lead) will be responsible for multiple daily cleaning of the
 various field offices and related workspaces.
- Smart phones and radios should be wiped down frequently throughout the day and should
 not be shared to the greatest extent possible. If these items are shared, they are to be wiped
 down prior to handing off to another individual or placing in storage for the day.
- Field support areas, boats/vessels, and equipment cabs will be cleaned throughout the day and at every shift change. All "touch" surfaces will be thoroughly wiped clean using a disinfectant.
- Staff should follow published guidance to limit transmission at home and outside of work: https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-prevent-spread.html

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- The following links provide a list of U.S. Environmental Protection Agency recommended cleaning products able to kill the virus, as well as some initial guidance with alternatives if supplies run out. "Note: Inclusion on this list does not constitute an endorsement by EPA. Additional disinfectants may meet the criteria for use against SARS-CoV-2. EPA will update this list with additional products as needed."
 - https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2
 - If these products are not available, then either a diluted bleach solution or 70% alcohol solution will work.
 - https://www.cdc.gov/coronavirus/2019-ncov/community/home/cleaningdisinfection.html
- If a staff member becomes ill while on site, they should return to their hotel room or local home, contact their healthcare provider, and follow their guidance. The staff member's Manager should be contacted immediately. Our Health and Safety representatives will follow up with the staff member. If the staff member has a confirmed or presumed case as determined by a healthcare provider, we will follow our procedures as outlined in this document. If the staff member is not able to transport themselves, local emergency responders will be called as per company protocol.

Case Response, and Equipment and Facility Decontamination

According to the CDC, symptoms can appear 2 to 14 days after exposure. Symptoms or combinations of symptoms that may be consistent with COVID-19 include cough, shortness of breath, difficulty breathing, fever (100.4°F [37.8°C] or greater), chills, repeated shaking with chills, muscle pain or body aches, headache, sore throat, congestion or runny nose, nausea or vomiting, diarrhea, or new loss of taste or smell.

If you have symptoms that are consistent with COVID-19 but have not tested positive, regardless of what your primary physician concludes, you are to self-isolate until you have been released to return to work by WorkCare. Immediately contact your Regional Lead and Project Manager. WorkCare may ask you to submit a physician's note releasing you back to work. The exception to this would be if your primary physician recommends more restrictive measures. In this case there is no need to alert or self-isolate any other staff.

Regarding COVID-19 exposures, there are three general scenarios:

Primary Exposure: These are staff who have tested positive for the virus. If you have tested
positive for COVID-19, you must be in self-isolation and an effort will be made to contact
those people you had direct contact with in the last 14 days. You must not return to the work
site until you have been released to return by WorkCare. The exception to this would be if
your primary physician recommends more restrictive measures.

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- Secondary Exposure: These are staff who, within the last 14 days, have had direct contact with someone who has tested positive for COVID-19. You must self-isolate until released by WorkCare to return. You are encouraged to seek medical care. If you start to have symptoms or test positive, follow the appropriate guidance for Primary Exposure noted above.
- Tertiary Exposure: These are staff who have had direct contact with someone that meets Secondary Exposure criteria or have been in the same general area. In this scenario, there is no requirement to isolate; however, the staff should self-monitor for the development of symptoms.

In the event there is a documented case of a staff member becoming infected with COVID-19 (Primary Exposure) the field management team will take immediate action as follows:

- The staff member should immediately self-isolate until they have been released to return by WorkCare.
- Notify the Project Manager, Human Resources, and Regional Lead immediately.
- The staff member's work steps will be traced back 14 days to identify work areas the individual may have contacted. All identified areas will be isolated and marked off limits to all site personnel, until a decontamination process can be implemented.
- All identified areas will be disinfected by qualified individuals following CDC guidelines.
- Staff who came in direct contact with the individual will be notified. The Regional Lead will
 work with the Project Manager and Human Resources to notify the Anchor QEA staff who
 were identified.
- The Project Manager, in coordination with the client, will notify subcontractors and vendors on the site who had direct contact with the individual.
- The Project Manager should notify the client immediately and inform them of our backup staffing plan as well as our notification plan.
- Confidentiality for the staff member should be maintained.

If a staff member, within the last 14 days, has had direct contact with someone diagnosed with COVID-19 (Secondary Exposure), the field management team will take immediate action as follows:

- Send staff home immediately and have them coordinate with WorkCare for their return.
- Let the Regional Lead and Project Manager know immediately.
- Continue cleaning of common touch areas with recommended disinfectants.
- If staff tests positive, this becomes a Primary Exposure scenario, and that guidance should then be followed.

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Situations where a staff member may have had Tertiary Exposure are more difficult to manage. This involves having direct contact with someone who has had Secondary Exposure. In the event of Tertiary Exposure, the field management team will take immediate action as follows:

- Let the Regional Lead and Project Manager know immediately.
- No further notifications are necessary with this scenario.
- Continue cleaning of common touch areas with recommended disinfectants.
- This becomes a Secondary Exposure scenario if the acquaintance is confirmed to be infected, and that guidance should then be followed.

When staff are in self-isolation, their Manager or designee will follow up with them two times per week.

General Measures / Guidance

- Staff must follow the same prevention guidelines off site, which includes travel, hotel, and other activities, in order to address potential exposures outside the workplace.
- Travel, whether by train or plane, will be reviewed on a case-by-case basis. Mass transit should be avoided where social distancing is difficult.
- The virus may live on a variety of surfaces for some period of time; closely follow the cleaner/disinfectant contact time. Avoid combining products that are incompatible and may create toxic byproducts.
- When at hotels, disinfect your own room with EPA-registered cleaners or alternatives, and use the NO HOUSEKEEPING sign to minimize the people coming into your room.
- Catch coughs and sneezes with a disposable tissue, etc. and throw away, then wash hands. If tissues are not available, direct coughs and sneezes into elbow.
- Avoid touching your own mouth, nose, or eyes.
- Hand washing stations with soap and water will be available at all restroom facilities. Frequent
 hand washing is recommended throughout the day. Washing hands thoroughly for a
 minimum of 20 seconds with soap and water is one of the most effective ways to prevent the
 spread of germs. Personnel should wash their hands regularly, before and after going to the
 bathroom, before and after eating, and after coughing, sneezing, or blowing their nose.
- If soap and water are not available, use hand sanitizer with a minimum of 60% alcohol content.
- Anchor QEA will provide staff with face coverings that can be used for field projects and staff
 may also use their own face covering if they choose.
- Some projects, municipalities, counties, and states may implement additional requirements for the use of face coverings, gloves, or other items. Those requirements should be followed.

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- Time spent in large groups in enclosed spaces will be avoided. Potential alternatives could include phone conferences or holding meetings outside (i.e., field crew safety meetings). Field activities, whether inside or outside, should be planned to minimize staff density in that location.
- Avoid use of shared beverage containers (e.g., coffee pots, water coolers) or food setups (e.g., pizza, buffets). For instance, bring an individual water bottle.
- Work requiring several or more staff will need to be evaluated and a determination will need
 to be made on how the work can be done safely with a few staff, if at all. If the work cannot
 be conducted safely, then it may have to be rescheduled for a later time.
- Disinfecting wipes will be located throughout the site for wiping down hard surfaces as required. Alternatives, such as bleach/water solutions, may be used in addition to or in place of disinfecting wipes.
- The frequency and scope of the cleaning program for project facilities (office trailers, bathrooms, other buildings, and work areas) will be reviewed and increased, as necessary.
- Areas where staff eat should be a focus of cleaning efforts.
- Field team equipment operators, vessel operators, and vehicle drivers (whether Anchor QEA
 equipment or subconsultant equipment) will be provided with disinfecting wipes to clean the
 enclosed spaces daily. Emphasis should be on hard surfaces that are commonly touched
 (steering wheel, door handles, levers, buttons).
- Alternates for critical job functions should be available.
- All staff will have their own PPE and will not share with others. Respirators and PPE will be cleaned/disinfected when doffing, along with a thorough arm, hand, and face washing when exiting.
- All staff need to be vigilant regarding potential exposure and transmission of COVID-19.
 Avoiding any complications related to this outbreak will be a team effort as much as any safety or production concerns related to the project.





Project Number:

COVID-19 Management Plan Acknowledgement

ect Name:			_	
y signature below certifies that I have read and understand the policies and procedures speci is Field Program COVID-19 Management Plan.				
Date	Name (print)	Signature	Company	

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Appendix C Community Air Monitoring Plan

March 2022 Cedar Street Works Former Manufactured Gas Plant Site NYSDEC Site No. V00570



Appendix C Community Air Monitoring Plan

Prepared for

Consolidated Edison Company of New York, Inc. 3101 20th Avenue, Building 136, 2nd Floor Long Island City, New York 11105

Prepared by

Anchor QEA Engineering, PLLC 290 Elwood Davis Road, Suite 340 Liverpool, New York 13088

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ATTACHMENT

Attachment 1 New York State Department of Health Generic Community Air Monitoring Plan

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ABBREVIATIONS

μg/m³ micrograms per cubic meter
 Anchor QEA Engineering, PLLC
 CAMP Community Air Monitoring Plan

Con Edison Consolidated Edison Company of New York, Inc.

HASP Health and Safety Plan
MGP manufactured gas plant
NAPL nonaqueous phase liquid

NYSDEC New York State Department of Environmental Conservation

NYSDOH New York State Department of Health

OVA organic vapor analyzer

particulates total suspended particulates
PDI pre-design investigation
PID photoionization detector

PM10 particulate matter less than 10 microns in diameter

ppm parts per million

QEP Qualified Environmental Professional

Site Cedar Street Works former manufactured gas plant

VOC volatile organic compound

1 Introduction

This Community Air Monitoring Plan (CAMP) has been prepared to support performance of intrusive work at the location of the former manufactured gas plant (MGP) situated within Cedar Street and the parcel designated as Section 1, Block 247, Lot 15 (the parcel) on the Tax Map of the City of New Rochelle, County of Westchester (hereinafter referred to as the "Site") pursuant to the site-specific *Health and Safety Plan* (HASP).

The purpose of this CAMP is to describe real-time air monitoring for volatile organic compounds (VOCs) and particulates within and at the perimeter of any areas where intrusive activities are to occur. This CAMP includes monitoring requirements during intrusive activities, minimum requirements for dust and odor controls, air emission action levels, air monitoring procedures, a monitoring schedule, and data collection and reporting to be performed during and following the intrusive activities.

A Qualified Environmental Professional (QEP) is responsible for providing all labor, materials, and equipment necessary to implement the community air monitoring program specified herein. The QEP is ultimately responsible for confirming all corrective measures associated with the community air monitoring program (including the control of dust, vapors, and odors) are performed in accordance with this CAMP.

1.1 Overview of Intrusive Work Activities

Anchor QEA Engineering, PLLC (Anchor QEA), will complete pre-design investigation (PDI) activities at the Site. Locations and specifications for work to be completed are included in the *Pre-Design Investigation Work Plan*.

1.2 Potential Air Emissions Related to Intrusive Activities

As indicated in the New York State Department of Health (NYSDOH) Generic CAMP (Attachment 1), the following intrusive activities may be performed at the Site and have the potential to generate localized impacts to air quality:

- Installation of soil borings or monitoring wells
- Test pit excavation
- Installation of soil gas probes
- Groundwater monitoring
- Material handling (e.g., manipulation of excavated materials and/or investigation-derived waste to render them suitable for off-site treatment/disposal and loading materials for transport to the off-site treatment/disposal facility)
- Nonaqueous phase liquid (NAPL) gauging and recovery activities

2 Air Monitoring Procedures

The community air monitoring program is intended to be a discrete program that will operated in conjunction with the Exclusion Zone air monitoring program as defined by the site-specific HASP. The QEP will conduct real-time community air monitoring throughout the remedial construction. Monitoring will be conducted at representative locations around the perimeter of the Exclusion Zone for VOCs and total suspended particulates (particulates). However, particulate monitoring will not be performed during precipitation events. Additional information regarding the monitoring locations, equipment, and action levels is presented as follows.

CAMP Data including Site figure depicting daily work zones and locations of the CAMP monitoring stations will be collected daily and provided via email to the NYSDEC, DOH Project Managers and Consolidated Edison Company of New York, Inc. (Con Edison) on a daily basis. CAMP exceedances and corrective measures taken will be reported to the NYSDEC and NYSDOH Project Managers within one business day. A hard copy of the data will be maintained by the QEP.

Table 1
Community Air Monitoring Plan Contact List

Name/Title	Affiliation	Contact Information
Rachel Savarie, P.E. Project Manager	NYSDEC	Phone: 518-402-9717
Renata Ockerby Project Manager	NYSDOH	Phone: 518-402-7860
Melissa Abt Project Manager	Con Edison	Phone: 646-860-5143
Matthew Cavas, PG Qualified Environmental Professional	Anchor QEA Engineering, PLLC	Office: 518-886-0643 Mobile: 518-222-5486

2.1 Monitoring Location Selection and Deployment

VOC and particulate monitoring station locations will be determined daily based on data from the on-site meteorological monitoring station and the nature of the anticipated remediation activities. An upwind location for VOC and particulate monitoring will be selected at the start of each workday. One downwind (based on predominant wind direction) location for VOC and particulate monitoring will also be selected. In instances where work zone is in close proximity to an occupied building, an additional CAMP monitoring station will be located between the work zone and the building. The VOC and particulate monitoring stations will be deployed each day before the start of work activities. If wind direction shifts radically during the workday for an extended period of time, such that the upwind location and downwind locations no longer fall within acceptable guidelines (+/- 60°

compass change from the original wind direction), the monitoring stations will be relocated so the upwind and downwind positions are maintained throughout the duration of the workday. Air monitoring location changes will be documented in a field logbook.

2.2 Sampling Methods

Real-time monitoring for total VOCs and particulate matter less than 10 microns in diameter (PM10) will be conducted during intrusive activities at the Site. As required by the NYSDOH Generic CAMP (Attachment 1), VOCs will be monitored continuously during all intrusive and/or potential dust-generating activities (e.g., installation of erosion control measures, sheetpile installation, excavation, backfilling, soil mixing/stabilization, and material handling activities) using instrumentation equipped with electronic data-logging capabilities.

2.2.1 Total Volatile Organic Compounds

Total VOCs in ambient air will be monitored and recorded using a portable organic vapor analyzer (OVA) equipped with a photoionization detector (PID) with data-logging capabilities (MiniRae2000 or equivalent). The OVA-PID may be housed in a watertight shelter attached to a tripod and set to an appropriate height. All measurements should be made at a height of approximately 5 feet above the ground. Total VOC levels will be measured continuously, and a running average will be calculated and recorded every 15 minutes.

2.2.2 PM10 Monitoring

Real-time monitoring for particulates will be conducted during remedial activities at the Site. As required by the NYSDOH Generic CAMP (Attachment 1), real-time airborne particulate monitoring will be conducted continuously during all intrusive and/or potential dust-generating activities (e.g., installation of erosion and sediment control measures, sheetpile installation, excavation, backfilling, and material-handling activities) using instrumentation equipped with electronic data-logging capabilities. A real-time particulate monitor (MIE DataRAM PDR1000 or equivalent) will be used for particulate monitoring. The equipment will be equipped with an audible alarm to indicate exceedance of the action level.

In addition, fugitive dust migration will be visually assessed during all work activities. All average concentrations (calculated for continuous 15 minute increments [e.g., 08:00 to 08:15, 08:15 to 08:30]) and any instantaneous readings taken to assess appropriate course of action will be recorded using an electronic data logger and/or in the field logbook.

Fugitive dust migration will be visually assessed during all work activities, and reasonable dust-suppression techniques will be used during any Site activities that may generate fugitive dust.

2.3 Action Levels

The action levels provided in the following subsections will be used to initiate corrective actions, if necessary, based on real-time monitoring. Each piece of monitoring equipment will have alarm capabilities (audible and/or visual) to indicate exceedances of the action levels specified below.

2.3.1 Action Levels for Volatile Organic Compounds

As outlined in the NYSDOH Generic CAMP (Attachment 1), if the ambient air concentration for total VOCs exceeds 5.0 parts per million (ppm) above background (i.e., upwind location) for the 15 minute average, work activities will be temporarily halted while monitoring continues. If the total VOC concentrations readily decrease (through observation of instantaneous readings) below 5.0 ppm above background, then work activities can resume with continuous monitoring.

If the ambient air concentrations for total VOCs persist at levels in excess of 5.0 ppm above background but less than 25.0 ppm above background, work activities will be halted, the source of the elevated VOC concentrations identified, corrective actions undertaken to reduce or abate the emissions, and air monitoring will be continued. Once these actions have been implemented, work activities can resume provided the following two conditions are met:

- The 15-minute average VOC concentrations remain below 5.0 ppm above background.
- The VOC level 200 feet downwind of the monitoring location 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 5.0 ppm above background for the 15-minute average.

If the ambient air concentrations for total VOCs exceed 25.0 ppm above background, the work activities must cease, and emissions-control measures must be implemented.

2.3.2 Action Levels for PM10

The following PM10 action levels and responses, based on the NYSDOH generic CAMP, will be implemented during any intrusive activity that may generate emissions:

- If the average ambient air concentration of PM10 at any one (or more) of the sampling locations is noted at levels in excess of 100 micrograms per cubic meter (µg/m³) above the background (upwind location) for the 15-minute interval, or if airborne dust is observed leaving the work area, intrusive Site activities will be temporarily halted. The source of the elevated PM10 concentration is to be identified, corrective actions to reduce or abate the emissions will be undertaken, and air monitoring will continue. Work may continue following the implementation of dust-suppression techniques, provided the PM10 levels do not exceed 150 µg/m³ above background and no visible dust is migrating from the work area.
- If, after implementation of dust-suppression techniques, the PM10 levels are greater than 150 µg/m³ above background, work will stop and Site activities will be re-evaluated. Work will

only resume after dust-suppression measures and other controls are implemented, PM10 levels are less than 150 $\mu g/m^3$ above background, and no visible dust is migrating from the work area.

2.4 Emissions Control Measures

Air emissions-control measures will be implemented by a QEP (or person under their supervision) concurrently with any intrusive activities (as needed) to limit the potential for organic vapor and dust emissions or odors from the Site. Air emissions associated with excavation and backfilling, material handling and stockpiling, other intrusive activities, and certain non-intrusive activities (such as mobilization, transportation, and restoration activities) will be controlled as described below.

The following emissions-control measures may be used during these activities, depending on specific circumstances, visual observations, and air monitoring results:

- Apply water or BioSolve spray to exposed soil/material piles.
- Cover excavated material or excavation faces with polyethylene sheeting or other appropriate material.
- Minimize surface area of exposed material.
- Containerize excavation materials and soil.
- Apply vapor-suppression foam.
- Apply water on haul roads and/or staging areas, wet equipment, and spray water on earth-removal equipment buckets during dumping.
- Establish a vegetative cover immediately after placement of cover soil.

The QEP is required to mobilize BioSolve (or approved equivalent) and vapor-suppressant foam (including application equipment) to the Site prior to initiating intrusive activities and to maintain an adequate supply of such materials for the duration of such activities.

2.5 Meteorological Monitoring

Meteorological monitoring will be conducted continuously at the Site using a portable meteorological monitoring system. The meteorological monitoring system will be deployed at a location in accordance with siting criteria established by the U.S. Environmental Protection Agency and the New York State Department of Environmental Conservation (NYSDEC) for meteorological monitoring systems (*Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements* [USEPA 1989] and New York State Air Guide-19 – *Oversight of Private Air Monitoring Networks*, dated June 1989 [NYSDEC 1989]). Use of these guidelines enables the meteorological monitoring system to provide representative observations of the local meteorological conditions. Security and accessibility to the meteorological monitoring system will also be considered during the selection of the meteorological monitoring system location.

The meteorological monitoring system will monitor wind speed, wind direction, relative humidity, and ambient temperature. Wind direction and wind speed will be monitored and recorded at least once per hour during intrusive activities. Wind direction will be determined using a windsock, wind vane, multi-purpose wind meter, or other appropriate equipment. Wind speed will be determined using a handheld wind speed meter. Alternatively, Anchor QEA may use a multi-parameter meteorological monitoring system (such as a Met One station or equivalent).

2.6 Instrument Calibration

Calibration of the VOC, PM10, and meteorological monitoring instrumentation will be conducted in accordance with each of the equipment manufacturer's calibration and quality assurance requirements. The VOC and particulate monitors will be calibrated daily (at a minimum), and calibrations will be recorded in the field logbook.

3 Vapor Emission Response Plan

Anchor QEA will prepare a Vapor Emission Response Plan to be implemented for worker safety following an exceedance of the 15-minute average VOC concentration within the Exclusion Zone. Anchor QEA (and its subcontractors) will initiate engineering controls for employee safety.

If an exceedance of the 15-minute average VOC concentration of 5.0 ppm above background is measured at the perimeter of the Exclusion Zone, all intrusive activities will be stopped, and the following action will be taken:

- Continue total VOC monitoring within the Exclusion Zone and at the perimeter of the Exclusion Zone. If the total VOC level drops below 5.0 ppm above background, excavation activities can resume with the addition of engineering controls or modifications to the excavation process to minimize VOC emissions. However, if the VOC level persists above 5.0 ppm, based on continual observance of the total volatile organic analyzer, the contractor will immediately implement engineering controls such as misting the area with a vapor-suppression solution of BioSolve, covering the excavation, and backfilling, as needed, to reduce emissions and, at the same time, should notify NYSDEC and Con Edison.
- If after the implementation of additional engineering controls, the total VOC levels drop below 5.0 ppm (above background) within the Exclusion Zone and at the perimeter of the Exclusion Zone, the excavation activity can resume, provided process and work activities were adjusted to reduce emission levels
- If the total VOC levels continue to be greater than 5.0 ppm (above background) at the perimeter of the Exclusion Zone, all Site activities must be discontinued. When the work is shut down, downwind air monitoring as directed by Anchor QEA's QEP in consultation with the NYSDEC representative will be implemented to ensure the emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan (see Section 4).

The following primary engineering controls may be implemented to reduce emission levels:

- Adding a vapor-suppression solution of BioSolve to impacted media (application in excavated areas will be a light mist as to avoid increasing solubility of wastes leading to increased groundwater contamination)
- Limiting excavation size and the surface area of exposed contaminated soil

4 Major Vapor Emission Response Plan

If, after the cessation of the work activities and implementation of engineering controls, total VOC levels exceed 5.0 ppm (above background) at the perimeter of the Exclusion Zone (as defined by the site-specific HASP), then the following actions will be immediately taken:

- Cover the excavation with polyethylene sheeting or clean soil.
- Notify individuals on the CAMP contact list provided in Table 1 and the City Police Department at 911.
- Continue real-time VOC monitoring at the upwind, downwind, and nearest receptor until VOC levels drop below 5.0 ppm.
- If total VOC levels persist above the 5.0 ppm (above background), Anchor QEA's QEP,
 Con Edison, NYSDEC, and NYSDOH will consult with each other and the emergency response
 agencies to determine the appropriate actions to be implemented. Anchor QEA has ultimate
 authority during major vapor emission emergencies. Intrusive activities shall not be resumed
 until the NYSDEC approves the restart of work activities.

5 Monitoring Schedule and Data Collection and Reporting

The following identifies the monitoring schedule and data collection and reporting requirements.

5.1 Monitoring Schedule

Real-time VOC and PM10 monitoring will be performed continuously throughout the intrusive activities. VOC monitoring will also be performed during non-intrusive sampling-type activities (such as NAPL gauging and recovery). Wind direction and speed will be monitored and recorded at least once per hour during investigation activities.

5.2 Data Collection and Reporting

Air monitoring data will be collected continuously from VOC and PM10 monitors during intrusive (and non-intrusive) monitored activities by an electronic data-logging system. The data management software will be set up so instantaneous observed readings would be recorded by the electronic data acquisition system and averaged throughout 15-minute time periods. All readings will be recorded and provided via email to the NYSDEC and the DOH Project Managers on a daily basis. This will include a Site Figure depicting daily work zones and locations of CAMP monitoring stations.

6 References

NYSDEC (New York State Department of Environmental Conservation), 1989, New York State Air Guide-19 – Oversight of Private Air Monitoring Networks. June 1989.

USEPA, 1989. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements. Revised August 1989.

Attachment 1 New York State Department of Health Generic Community Air Monitoring Plan

Appendix 1A New York State Department of Health Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all <u>ground intrusive</u> activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during <u>non-intrusive</u> 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 might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

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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.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (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, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should 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.

- 1. 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 the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- 2. 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.
- 3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
- 4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

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.

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- 1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m³) 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/m³ above the upwind level and provided that no visible dust is migrating from the work area.
- 2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m³ 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/m³ of the upwind level and in preventing visible dust migration.
- 3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

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Appendix 1B **Fugitive Dust and Particulate Monitoring**

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

- Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.
- Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.
- Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:
 - (a) Objects to be measured: Dust, mists or aerosols;
 - (b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
- (c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
 - (d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
 - (e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
 - (f) Particle Size Range of Maximum Response: 0.1-10;
 - (g) Total Number of Data Points in Memory: 10,000;
- (h) Logged Data: Each data point with average concentration, time/date and data point number
- (i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
- Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
 - (k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
 - (l) Operating Temperature: -10 to 50° C (14 to 122° F);
- (m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.
- In order to ensure the validity of the fugitive dust measurements performed, there must be 4. appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.
 - The action level will be established at 150 ug/m3 (15 minutes average). While conservative, 5.

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

- 6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potentialsuch as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.
- The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:
 - (a) Applying water on haul roads:
 - (b) Wetting equipment and excavation faces;
 - (c) Spraying water on buckets during excavation and dumping;
 - (d) Hauling materials in properly tarped or watertight containers;
 - (e) Restricting vehicle speeds to 10 mph;
 - (f) Covering excavated areas and material after excavation activity ceases; and
 - (g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

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Appendix 1C DEC Permits Subject to Exemption

In accordance with section 1.10, exemptions from the following permit programs may be granted to the person responsible for conducting the remedial programs undertaken pursuant to section 1.2:

Air - Title 5 permits

Air - State permits

Air - Registrations

Ballast Discharge

Chemical Control

Coastal Erosion Hazard Areas

Construction of Hazardous Waste Management Facilities

Construction of Solid Waste Management Facilities

Dams

Excavation and Fill in Navigatable Waters (Article 15)

Flood Hazard Area Development

Freshwater Wetland

Hazardous Waste

Long Island Wells

Mined Land Reclamation

Navigation Law - Docks

Navigation Law - Floating Objects

Navigation Law - Marinas

Non-Industrial Waste Transport

Operation of Solid Waste Management Facilities

Operation of Hazardous Waste Management Facilities

State Pollution Discharge Elimination Systems (SPDES)

Stream Disturbance

Tidal Wetlands

Water Quality Certification

Water Supply

Wild, Scenic and Recreational Rivers

Appendix D Standard Operating Procedures



Standard Operating Procedure

Field Records

SOP 001

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for the documentation of field activities during implementation of field tasks. Field documentation will consist of field forms, daily logs, photographs, and electronically recorded field measurements.

2. Equipment List

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required pending field conditions including, but not limited to, the following:

- Daily logs
- Field forms and records
- Waterproof pen
- Camera

3. Documentation Procedures

Field team members will keep a daily record of significant events, observations, and measurements on paper field forms. All field activities will be recorded on forms specific to the collection activity and will be maintained by the Field Team Leader. Field notes should be maintained for all field activities (e.g., the collection of samples or the gathering of environmental data). The on-site field representative will record on the daily log forms information pertinent to the field task, including, at a minimum, the following information:

- Project name
- Field personnel on site
- · Health and safety discussions
- Soil boring location ID
- Well location number
- Observations made during sample collection, including weather conditions, complications, and other details

- Sampling method and description of activities
- Name, telephone number, and category of site visitors (e.g., Client, Regulatory, Municipal, or General Public).
- Meetings in the field associated with sampling/installation activities

Field notes shall be written in water-resistant paper logbooks or on pre-printed forms, and all field documentation will be made using an indelible, waterproof ink pen. Corrections will be made by drawing a single line through the error, writing in the correct information, then dating and initialing the change. Blank pages or lines in the field logbook will be lined out, dated, and initialed at the end of each sampling day. The field forms will be scanned into the project file directory as convenient during the sampling event or upon completion of each sampling event.

4. Quality Assurance/Quality Control

It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

Attachment

Attachment 1 Daily Log

Attachment 1 Daily Log

Daily Log



Anchor QEA, LLC

1201 3rd Avenue, Suite 2600

Seattle, WA 98101

Phone 206.287.9130 Fax 206.287.9131

WEATHER: WIND FROM: N NE E SE S SW W NW LIGHT MEDIUM HEAVY SUNNY CLOUDY RAIN ? TEMPERATURE: "F "C Extra supportation submits TIME COMMENTS TIME COMMENTS	PROJECT NAME SITE ADDRESS:	:		<u>D</u> PERSON	ATE: NEL:		
	WEATHER:	WIND FROM:	N NE E SUNNY CLC		LIGHT MEI	°F	. °C
	TIME	COMMENTS					1

Signature:



Standard Operating Procedure

Monitoring Well Assessment

SOP 002

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for performing inventories of existing monitoring wells. Monitoring well inventories are periodically conducted to assess the integrity of existing monitoring wells and to identify the need for repairs, replacement of parts, or replacement of wells that are determined to no longer be usable. A well inventory involves an inspection of the overall condition of the well, comparison of measurable quantities (e.g., riser stickup relative to grade and total depth), general verification of survey coordinates and elevation, and measurement of depth to water in the well.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the installation procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

3. Personnel Qualifications

Only qualified personnel will direct well assessment activities. Training requirements include reviewing this SOP, other applicable SOPs, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and first aid and cardiopulmonary resuscitation [CPR] training) as needed.

4. Equipment List

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required pending field conditions including, but not limited to, the following:

- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Field forms and records, including well construction information
- Waterproof pen
- Camera
- Tape measure
- Water level indicator and/or interface probe
- Photo-ionization device with appropriate lamp and calibration gas

If feasible, a supply of typical replacement parts (e.g., locks, bolts, and well caps) should be available to enable immediate usage as necessary.

5. Procedure

The typical procedure for assessing the integrity of a monitoring well is outlined below.

- 1. Prior to mobilizing in the field, obtain a list of monitoring wells to be inventoried and available information concerning their location and physical characteristics. Use the predetermined list of wells to plan the locations to be inspected and inventoried.
- 2. Identify site and well identification number on a Monitoring Well Integrity Assessment Form (Attachment 1). Record all observations on this form, supplemented by notes in the field notebook, if necessary.
- 3. Examine the well for the presence of an identification marker. If absent, label well with the appropriate number.
- 4. Examine the surface condition of the well. Record the type of well (i.e., flush-mount or above grade stickup) and the condition of the well and surface seal. Confirm the protective casing is not bent, the PVC casing is not broken or chipped and there is no evidence of frost heaving. Measure the above-grade portion of the well stickup and compare to the known length of the stickup measured during well installation. If the difference between the observed stickup length and the known stickup length is greater than 0.1 foot, the monitoring well location and elevation should be resurveyed.
- 5. Open the manhole or stickup and remove the inner cap or "J-plug". Use a PID to measure the air immediately above the well casing, in the workers breathing zone and record the measurements. Follow the air monitoring action levels in the HASP.

- 6. Record the type (e.g., PVC or stainless steel), dimensions (i.e., casing diameter and stickup relative to grade), condition of the well casing, and type of well cap. If well cap is missing, replace with available parts or record the type of cap required.
- 7. Locate the marked measuring point along the top of the well casing. If no mark is visible, add a mark at the highest point of the casing.
- 8. Measure the depth to water and total depth of the well following the procedures specified in SOP 004. For total depth measurements, account for any difference in calibration of the measuring tape on the probe (i.e., distance from part of probe which measures depth to water and the physical bottom of the probe which will measure total depth of the well). Record any obstructions encountered and a description of the feel of the well bottom (i.e., soft due to sediment or hard). Check well for the presence of non-aqueous phase liquid (NAPL) and record observations on the Monitoring Well Integrity Assessment Form. If NAPL is observed in a well where it has not previously been known to be present, the appropriate Project Manager should be notified.
- 9. Compare all observations concerning the measured dimensions of the well with the listed values. Based on these results, as well as other observations concerning the condition of the well, record any appropriate recommendations on the Monitoring Well Integrity Assessment Form. Perform any recommended maintenance activities which can be accomplished with available equipment.
- 10. Remove all equipment from the well. If no additional maintenance activities are to be performed, close the well and collect all personal protective equipment (PPE) and other wastes generated for disposal. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

6. Follow-Up Activities

Depending on the results of the well inventory, several additional activities may be warranted prior to future usage of the well. Typical follow-up activities include replacement of missing parts, removal of sediment from the base of the well, re-surveying of the well, or complete replacement if the well is determined to be unusable. These activities are briefly discussed below.

As stated above, a supply of locks, bolts, and well caps should be available for immediate usage during performance of the well inventories. However, it is not feasible to maintain a supply of all potential replacement parts due to the variety of well types in use. Therefore, a list of required replacement parts will be compiled during the performance of a well inventory event. At the conclusion of the event, the necessary replacement parts for all wells should be obtained and installed.

Sediment accumulation occurs to some degree in all monitoring wells, particularly those which are not pumped on a routine basis. If a sufficient quantity of sediment which may adversely impact

future groundwater sampling or NAPL monitoring activities is observed during a well inventory (i.e., a sediment accumulation of greater than 1 foot above the bottom of the well screen), activities should be taken to remove the sediment. These activities will involve the removal of sediment by either pumping or bailing the well, followed by re-measurement of the total depth of the well to confirm a total depth near the reported values. The removed sediment should be inspected for the presence of filter pack materials which may indicate that the well screen has been damaged. If initial efforts are unsuccessful in clearing the sediment accumulations, the well may need to be re-developed (see SOP 009) or replaced.

The measuring points marked on the well risers will be utilized as a base datum in the determination of groundwater elevations. The distance of these markers from the ground surface will be verified against listed values during well inventory activities. Minor variations between listed and measured values may be attributed to an uneven ground surface around the well or to enhancements to the ground surface, such as paving or grading activities that may have been performed since installation of the well. Therefore, such minor variations (i.e., less than 1 inch) will be discounted and existing survey information for the measuring point on the well will be assumed to be accurate. Greater discrepancies may be attributed to damage or modifications to the well, such as cutting or lengthening the well riser. In these situations, the well should be re-surveyed to establish a new datum for future groundwater elevation measurements.

Replacement or decommissioning of a well may be warranted if the well is broken, obstructed, or otherwise compromised. If the well cannot be adequately repaired and is required for future monitoring purposes, a replacement well should be installed if no suitable alternate wells are located in the vicinity.

7. Waste Management

Investigation derived waste (IDW), rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

8. Data Recording and Management

All activities conducted under this SOP will be documented, at a minimum, in a project specific field book or on Monitoring Well Integrity Assessment Forms. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

9. Quality Assurance

It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP.

Attachment

Attachment 1 Monitoring Well Integrity Assessment Form

Attachment 1 Monitoring Well Integrity Assessment Form

MONITORING WELL INTEGRITY ASSESSMENT

				Si	ite Nai	me:	
						I.D.:	
						ate:	
(For each item, circle the appro	nriate resnonse	or fill i	n the hlar	nk)	Ο,		
Well I.D. Clearly Marked:	YES	NO	ir tire btar	nty			
Well Completion:	FLUSH MOUN		^ R○\/E	-GRADE S	TAND	DIDE	
•			ABOVE				
Lockable Cover:	YES	NO			ED (De	escribe below)	
Lock Present:	YES	NO		ADDED		Key Brand/Number:	
Measuring Point Marked:	YES	NO		ADDED			
Well Riser Diameter (inches): _							
Well Riser Type:	PVC	Stainl	less Steel	C	Other ((Describe)	
Surface Condition							
Cement Intact:	YES		NO (De	escribe be	low)		
Curb Box/Well Cover Present:	YES		NO			DAMAGED (Describe below)	
All Bolts Present:	YES		NO (De	escribe be	elow)		
Well Condition							
Well Cap: PVC Slip Cap	Pracci	ure-fit C	an	None			
Well Vent: Slot Cut in Rise			.ар Сар		Not An	plicable (Flush Mount Well)	
Reported Well Riser Stickup (fo						low grade)	
·			_			=	
Measured Well Riser Stickup (ieet):	(u	se negativ	⁄e number	ij beid	ow grade)	
Depth to Water (feet from Top	of Well Riser):	:		-or- D	DRY		
Depth to LNAPL (feet from To				NONE			
Depth to DNAPL (feet from To	•				NONE		
	p or real rase.	/		0			
Reported Total Depth of Well	(feet below gra	ade):		_			
Measured Total Depth of Well	(feet below gr	ade):					
Well Obstructed: YES	NO If yes,	list dep	oth in feet	from Top	of W	ell Riser:	
Well Bottom: SOFT (contains sedim	ent)	FIRM (ı	no sedime	ent)		
Recommendations							
Repair Concrete/Surface Comp	oletion:	YES	NO				
Re-Survey Well:	dietion.	YES	NO	If you list	t data	performed:	
Remove Sediment and Re-Me	acura Donthi	YES	NO	-		performed:	
	asure Depth.	YES	NO	-		performed:	
Replace Well Cap: Replace Bolts:		YES	NO	-			
•	-4:	163	NO	ii yes, iisi	t date	performed:	
Other/Miscellaneous Observ	ations:						

Inspector(s):_____



Standard Operating Procedure

NAPL Recovery Testing

SOP 003

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for performing testing to evaluate the potential recovery rate of nonaqueous phase liquid (NAPL) in monitoring wells.

This SOP describes the equipment, field procedures, materials, and documentation procedures necessary to perform baildown testing of light (LNAPL) and dense (DNAPL) NAPL in monitoring wells. The details within this SOP should be used in conjunction with the project work plan, which will specify the duration of testing (typically one to three days) and initial monitoring/recovery interval requirements.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the installation procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

3. Personnel Qualifications

Only qualified personnel will perform NAPL recovery activities. Training requirements include reviewing this SOP, other applicable SOPs, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and first aid and cardiopulmonary resuscitation [CPR] training) as needed.

4. Equipment List

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required pending field conditions including, but not limited to, the following:

- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Interface probe
- Indelible ink pen
- Peristaltic pump (or similar) with dedicated polyethylene tubing or bailer
- Silicone flexible tubing (for peristaltic pump)
- Non-absorbent (e.g., polyethylene) cord (for bailer)
- Graduated cylinder or other measurement vessel
- Camera
- Whiteboard with erasable markers
- Field logbook; field forms for core collection, well construction, and well development; or notebook with relevant forms
- Safety knife or scissors
- Photo-ionization device with appropriate lamp and calibration gas
- Plastic sheeting
- Absorbent pads
- Cleaning equipment
- Container for recovered NAPL

5. Procedure

The typical procedure for a NAPL recovery test is outlined below.

- 1. Gather all necessary supplies listed in Section 4 above. Arrange for a drum delivery to the site and notify client of the schedule to ensure property owners and others are notified as necessary.
- 2. Upon arrival establish an IDW storage area. This will be where drums or containers of waste will be stored. The area should be established with cones or similar barricades to demarcate the area and a secondary containment set up so that any potential spills are contained.
- Open the manhole or stickup and remove the inner cap or "J-plug". Use a PID to measure the air immediately above the well casing, in the workers breathing zone and record the measurements. Follow the air monitoring action levels in the HASP.
- 4. Measure the depth to water, LNAPL, DNAPL, and total depth of the well following the procedures specified in SOP 004: NAPL Monitoring and Removal and record observations on the appropriate LNAPL or DNAPL Recovery Test Field Log, along with the time of measurement.

- Calculate the thickness of LNAPL (difference between depth to LNAPL and depth to water)
 and/or DNAPL (difference between depth to DNAPL and depth to bottom of well) and record on
 the appropriate NAPL monitoring/recovery field log.
- 6. Remove LNAPL or DNAPL utilizing a bailer or peristaltic pump and record the volume removed. If direct measurement is not feasible, estimate the volume of NAPL removed by utilizing the diameter of the well and the measured thickness of the NAPL layer. Record the estimated quantity removed on the appropriate NAPL monitoring/recovery field log.
- 7. Transfer material into an appropriate container for analysis or disposal.
- 8. Allow well to recover for approximately one hour and repeat Step 2.
- 9. If sufficient NAPL has returned to the well (e.g., a removable quantity or project-specified thickness), repeat Steps 3 through 5. Otherwise, continue to repeat Step 2, initially on an hourly basis until conditions are met for additional NAPL removal. The monitoring interval may be modified based on the observed NAPL return rates during testing.
- 10. For each measurement, note the recovery time on the appropriate NAPL monitoring/recovery field log. The recovery time is the elapsed time between the most recent NAPL removal (i.e., Pump Stop Time) until the measurement was collected. This will be utilized to calculate NAPL recovery rate for the test interval (i.e., the amount of NAPL that returned to the well divided by the recovery time).
- 11. Continue to repeat the NAPL monitoring and removal sequence for the duration of the test. For a standard three-day test period, NAPL removal intervals of hourly on Day One, every two hours on Day Two, and every four hours on Day Three (with extended overnight recovery periods between days) are typically utilized. However, the time intervals of NAPL removal may be increased or decreased based on field observations and/or project-specific requirements.
- 12. Remove all equipment from the well, close the well and collect all personal protective equipment (PPE) and other wastes generated for disposal. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

6. Waste Management

Investigation derived waste (IDW), rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

7. Data Recording and Management

All information relevant to the performance of NAPL recovery testing beyond the items contained on the LNAPL or DNAPL Recovery Test Field Log Forms (Attachments 1 and 2) will be recorded by Anchor QEA field staff using the field logbook. Field equipment decontamination activities and waste management activities will be recorded in the field logbook. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

8. Quality Assurance

It is the responsibility of the field team leader to periodically check to ensure the procedures are in conformance with those stated in this SOP.

Attachments

Attachment 1 LNAPL Recovery Test Field Log Form
Attachment 2 DNAPL Recovery Test Field Log Form

Attachment 1 LNAPL Recovery Test Field Log Form

LNAPL RECOVERY TEST FIELD LOG

WELL ID			SITE				LOCATION		
DATE	MEASUREMENT TIME/PUMP START TIME	PUMP STOP TIME	PUMPING TIME (Minutes)	RECOVERY TIME (Minutes)	DEPTH TO LNAPL (Feet BMP)	DEPTH TO WATER (Feet BMP)	LNAPL THICKNESS (Feet)	LNAPL REMOVAL (Liters)	LNAPL REMOVAL (Gallons)
NOTES/OBSI	ERVATIONS: Recover	ry time refers to the e	lapsed time from	the end of pump	ing (during the p	rior measurement	interval) until the	next measureme	ents are collected

Attachment 2 DNAPL Recovery Test Field Log Form

DNAPL RECOVERY TEST FIELD LOG

WELL ID			SITE				LOCATION		
DATE	MEASUREMENT TIME/PUMP START TIME	PUMP STOP TIME	PUMPING TIME (Minutes)	RECOVERY TIME (Minutes)	DEPTH TO DNAPL (Feet BMP)	DEPTH OF WELL (Feet BMP)	DNAPL THICKNESS (Feet)	DNAPL REMOVAL (Liters)	DNAPL REMOVAL (Gallons)
NOTES/OBSE	RVATIONS: Recover	y time refers to the e	lapsed time from	the end of pump	ing (during the p	rior measurement	interval) until the	next measureme	ents are collected



Standard Operating Procedure

NAPL Monitoring and Removal

SOP 004

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for monitoring of groundwater elevations and presence of nonaqueous phase liquid (NAPL) in monitoring wells, as well as NAPL removal from wells where accumulated.

This SOP describes the equipment, field procedures, materials, and documentation procedures to be followed.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

3. Personnel Qualifications

Only qualified personnel will perform NAPL monitoring and recovery activities. Training requirements include reviewing this SOP, other applicable SOPs, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and first aid and cardiopulmonary resuscitation [CPR] training) as needed.

4. Health and Safety Considerations

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the HASP attached to the SMP (Anchor QEA 2018), which serves as the minimum requirements for work on the Site. The HASP will be followed during all activities conducted by Anchor QEA personnel and subcontractors.

The HASP and will be used to guide the NAPL removal activities in a safe manner. The following specific health and safety issues must be considered when completing NAPL removal:

- Air monitoring will be conducted for chemicals at action level as established in the HASP.
- Appropriate PPE must be worn to avoid contact with NAPL.
- Potential hazards from working in a public area and potential hazards to the public by NAPL removal activities must be addressed before activities begin and as conditions change.
- Waste generated during the locating activities must be properly managed in accordance with facility and applicable regulatory requirements.

5. Equipment List

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required pending field conditions including, but not limited to, the following:

- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Interface probe
- Peristaltic pump (or similar) with dedicated polyethylene tubing and/or bailers (disposable polyethylene or stainless steel)
- Silicone flexible tubing (for peristaltic pump)
- Non-absorbent (e.g., polyethylene) cord (for bailer)
- Cotton string or rope and threaded rod
- Camera
- Field logbook or daily log form
- Photo-ionization device with appropriate lamp and calibration gas
- Plastic sheeting, absorbent pads, paper towels, trash bags, and similar materials to maintain a clean work area and contain any potential spills
- Decontamination supplies to include water, soap, degreaser, and solvent for use in cleaning if necessary, such as Hexane or ethyl acetate
- Container for recovered NAPL to include 55-gallon steel, Department of Transportation opentop drums and 5-gallon pails with lids

6. Procedure

The typical procedures for NAPL monitoring and recovery are outlined below.

6.1 NAPL Monitoring

- 1. Gather all necessary supplies listed in Section 5 above. Arrange for a drum delivery to the site and notify client of the schedule to ensure property owners and others are notified as necessary.
- 2. Upon arrival establish an IDW storage area. This will be where drums or containers of waste will be stored. The area should be established with cones or similar barricades to demarcate the area and a secondary containment set up so that any potential spills are contained.
- 3. Use the predetermined list of wells to be surveyed to plan the locations to be monitored.
- 4. Move on the site to the location of a well and locate. Arrange gauging equipment on a plastic sheet or trash bag.
- 5. Open the manhole or stickup and remove the inner cap or "J-plug". Use a PID to measure the air immediately above the well casing, in the workers breathing zone and record the measurements. Follow the air monitoring action levels in the HASP.
- 6. Use the interface probe to first check for the presence of light NAPL (LNAPL) and to measure the static water depth in the well. Be sure to measure from the known survey point for each location. Record the depth to LNAPL (if present) and depth to water measurements to the nearest 0.01 feet.
- 7. Next use the interface probe to check for the presence of dense-NAPL (DNAPL). Lower the interface probe slowly through the water column while listening and watching for an indication of NAPL being detected. Record any indications of NAPL and their depth. Continue to lower the interface probe until the bottom of the well is reached. Record the total measured depth of the well, correcting for any space between the bottom of the interface probe and the probe sensor that the measuring tape is calibrated to.
- 8. For sites where DNAPL may be found or has been identified in past events, an alternate means of measuring for DNAPL is via a threaded rod and cotton rope or string. Lower a threaded rod attached to a cotton string or rope to the bottom of the well and measure the total depth of the well (threads may be left as-is to trap NAPL or may be covered with white, cotton tape which NAPL, when present, will stain). Remove the equipment and inspect the threaded rod and cotton rope or string for signs of DNAPL. Record the measured thickness of DNAPL and depth to well bottom as well as any observations of the condition of the bottom of the well (e.g., hard or soft).
- 9. Determine the thickness of NAPL identified in any wells and use the well diameter to estimate the volume of NAPL.
- 10. Once measurements are complete remove and decontaminate all equipment, place the "J-plug" cap back on the well casing and close the flush mount or stick-up well cover.
- 11. Clean up all PPE and other materials prior to moving to the next well location.

6.2 NAPL Removal

Following well monitoring, those wells identified with a potentially recoverable amount of NAPL will be revisited. The following procedures describe NAPL removal:

- 1. Gather all necessary supplies listed in Section 5 above.
- 2. At wells with potentially recoverable NAPL, open the flush mount of stick-up well cover.
- 3. Create a work zone with cones or other similar barriers and an area of plastic sheeting. Plastic sheeting should be secured to the well casing when possible.
- 4. Field staff should ensure that proper PPE and air monitoring equipment is on hand and don appropriate equipment.
- For wells that are approximately 35 feet in depth or shallower, a peristaltic pump may be used to removal NAPL. Note, pump will likely not work for DNAPLs and use of pumps should be confirmed with project manager prior to use.
 - a. Place the pump, tubing, battery, storage container, and air monitoring equipment on the plastic sheeting. Ensure that absorbent pads are also nearby for potential spillage.
 - b. Open the inner well cap or "J-plug" and use the PID to measure the air immediately above the well casing as well as the worker breathing zone and record the measurements.
 - c. Connect the tubing to the pump and lower into the well while also placing the discharge into an appropriate container.
 - d. Turn the pump on above the previously measured depth where NAPL was encountered and then lower the tubing once groundwater is being pumped.
 - e. Monitor the discharge once groundwater is moving and lower raise the tubing to maintain flow and removal of NAPL. Periodically check the water level in the well with the interface probe and record.
 - f. Once NAPL has stopped being removed (or if is unable to be removed with the pump) turn the pump off and remove the tubing. Place used tubing in appropriate container.
 - g. Replace the inner cap or "J-plug" and the clean up the area. Take care to ensure that any materials that came into contact with NAPL are properly disposed of in labeled containers.
- 6. For deeper wells where a peristaltic pump may not be able to remove water or NAPL (or NAPL is not able to be pumped) from a deeper zone alternate pumps may be considered, and the above steps followed. If no other pumps are available, then bailers will be employed.
 - a. Place the bailer, storage container, and air monitoring equipment on the plastic sheeting. Ensure that absorbent pads are also nearby for potential spillage.
 - b. Open the inner well cap or "J-plug" and use the PID to measure the air immediately above the well casing as well as the worker breathing zone and record the measurements.
 - c. Tie a rope or string to the bailer and secure the other end to the well cap or some other object to that the bailer is always tied-off.

- d. Lower the bailer into the well and then slowly through the water column. Ensure that the bailer is lowered to and below the zone where NAPL was previously measured.
- e. Allow the bailer to rest for a few moments before pulling the bailer back to the surface.
- f. Once near the surface ensure that an appropriate container is nearby to transfer the bailer contents into. Then remove the bailer, move over the container and discharge either by inverting or displacing the ball/flapper at the bottom.
- g. Once the bailer has been emptied, repeat the above process. Periodically check the water level in the well with the interface probe and record.
- Once NAPL has stopped being removed remove the bailer and place into an appropriate container for disposal.
- i. Replace the inner cap or "J-plug" and the clean up the area. Take care to ensure that any materials that came into contact with NAPL are properly disposed of in labeled containers.

7. Waste Management

Investigation derived waste (IDW), rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

8. Data Recording and Management

All activities conducted under this SOP will be documented, at a minimum, in a project specific field book or on daily log field forms. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

9. Quality Assurance

It is the responsibility of the field team leader to periodically check to ensure the procedures are in conformance with those stated in this SOP.



Standard Operating Procedure

Utility Clearance

SOP 005

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for Utility Clearance prior to and in support of the drilling or excavation of fill and unconsolidated soils.

This SOP describes the requirements, process, and documentation procedures necessary to locate and mark utilities before soil boring, test pit excavation, and well installation.

The details within this SOP should be used in conjunction with the project work plan.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the installation procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

This SOP was prepared in compliance with the Con Edison Utility Clearance Process for Intrusive Activities, which is provided as Attachment 1. In the event of any discrepancies between requirements described in this SOP and those in Attachment 1, the requirements contained in Attachment 1 will apply.

3. Summary of Method

Utility clearance is required before any subsurface work associated with this project. This is an Anchor QEA requirement. The following is a summary of the methods for utility clearance:

- Obtain and review plates, drawings, and maps for each subsurface work location (Anchor QEA lead) if available
- Conduct mark-outs using the following methods:
 - Code 753 call in (i.e., "811" or "Dig Safe New York") at 800-272-4480 (drilling subcontractor lead with Anchor QEA confirmation) for public utilities

- Private Utility Contractor for private property if applicable (Anchor QEA lead)
- Con Edison M-Scope Survey (Anchor QEA lead)
- Site walk (Anchor QEA lead)
- Utility clearance sample location confirmation (Anchor QEA lead)
 - Tolerance Zone
 - Test Pit/Soft Dig
 - Sample location field measurements to fixed objects
 - Re-excavate cleared locations by hand, as needed
- Documentation
 - Utility Contact Prevention Checklist (Anchor QEA lead)
- Notice-to-Proceed (Anchor QEA lead)

4. Personnel Qualifications

Only qualified personnel will manage utility clearance activities. Training requirements for direction of utility clearance activities include reviewing this SOP, other applicable SOPs, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for utility clearance.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and first aid and cardiopulmonary resuscitation [CPR] training) as needed.

5. Equipment List

Equipment and materials that will be used by Anchor QEA personnel for overseeing and directing utility clearance include the following:

- Camera
- Tape measure
- Spray paint
- Field logbook
- Utility Contact Prevention Checklist
- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Indelible ink pen
- Whiteboard with erasable markers
- Air monitoring equipment (during sample location confirmation Test Pit/Soft Dig)

6. Cautions

Special care must be taken when conducting Test Pit/Soft Dig activities, as well as subsurface work even following completion of Utility Clearance procedures. It should be assumed that utilities can exist in any work area. Completion of all Utility Clearance procedures does not fully guarantee utilities are not present in the work area. As such, subsurface work must always be conducted with an abundance of caution, given the substantial and historic level of urbanization of the site area.

7. Health and Safety Considerations

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project HASP (Appendix B). The HASP will be followed during all activities conducted by Anchor QEA personnel and subcontractors.

The site-specific HASP and (as needed) subcontracted utility clearance firm's HASP will be used to guide the locating activities in a safe manner. Job Safety Analyses (JSAs) will be prepared for oversight by Anchor QEA and subcontractors. The following specific health and safety issues must be considered when conducting locating activities:

- Underground and overhead utility hazards must be mitigated prior to subsurface work.
- Test Pit/Soft Dig equipment present a variety of safety hazards. Equipment must be inspected each day prior to use. All personal must know where the emergency "kill" switch is, and the switch must be tested daily. Only the equipment operator and helper may approach the equipment during locating activities.
- Air monitoring will be conducted for chemicals at action level as established in the site-specific HASP.
- Appropriate PPE must be worn.
- Potential hazards from working in a public area and potential hazards to the public by locating activities must be addressed before activities begin and as conditions change.
- Waste generated during the locating activities must be properly managed in accordance with facility and applicable regulatory requirements.

8. Procedure

During utility clearance activities, the Utility Contact Prevention Checklist (Attachment 2) will be used and/or filled in to ensure all practicable steps have been taken to locate utilities in the work area. It is the responsibility of Anchor QEA project managers, with the assistance of the field team members, to ensure these documents are used for each sampling location.

8.1 Obtain and Review Plates, Drawings and Maps for Each Subsurface Work Location

Efforts will be made to obtain hard copies of available utility plates, drawings, and/or maps by Anchor QEA if available. Drawings, plates, etc., should be reviewed as a preliminary step to determine the type and approximate size and location of utilities in the vicinity of the sampling location. The drawing title, most recent revision date shown on the drawings, approximate scale, and source shall be documented in the appropriate space(s) on the Utility Contact Prevention Checklist (Attachment 2).

The source of the drawings may vary depending on whether the site is a private/public property or extends into a public street/sidewalk. Drawings for private properties and facilities, such as apartments, schools, churches, residences, etc., can typically be reviewed at, and/or obtained from, the property/facility manager and Department of Public Works and/or Department of Buildings in the municipality where the property is located.

8.2 Conduct Utility Mark-Outs

Given the urban/public/private nature of the site and substantial history of development and redevelopment, three types of utility mark-outs may be required by default for each sampling location:

- Code 753 call in (i.e., "811" or "Dig Safe New York") at 800-272-4480 for public property
- Private Utility Contractor for private property
- Con Edison M-Scope Survey

The results of the utility mark-outs will be documented on the Utility Contact Prevention Checklist (Attachment 2).

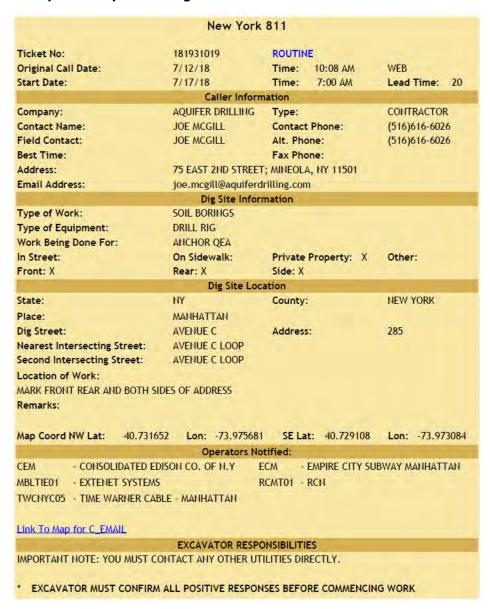
8.2.1 Code 753 – Public Property

A Code 753 utility mark out by calling (800) 272-4480 must be conducted for each sampling location by the excavator with Anchor QEA support (i.e., providing sampling locations). Consistent with the One-Call (also called Dig Safe New York) criteria, the request should be made at least 72 hours prior to initiating fieldwork.

Confirmation that mark outs completed under Code 753, and as received by e-mail, facsimile or telephone from the participating utility companies, must be documented on the Utility Contact Prevention Checklist (Attachment 2). The mark-outs must be maintained by the excavator. If the physical markings become faint or obscure, they must be refreshed by over-painting with new paint as needed. When the utility mark-outs are being refreshed, the Anchor QEA field lead MUST be present and observe and document (via photographs) this activity.

When performing the Code 753 utility mark out, confirm the ticket includes the property address (in addition to cross streets) and has the "private property" portion of the Dig Site Information completed as needed:

Example Description of Dig Site Information and Location Portion of One Call Ticket



8.2.2 Private Utility Contractor – Public and Private Property

Sampling location may be investigated by a private utility contractor using non-intrusive methods to identify potential utilities in the work area. Locating activities will include a minimum 5-foot by 5-foot buffer around each sampling location. The non-intrusive investigations will consist at a minimum of a ground penetrating radar (GPR) survey and an electromagnetic utility clearance survey.

Following locating activities, newly identified, known utilities will be marked in standard industry colors (e.g., blue for water lines), and probable utilities (i.e., an object identified in the subsurface by either means employed but which could not be readily identified by tracing to a known termination such as a manhole or gas valve) will be marked with orange paint. Markings made by the private utility contractor will not obscure or supersede markings done during the Code 753 mark-out. Following the locating activities, the private utility contractor will prepare a report for each sampling location that documents on maps and by photographs/measurements known and probably utilities, supported by:

- Review of applicable utility drawings
- Reconciliation of drawings with mark-outs identified by the Code 753 survey at the property perimeter
- Determination of the presence and type nature of utilities and confirm their configuration during the utility survey
- Inspection of the site to identify where utility service enters and/or leaves the property and/or building
- Identification of utility access-ways including manholes, vaults, gas, and/or water valves boxes and telephone, cable and communication boxes
- Identification of apparent uncertainties such as manholes containing service lines that apparently go to the building or property, but that cannot be located within the basement of the building or on site

Prior to mobilizing to the site, the following information must be provided to and reviewed by the Con Edison PM:

- The name of the subcontractor
- The name of technician(s) who will perform the utility surveys
- For each technician, a summary of experience and training in conducting surveys in a setting similar that at the site (e.g., urban, inside buildings, etc.) and
- Summary of experience and training of each instrument.

Additional requirements for subcontractors providing private utility location services are provided in Attachment 1.

8.2.3 Con Edison M-Scope Survey

Con Edison engineering groups (see Attachment 1 for contacts) can conduct utility surveys using a "MScope" on a case-by-case basis and will be limited to the engineering group' availability. This tool uses the magnetic susceptibility of subsurface features such as electrical conduits, electric cables, pipes, etc. This method of survey can be subject to interference by other conductive bodies at grade or in the subsurface, such as buried pieces of metal, rebar in concrete, iron-rich soil, etc., and may be

ineffective or produce misleading results in these types of conditions. A utility survey using an M-Scope can be requested by contacting the appropriate party listed in Attachment 1.

8.3 Site Walk

After completion of the activities outlined above, a site walk shall be conducted by Anchor QEA. All site walk activities and results will be documented on the Utility Contact Prevention Checklist (Attachment 2).

The key objectives of the site walk are as follows:

- Review all planned locations where invasive activities will be performed.
- Adjust the positions of the locations away from utilities as marked out (as necessary).
- Collectively determine the appropriate utility clearance activities (e.g., test pits, soft digs) that will be performed at each location.

Other site conditions and project issues assessed during the site walk should include the following:

- Presence and location of overhead utilities and/or obstructions that might prevent the safe operation of equipment
- Presence of, or need for, appropriate grounding for electrical equipment at the site
- Site access to equipment
- Storage of equipment/supplies overnight (e.g., establish a staging area)
- Storage and management of investigative derived waste (IDW)
- Hours of on-site work
- Permits needed, if any
- Review roles and responsibilities of all project personnel who will be onsite
- Review site and emergency contacts
- Review anticipated schedule of work and contingency action as deemed appropriate

8.4 Utility Clearance – Sample Location Confirmation

Once utilities have been identified using the suite of methods described above (drawing reviews, mark-outs via Code 753, private utility contractor, and site walk), sample location confirmation will be conducted to further protect workers from contacting utilities and utility damage.

8.4.1 Tolerance Zone

Sample locations will be moved outside the tolerance zone, if possible. If no tolerance zone is marked out during the utility survey (i.e., only a utility center line is marked), the tolerance zone will be defined in the field as follows: the distance of one-half of the known diameter of the utility plus two feet on either side of the centerline as marked out.

8.4.2 Test Pit/Soft Dig

After adjusting sample locations for tolerance zones, a utility clearance test pit or soft dig will be excavated to a minimum of 5 feet below ground surface using non-mechanical methods, such as hand auger, post-hole digger and/or vacuum truck. The diameter of the test pit will be at least two inches wider than the outer diameter (OD) of the mechanized drilling equipment. The 5-foot depth is consistent with the Con Edison requirements contained in Attachment 1, as well as the concept that most utilities are typically installed within the top three to four feet of the subsurface.

NOTE: Utilities may be deeper than four feet due to buildup of surface grade on properties and/or streets or rights-of-way. Although the original depth of utilities is anticipated to be within the upper five feet, utilities that are buried in areas that have been built up will presently be deeper by the thickness of the built-up material.

Where physical constraints prohibit the relocation of proposed sample locations outside the tolerance zone, the adjacent utility(ies) will be exposed by excavating using non-mechanical methods to visually confirm its physical location and configuration. This confirmatory excavation will be completed in addition, a 6-foot excavation at the specific location being investigated (e.g., soil boring, monitoring well boring), as described above.

Photographs and measurements will be taken at each test pit/soft dig location to document the inside conditions of each excavation and the absence of utilities.

8.4.2.1 Confirmation of Previously Cleared Locations

If there is a delay of more than 24 hours between the soft dig and the start of the drilling activities at a sample location (which was previously cleared following the steps outlined in this document), the driller will confirm the bore hole was previously cleared by either:

- 1. Manually re-excavating, as needed, the bore hole to 5 feet below ground surface and visually re-confirming the absence of subsurface utilities. Following completion of the re-excavation and visual re-confirmation that no subsurface utilities are visibly present, the drilling will begin.
- Following completion of the original soft dig, placing a PVC pipe (of a diameter larger than the proposed borehole) in the sample location, extending from the ground surface to the bottom of the soft dig and installing the inside of the PVC pipe.

8.4.3 Sample Location Field Measurements to Fixed Objects

Once sample locations have been confirmed and cleared, no less than three lateral measurements to the nearest inch from fixed objects will be collected, photographed, and documented on the Utility Contact Prevention Checklist (Attachment 2) to enable future precise re-location of the confirmed sample location.

8.5 Documentation

All activities conducted under this SOP will be documented, at a minimum, on the Utility Contact Prevention Checklist (Attachment 2). Additional required field documentation includes field notes and photographs. Documentation from utility mark-out efforts by others (i.e., Code 753 and private utility contractors must also be maintained).

9. Waste Management

Investigation derived waste (IDW), rinse water, PPE, and other waste materials generated during utility clearance activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP011: Investigation-Derived Waste.

10. Data Recording and Management

All information relevant to the activities above will be recorded by Anchor QEA field staff using the field logbook and on the Utility Contact Prevention Checklist (Attachment 1) to enable future precise re-location of the confirmed sample location, at a minimum. Field equipment decontamination activities and waste management activities will be recorded in the field logbook. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

11. Quality Assurance

It is the responsibility of the field team leader to periodically check to ensure the procedures are in conformance with those stated in this SOP.

Attachments

Attachment 1 Con Edison Utility Clearance Process for Intrusive Activities

Attachment 2 Utility Contact Prevention Checklist

Attachment 1 Con Edison Utility Clearance Process for Intrusive Activities

UTILITY CLEARANCE PROCESS FOR INTRUSIVE ACTIVITIES E H&S REMEDIATION PROGRAM

1.0 INTRODUCTION

This document outlines a process to identify, locate and clear subsurface utilities as part of all Environmental Health and Safety (EH&S) Department's Remediation Section intrusive site investigations. The various activities that comprise this process are specified in efforts to eliminate or substantially reduce the risk of encountering a subsurface utility while performing intrusive activities. Where appropriate, reference is made to other existing *Con Edison and or industry* safety procedures that should also be considered. Note that modifications and additions to the text in this version of the process, relative to the topics outlined in Section 2.0, are italicized.

Due to the potential presence of subsurface utilities and the inherent variable of their size, depth and layout, it is not possible to address all situations and circumstances that may be encountered during intrusive activities. However, adherence to the steps outlined here will effectively minimize physical impacts to subsurface utilities and prevent associated health, safety *and environmental* risks that might otherwise result from field investigation activities. The activities prescribed below should not be blindly followed. Rather, it is the intent of this document that **ALL FIELD PERSONNEL**:

- 1) Understand the terms of this process including all revised or added provisions;
- 2) Develop an awareness and be mindful of, the potential and actual risks associated with utilities and other related hazards at a site;
- 3) Become familiar with the location(s) and configuration(s) of all subsurface utilities at the site, which will include surrounding/adjacent facilities and or buildings, as marked out and as delineated on available drawings;
- 4) Develop an awareness and understanding of the potential uncertainties associated with utility locations as marked out;
- 5) Maintain a high level of vigilance while implementing all components of intrusive fieldwork.

ALL FIELD PERSONNEL, including the Con Edison Project Manager (PM), Construction Management (CM), consultants and contractors should, at a minimum, be familiar with the fundamental provisions of this utility clearance process PRIOR to engaging in any field activities.

The process described in the remainder of this document consists of the three (3) primary components summarized below. These components are designed for use in an integrated manner.

<u>Process Narrative</u> – The narrative provides detailed descriptions of the specific steps that should be taken prior to and during intrusive activities to minimize the potential of encountering subsurface utilities.

<u>Utility Clearance Flow Chart:</u> The key steps of the utility clearance process, as outlined in the narrative, are shown graphically on the flow chart provided in **Attachment A**. The flow chart serves as a guide and should not replace the narrative for developing an understanding of and/or implementing the process.

<u>Utility Clearance Checklist</u> - A key component of this process is the completion of the checklist provided in **Attachment B**. The checklist shall, be completed by the Con Edison PM *or their designee, such as consultant or Con Edison Construction Management Inspector.* The intent of the checklist is to ensure that all appropriate steps of the process described herein have been completed. Secondly, it will be used to document that all reasonable steps were taken to prevent conditions that may be potentially harmful to the on-site workers and the surrounding community at large, and that might otherwise adversely impact the physical integrity of, or cause damage to, the utility. The completed checklist will be incorporated in the project files maintained by the Con Edison PM *or their designee*.

2.0 REVISIONS FROM PREVIOUS VERSION

This version (**Revision 2**) contains modifications to Revision 1 and includes additional provisions and or guidance based on lessons learned during implementation of the previous versions for intrusive activities at various sites. The key topics that have been added or modified are listed below and described in greater detailed in the referenced sections of this protocol.

- Considerations for potential presence of fiber optics;
- Accessing manholes and other utilities during field inspection and utility mark out;.
- Considerations for potential presence of traffic control electric lines; and
- O Considerations for potential presence of unmapped non-routine utilities or subsurface utilities, such as drainage pipes, etc.

Modifications and additions to the text relative to the introductory sections of this document and the topics listed above are *italicized*.

3.0 APPLICABILITY

The utility clearance process shall be performed prior to and/or during the intrusive site investigation activities listed below.

Excavation of Soil Borings

- o Installation of Monitoring Wells
- Installation of Soil Gas Sampling Probe Points
- o Excavation of Exploratory Test Pits/Trenches

4.0 SUBSURFACE UTILITY CLEARANCE PROCESS

The key activities that comprise the process are listed below and a detailed description of each is provided in the remainder of this document in the order in which they should be completed (as shown in the Utility Clearance Flow Chart in **Attachment A**).

- o Obtain Plates, Drawings and Maps
- Notification to Con Edison Operating Groups and Submission of Site-Specific HASP for review and approval
- o Code 753 Utility Mark-Out
- o Site Walk
- O Utility Clearance Sample Location Confirmation
- Checklist Completion

It is noted that completion of some steps may not be warranted for all intrusive activities at all sites. The process is designed to be flexible and, thus, allows the Con Edison PM to incorporate those utility clearance activities that are appropriate for a set of site-specific conditions, knowledge of the site, previous work completed at a site, etc. Exceptions are summarized in Section 5.0 of this document. The key premise is that any deviations and the rationale for each are well documented and reflect sound judgment on the part of the Con Edison PM and other project personnel.

4.1 Obtain Plates, Drawings and Maps

Hard copies of available utility plates, drawings and/or maps should be obtained by the Con Edison PM or their designee. Drawings, plates, etc. should be reviewed as a preliminary step to determine the type and approximate size and location of utilities in the vicinity of the work site. When working at, adjacent to or in the immediate vicinity of a Con Edison facility ("Facility"), such as substation or gas regulator station, the Con Edison PM or their designee shall also obtain and review the Facility-specific plates. These shall include all utilities (both Con Edison and non-Con Edison) on and/or entering or leaving the Facility. Regardless of who obtains the requisite utility plates and or drawings, the Con Edison PM shall ensure that the job package is complete and includes ALL required such drawings and or plates of sub-surface facilities in the

area(s) of intrusive activity, such as excavation or drilling. The drawing title, most recent revision date shown on the drawings, approximate scale and source shall be documented in the appropriate space(s) on the <u>Utility Clearance Checklist</u> (Attachment B).

The source of the drawings may vary depending on whether the site is a Con Edison owned/operated facility, private/public property, or extends into a public street/sidewalk. The various sources for substation utility drawings are discussed below and listed in **Table 1**. Drawings for private properties and facilities, such as apartments, schools, churches, residences, etc., can typically be reviewed at, and/or obtained from, the property/facility manager and Department of Public Works and/or Department of Buildings in the municipality where the property is located.

NOTE: Fiber optics at Con Edison facilities are not routinely identified on utility drawings. Therefore, when conducting intrusive work at Con Edison facilities, the facility engineer should be contacted in advance of the site walk to determine if fiber optic cables are known to be present and, if so, what is their layout. Fiber optic lines generally cannot be detected using routine geophysical methods accordingly, at sites with known fiber optics every effort should be made to determine their location or confirm their absence in the work area.

NOTE: Copies of all drawings obtained during this step should be available at the site during all site walks/inspections and at all times during subsequent intrusive activities. The drawings should be reviewed immediately prior to implementing intrusive activities at each new site location where intrusive activities are to be performed.

Steam, Gas and Electric

All electric and gas plates are available on Con Edison's intranet by searching for 'maps' or accessing the Advanced Mapping System website listed below.

http://maps/AdvancedMappingHomePage.htm

Similarly, steam plates can be obtained by selecting "Active" and "Archived" Steam Plates from the website:

http://maps/steam.htm

Based on agreement between Transmission Operations and EH&S, Remediation personnel may access these intranet sites and print the plates using the plotter located in the 2nd floor of Building 138. In addition, a large format photocopier, which is also located in Building 97, is available for use by EH&S remediation. A log book, which is stored at the facility, should be completed each time the facilities (i.e., computer, and or photocopier) are used.

Conduit and Duct Occupancy (C&DO) utility plates can also be obtained from the appropriate Con Edison engineering group(s) including, electric (e.g., distribution lines, transmission feeders, etc.) steam and gas by the Con Edison PM.

AFTER accessing the website and obtaining the required drawings, the appropriate party listed in **Table 1** may be contacted with inquiries regarding electric and steam plates or for questions regarding use of the Advanced Mapping System.

Sewer and Water

Drawings showing water and sewer utilities should be obtained from the New York City Department of Environmental Protection (NYCDEP) or, if in Westchester, then the drawings and or plates should be obtained from the local authority, such as the County Health Department or municipal Departments of Public Works (DPW) and or Buildings (DOB). Drawings can be requested from the NYCDEP by completing the form provided in **Attachment C** and faxing or mailing it using the appropriate contact information listed on the request form. If you have questions you should contact the NYCDEP personnel at the telephone number listed in **Table 1**.

Subterranean Tunnels

Drawings showing locations and depths of tunnels including subways and automobile tunnels and related subsurface infrastructure should be obtained as appropriate by contacting the Metropolitan Transportation Authority as listed in **Table 1**. It is noted that if intrusive activities will be performed in the immediate vicinity of subsurface MTA structures, such as subway or automobile tunnels, a letter submitted to the MTA may be required to request a work permit from MTA. The letter should include a brief summary of the work and a map(s)/drawing(s) of the proposed work and will be submitted to:

Mr. Rajen Ydeshi Outside Projects New York City Transit 2 Broadway, 7th Floor New York, New York 10004

Fiber Optics

As noted above, fiber optic lines are typically not shown Con Edison's utility drawings. Accordingly, the facility engineer should be consulted regarding the presence, and if present, their location as discussed above.

Traffic Control Cables

Drawings and or plates for subsurface traffic control facilities should be requested from New York City Department of Transportation (NYCDOT) or the local/municipal DPW or DOT.

Miscellaneous

Con Edison generally does not maintain plates and drawings showing detailed information of utility distribution on private property. However, as discussed above, facility managers, property owners, Department of Public Works and/or Department of Buildings of the municipality where the site is located, should be contacted in efforts to obtain available utility drawings for the facility. Contact information (e.g., telephone numbers, e-mail addresses, etc.) for municipalities

can typically be obtained by accessing the municipality's website. The name, address and telephone numbers for the Department of Buildings in New York City are listed in **Table 1**.

4.2 Complete Utility Markouts

Due to the diversity and nature of sites investigated by the EH&S Remediation Group and the potential utilities at these sites, an effective mark out will require a Code 753 utility survey with supplemental M-scope survey by Con Edison and or a subsurface utility survey by a private utility-locating contractor. The applicability of each of these surveys is discussed below.

4.2.1 Overview of Utility Markout Methods

Code 753

The Con Edison PM should instruct their consultant and/or contractor to request a Code 753 utility mark out as per the 16 New York City Rules and Regulations (NYCRR) Part 753. Consistent with the One-Call (also called Dig Safe New York) criteria, the request should be made at least 72 hours prior to initiating fieldwork. The telephone numbers of the various one-call systems are listed by region below.

New York City / Long Island: (800) 272-4480 **Westchester** (800) 962-7962

Confirmation that mark outs completed under Code 753, and as received by facsimile or telephone from the participating utility companies, should be documented on spaces provided on the <u>Utility Clearance Checklist</u> (**Attachment B**). The markouts should be maintained by the Con Edison PM or designated representative. If the physical markings on the street/sidewalk become faint or obscure they should be refreshed by over-painting with new paint as needed. When the utility markouts are being refreshed, typically by consultant, contractor, or other project personnel, a Con Edison representative or their designee **MUST** be present and observe this activity.

Con Edison M-Scope Survey

Con Edison engineering groups (see below for contacts) can conduct utility surveys using a 'M-Scope' on a case-by-case basis and will be limited to the engineering group' availability. This tool uses the magnetic susceptibility of subsurface features such as electrical conduits, electric cables, pipes, etc. This method of survey can be subject to interference by other conductive bodies at grade or in the subsurface, such as buried pieces of metal, rebar in concrete, iron-rich soil, etc., and may be ineffective or produce misleading results in these types of conditions. A utility survey using an M-Scope can be requested by contacting the appropriate party listed below. Note for markouts inside substations contact Mark Rimler at (212) 460-3921.

County	Contact Name	Telephone Number
Manhattan	Jane Shin	(212) 894-9345
Brooklyn & Queens	John Haas	(718) 348-6725
Bronx	Greg Kasbarian	(718) 904-4659
Westchester	Faney Bantin	(914) 789-6715
Staten Island	Joseph Nappi	(718) 890-6231

Private Utility Contractor

Prior to mobilizing to the site the following information MUST be provided to and reviewed by the Con Edison PM:

- o the name of the contractor:
- o the name of technician(s) who will perform the utility surveys;
- o for each technician, a summary of experience and training in conducting surveys in a setting similar that at the site (e.g., urban, inside buildings, etc.); and
- o Summary of experience and training of each instrument.

When using a private utility location contractor, the Con Edison PM shall diligently attempt to arrange for the facility or property manager and or engineer, who is most familiar with the utility layout and distribution in the building or on the property to participate in the site walk with the private utility locating contractor during on the first day of conducting the on-site utility survey.

Private utility contractors employ a variety of utility detection and location techniques, which may include:

- o Ground Penetrating Radar (GPR)
- Magnetometer (M-Scope) [for locating metallic and non-metallic pipes and cables]
- o Radio Frequency Induction (RFI) [for locating non-metallic pipes and cables]
- o Electrical Conductivity
- o Electrical Resistance
- Acoustics

Use of multiple methods may permit the detection and surveying of conductive and non-conductive buried utilities.

The utility location contractor **SHALL** specify which utility detection tool/techniques they plan to bring **AND** use at the site. In addition, they **SHALL** bring **ALL** support tools and equipment necessary to allow them access to manholes, vaults, circuit boxes, pipe clean-outs, etc.

At the commencement of a utility survey using a private utility location contractor **AND** prior to them deploying any survey equipment, the utility location contractor **SHALL**, *in cooperation with the Con Edison PM and or their designee:*

- 1) Review **ALL** utility drawings
- 2) Reconcile **ALL** drawings with markouts identified by the Code 753 survey at the property perimeter.
- 3) Determine presence, type and nature of sub-slab utilities and diligently attempt to confirm their configuration during the utility survey.
- 4) Inspect the site to identify/*reconcile* where **ALL** utility service(s) enters and or leaves the property and or building. This **SHALL** include a thorough inspection of building basement(s); boiler and or machine room(s); externally-exposed utility infrastructure including manholes; vaults; electrical, gas, water valves and or meters; etc.
- 5) For work at or adjacent to Con Edison Facilities, conduct the site walk and review the facilities drawings with key Facility Management personnel.
- 6) Visually identify, open and inspect **ALL** relevant utility access-ways including manholes, vaults, gas and or water valves boxes and telephone, *fiber optic* cable, *traffic control lines* and communication boxes.

NOTE: Only circular manholes shall be opened. If opened improperly, rectangular manhole covers can fall into the underlying vault and damage the contained utility (e.g., transformer). If it is anticipated that manholes will need to be opened, Con Edison Transmission and Service Operations (T&SO) shall be contacted prior to conducting the site walk and or utility clearance survey using a private locator.

7) Identify and document **ALL** apparent uncertainties such as manholes containing service lines that apparently go to the building or property, but that cannot be located within the basement of the building or on site.

NOTE: In **ALL** cases, the private utility contractor shall diligently attempt to 'hook-onto' or 'tone' each conduit source (e.g., pertinent electrical conduits in basement, water and or gas valves in valve box, *sewer and or drain pipes*, distribution lines in manhole, *telecommunication lines*, etc.). This may require opening manholes circuit electrical distribution 'trunk' boxes, moving equipment or stored materials at the facility or property to allow access. No project personnel shall enter a manhole or vault unless they are certified and trained in confined space

access, have and know how to use **ALL** pertinent safety equipment, and approved by the Con Edison PM.

In some situations, multiple metallic conduits may be in direct contact in the subsurface. In this circumstance the signal of the locating tool may be transferred from the conduit being 'toned' to an adjacent conduit(s) and may produce a 'secondary' signal. In efforts to understand and identify this occurrence, the location of each apparent signal shall be visually/physically marked using pieces of tape, paint or similar method. The sources being 'toned' shall be numbered and the corresponding signals associated with each signal source shall be marked with the corresponding number at each location where the signals from each source is detected. Accordingly, the resulting mark outs will show apparent multiple conduits for a single source.

4.2.2 Applicability of Utility Clearance Resources

The use of the various utility markout resources that may be employed at various sites is summarized in the table below and discussed in the remainder of this section.

Site Setting	Utility Survey by Con Edison	Utility Survey by Private Contractor	Code 753 (1)
Con Edison Facility	X	X (optional)	\mathbf{X}^{1}
Street / Sidewalk	X (optional)	X (optional)	X
Private Property	X (optional)	X	\mathbf{X}^{1}

⁽¹⁾ At larger Con Edison Properties (e.g., Astoria) or large private or publicly owned properties, a Code 753 survey may not be warranted.

Con Edison Facility

Utility markouts at Con Edison facilities should be coordinated by the Con Edison PM with support from the Construction Management (CM) inspector assigned to the project (if any) and/or *key Facility Management personnel*, as appropriate. At a minimum, an M-Scope survey should be completed. In some circumstances, an independent utility locating contractor should also be used. The decision to use a utility contractor will be made by the Con Edison PM. The use of an independent utility mark-out contractor is strongly recommended at sites where a variety of utilities are known or suspected to be present and which may not be readily identified or mapped using M-Scope alone. A benefit of using a utility locator contractor is that, as described above, they can provide a greater array of tools to locate a variety of subsurface utilities that are non-conductive, such as concrete sewer lines, PVC pipes, etc. in addition to identifying/confirming the presence and location of conductive utilities.

Private Property (including Soil Gas Sampling Probes)

An independent utility locator should be used for utility markouts on private properties. It is noted that utility mark-outs in basements or slab-on-grade constructed buildings may be

inconclusive due to the presence of rebar or welders-mesh commonly used as reinforcement in concrete. Accordingly, a thorough inspection of the basement floor and walls should be performed to identify where utilities enter and leave the building, as well as how the utility (elctric, water gas, steam, etc.) are distributed in the vicinity of the sample locations. Sub- or infloor utilities often enter along the perimeter of the floor, at support columns, and/or along dividing walls. The observation of utilities entering the floor may indicate utilities that lie within or immediately beneath the concrete basement slab. If the location of the utility layout of any such sub- or in-floor utility cannot be effectively determined, then any intrusive work must be discussed with the Con Edison PM and may require that no intrusive activities be performed at that location. However, this action should only be considered after all applicable survey tools and methods have been diligently deployed and or implemented.

Public Street / Sidewalk

A combination of Con Edison utility survey staff and independent utility locator contractors may be used for work areas located in and along roadways. Since Con Edison maintains utilities in streets and along sidewalks, in addition to the mark outs performed through the Code 753 survey, an M-scope survey may also be requested within a 10 foot radius of each proposed sample location. It is noted that due to often heavy work loads of the M-Scope survey staff, this option may not always be available or practicable and should be considered optional.

4.3 Site Walk

After completion of the activities outlined above, a site walk shall be conducted by the Con Edison PM with participation from Construction Management (if it will be providing field oversight), contractors (drillers, soil gas, excavators, private utility location contractor, etc.), Con Edison Facility Managers, NYSDEC (as deemed appropriate by the Con Edison PM), private facility managers/property owners and or owners/operators/representatives of private utilities, such as NYCDOT, municipal DPWs, Westchester Department of Sewer, Westchester County Department of Health, etc. A list of the names and phone numbers of each participant at the site walk will be maintained by the Con Edison PM. The key objectives of the site walk are to:

- o Review the all planned locations where invasive activities will be performed,
- o Adjust the positions of the locations away from utilities as marked out (as necessary)
- O Collectively determine the appropriate utility clearance activities (e.g., test pits, etc.) that will be performed at each location (as described in Section 3.4) and document all decisions and /or concerns using the Utility Clearance Checklist (as described in Section 4.0) and in **Table 2**.

Other site conditions and project issues assessed during the site walk should include:

o Presence and location of overhead utilities and/or obstructions that might prevent the safe operation of drilling /excavating equipment;

- o Presence of, or need for, appropriate grounding for electrical equipment at the site;
- o Site access to equipment;
- o Storage of equipment/supplies overnight (e.g., establish a staging area);
- o Storage and management of investigative derived waste (IDW);
- Hours of on-site work;
- o Permits needed, if any;
- o Review roles and responsibilities of all project personnel who will be onsite;
- o Review site and emergency contacts; and
- o Review anticipated schedule of work and contingency action as deemed appropriate.

4.4 Utility Clearance - Sample Location Confirmation

The appropriate actions necessary to confirm the location and/or absence of utilities, which are agreed on during the site walk and as documented in the Utility Clearance Checklist and in **Table 2**, will be implemented at each sample location during the investigation. As discussed above, and as shown the Utility Clearance Process Flow Chart, the actions will generally include one or more of the following:

- o Moving the location outside the **tolerance zone**, if possible. If no **tolerance zone** is marked out during the utility survey (i.e., only a utility center line is marked), the <u>tolerance zone</u> will be defined in the field as: the distance of one-half of the known diameter of the utility plus two feet on either side of the centerline as marked out.
- o Performing a utility clearance test pit at each location where intrusive work will be performed; and/or
- o Performing a utility clearance test pit using non-mechanical means to expose and physically verify the exact location and configuration of all nearby utilities.

Brief descriptions of the activities that will be completed during the various investigation activities are discussed below.

NOTE: When working within 25 feet of high pressure gas lines (i.e., 125 psig or greater), Gas Emergency Response Center (ERC) shall be contacted [718-319-2330] and notified of the planned activities at least two days prior to start of intrusive work. If working within 5 feet of a transmission main or within 10 feet of the tolerance zone of a main the gas line will be

carefully excavated by hand in accordance with the Gas Operations Standard G-11863, titled "Inspection and Maintenance Requirements Associated with the Excavation Activities Near Gas Pipelines Operating at 125 psig and Above".

Soil Borings / Monitoring Wells

All locations within the tolerance zone should be moved outside the zone, if possible. After moving the location, a utility clearance test pit should be excavated to a minimum of 5-feet below ground surface using non-mechanical methods, such as hand auger, post-hole digger and/or vacuum truck. The diameter of the test pit should be at least two inches wider than the outer diameter (OD) of the mechanized drilling equipment. The 5-foot depth is consistent with the concept that most utilities are typically installed within the top five feet of the subsurface.

NOTE: Utilities may be deeper than five feet due to buildup of surface grade on properties and or streets or right-of-ways. Although the original depth of utilities is anticipated to be within the upper five feet, utilities that are buried in areas that have been built up will presently be deeper by the thickness of the built-up material.

Intrusive investigation locations where physical space prohibits the relocation of proposed sample locations outside the tolerance zone, the adjacent utility(ies) will be exposed by excavating using non-mechanical methods to visually confirm its physical location and configuration. This confirmatory excavation will be completed in addition, a 5-foot excavation at the specific location being investigated (e.g., soil boring, monitoring well boring, etc.), as described above.

Soil Gas Sampling

At soil gas sample locations, test pits will also be excavated to one foot below grade or below the bottom of a concrete floor, if present, prior to installation of soil gas sample probes points. The one-foot depth specified is consistent with the concept that most utilities that could be impacted by the advancement and emplacement of the probe points, such as telephone lines, local electric (e.g., for outdoor lighting), cable television, in-ground sprinkler lines, etc., are typically installed from grade to a depth of one foot.

Basements / Indoor Soil Borings and Monitoring Wells

Prior to installing a soil boring, monitoring well or soil gas sample probe point in the concrete slab of a basement and after identifying that no utilities are present in the floor of the basement or foundation slab (as per Section 3.2.2), an electric powered diamond core drill, concrete saw or jack hammer will be used to advance through the concrete and expose the underlying soil. If sub-slab utilities are suspected of being present, but not confirmed during the utility location survey, the concrete shall be cored or saw cut to an estimated depth of approximately 2/3 the thickness of the concrete (if known). If the thickness of the concrete thickness is not known, it shall be assumed to 8-inches thick. Coring shall proceed at 1-inch increments, with the removal of each one-inch 'plug' of concrete and visual inspection of the core hole to verify the absence of utilities. The remaining 1/3 of the concrete shall be broken using electric jackhammer,

hammer drill or using hand tools. Appropriate safety equipment shall be worn during concrete removal actions.

At each location where soil borings and/or monitoring wells will be installed, a hand excavated test pit will then be advanced to a depth of five feet below the bottom of concrete slab. This test pit should be excavated using hand auger, post-hole digger and/or vacuum truck in tandem with a non-conductive probe rod, which can be used to confirm the absence of utilities to a depth of five feet below the bottom of the concrete slab.

NOTE: The use of a jack-hammer to loosen compact soil during hand excavating a utility clearance test pit is strictly prohibited, except as noted above.

Exploratory Test Pit/Trench

Exploratory test pits/trenches will be performed to identify the presence or absence of subsurface structures related to former operating facilities at the site, such as gas holder foundations at former manufactured gas plant (MGP) sites, and should not be confused with **utility clearance test pits** discussed above. The **exploratory test pits** or **trenches** will typical have dimensions of approximately five feet wide by 10 feet deep by 10 to 20 long, accordingly, excavating them by hand is impracticable. The excavation of **exploratory test pits/trenches** must be approached with heightened awareness as the potential for damaging subsurface utilities, if present, is great.

In efforts to develop a reasonable degree of confidence that utilities will not be encountered during excavation of **exploratory test pits/trenches**, a focused utility survey will be conducted in the area immediately surrounding the test pit or the area defined by a boundary established by measuring two feet perpendicular from all sides of the proposed exploratory test pit boundaries. For example, if the surface dimensions of the exploratory test pit are 10 feet long by 5 feet wide, the surrounding area of the focused utility survey will have dimensions 14 feet long by nine (9) feet wide. It is suggested that the focused utility survey should be completed after all other onsite surveys have been completed. This will allow the surveyor(s) to develop a better understanding of the site-wide subsurface utility configuration.

Following completion of the focused utility survey, **utility clearance test pits** will be excavated by hand to confirm the presence of any and all utilities identified within five feet from the exploratory test pit/trench. After exposing the utilities, the excavator can proceed to excavate the **exploratory test pit/trench**, however, the operator should be experienced with digging in areas where underground utilities may be present and should use the utmost care when performing the excavation. Excavation should proceed slowly enough so that any obstruction/structure encountered can be evaluated and to confirm that the structure is not a utility.

5.0 CHECKLIST COMPLETION

The Utility Clearance Checklist (**Attachment B**), as well as the overall Utility Clearance Process to locate and clear utilities was designed to be dynamic. Accordingly the Utility Clearance Checklist should be updated throughout the process as each utility clearance activity is

completed. During the site walk and after all utility-related issues at each location have been identified and addressed to the satisfaction of all project personnel, the relevant portions of the Utility Clearance Checklist will be completed by the Con Edison PM. It is noted that the Utility Clearance Checklist will be considered complete only after all proposed utility clearance actions identified during the site walk have been successfully implemented and all pertinent information and activities have been documented.

6.0 EXCEPTIONS TO REQUIREMENTS OF THE UTILITY CLEARANCE PROCESS

Due to the inherent diversity and conditions present at project sites, some general exceptions to the utility clearance process are identified below.

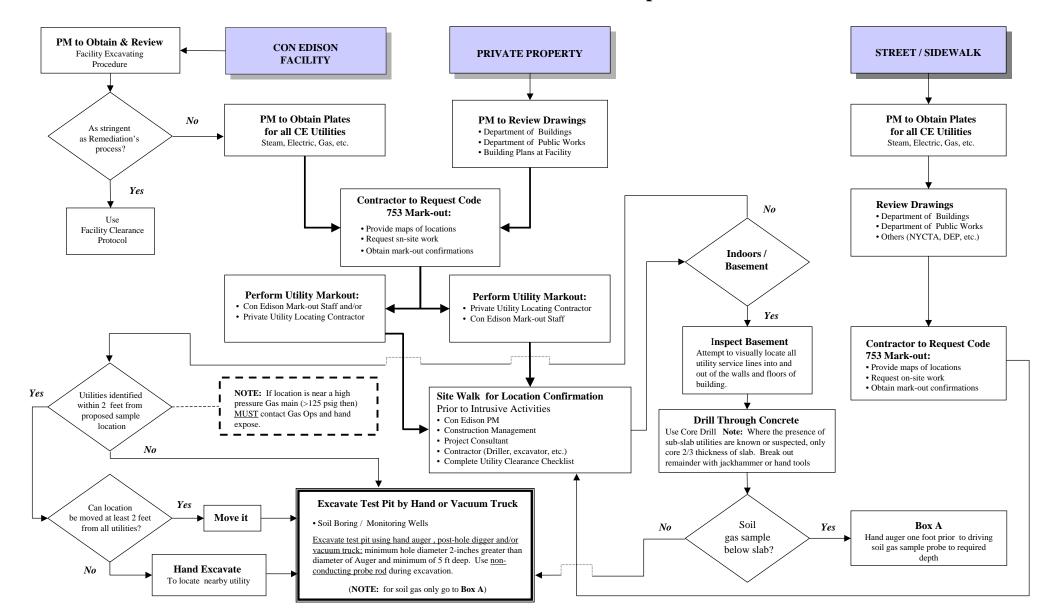
- o Sites where extensive utility mapping has been completed and/or where extensive intrusive activities have already been performed.
- o Locations where facility layout is well documented and understood.
- O Sites or portions of large sites (e.g., Astoria facility) where utilities are known not to exist currently or to not have ever existed throughout the life of the facility, property or site.

All circumstances where one or more steps of this process are not being implemented must be discussed with the Con Edison PM and must be duly documented. Regardless of whether or not exceptions are made during the utility clearance process, a Utility Clearance Checklist should always be completed for each site, in accordance with the terms outlined in Section 4.0 of this document.

ATTACHMENT A

Utility Clearance Process Flow Chart

Utility Clearance Process During Intrusive Activities E H & S – Remediation Group



ATTACHMENT B

Utility Clearance Process Checklist

CHECKLIST FOR INTRUSIVE FIELDWORK

PROJECT BACKGROUND INFORMATION

Site Address: Con Edison Project Mana Con Edison Site Manager Consultant Project Manage Consultant Site Manager Subcontractor (driller, exc Subcontractor's Contact I Meeting / Start Date	ger: : ger:			Phone: Phone:		
Con Edison Site Manager Consultant Project Manager Consultant Site Manager Subcontractor (driller, exc Subcontractor's Contact I	:ger:			Phone:		
Consultant Project Manager Consultant Site Manager Subcontractor (driller, exc Subcontractor's Contact I	ger:					
Consultant Site Manager Subcontractor (driller, exc Subcontractor's Contact I						
Subcontractor (driller, exc Subcontractor's Contact I	·					
Subcontractor's Contact I	cavation, etc):	Subcontractor (driller, excavation, etc):				
Meeting / Start Date	Person:			Phone		
moduling / Otal t Date				Time		
HEALTH AND SAFET	Y PLAN REVIEW					
Name:		Organization:			Date:	
Name:		Organization:			Date:	
Name:		Organization:			Date:	
Health and Safety Form C	ompleted:			Date		_
Site Drawings (yes/no/NA):	(Attach	site figure wit	h proposed boring l	ocations)	
CODE 753 UTILITY MA			Y / N ization:	Initials		
Reference #						
Utility Drawings Received	:	(A	ttach copy of u	ility maps)		
UTILITY INVENTORY	<u>At</u>	oove Ground Serv	ices:		Notification	
Utility	Utility Company Name	Depth (ft)	Phone	Date Notified	Method	Marked
Electric		NA				Y / N
Telephone		NA				Y / N
Cable		NA				Y / N
Overhead Supports		NA				Y / N
		NA				Y / N
Traffic light cables						
Traffic light cables Drawings/Plates Obtained	I (List)					
-	I (List)					

1

CHECKLIST FOR INTRUSIVE FIELDWORK

					Notification	
Utility	Utility Company Name	Depth (ft)	Phone	Date Notified	Method	Marked
Electric						Y / N
elephone						Y / N
Cable						Y / N
Sas			-			Y / N
Vater						Y / N
JST System				<u> </u>		Y / N
Storm				<u> </u>		Y / N
Sanitary						1 / Y
Steam			-			Y / Y
Pipeline Companies						1 / Y
Other (Tunnels, etc.)						1 / Y
_	vice:					
Name of Locating Sei	vice:					
Name of Locating Sei Telephone #/ contact: Name of Operator(s)/ METAL DETECTO	Type of sensing equipment us	sed				
Name of Locating Ser Telephone #/ contact: Name of Operator(s)/ METAL DETECTO Drilling location clear	Type of sensing equipment us R SURVEY ed by	eed	/Contractor) w		Date	
Name of Locating Ser Felephone #/ contact: Name of Operator(s)/ METAL DETECTO Drilling location clear	Type of sensing equipment us R SURVEY ed by	eed			Date:	
lame of Locating Ser elephone #/ contact: lame of Operator(s)/ METAL DETECTO Drilling location clear Consultant / Contract	Type of sensing equipment us R SURVEY ed by	eed (Consultant	/Contractor) w y (initials):	ith a metal detecto	Date:	
Name of Locating Service Felephone #/ contact: Name of Operator(s)/ METAL DETECTO Drilling location clear Consultant / Contract	Type of sensing equipment us R SURVEY ed by or Name LING LOCATIONS MARKE	eed (Consultant	/Contractor) w y (initials): D AND CLE <i>A</i>	ith a metal detecto	_Date:	
Name of Locating Service (September 2) Name of Operator(s)/ METAL DETECTO Drilling location clear Consultant / Contract	Type of sensing equipment us R SURVEY ed by or Name LING LOCATIONS MARKE	(Consultant B ED, M-SCOPE	/Contractor) w y (initials): D AND CLE <i>A</i>	ith a metal detecto ARED Date(s):		
Name of Locating Service Felephone #/ contact: Name of Operator(s)/ METAL DETECTO Drilling location clear Consultant / Contract NTRUSIVE SAMP	Type of sensing equipment us R SURVEY ed by or Name LING LOCATIONS MARKE	(Consultant B ED, M-SCOPE	/Contractor) w y (initials): D AND CLE <i>A</i>	ith a metal detecto ARED Date(s):		
Name of Locating Serice Felephone #/ contact: Name of Operator(s)/ METAL DETECTO Drilling location clear Consultant / Contract NTRUSIVE SAMP Locations Marked M-Scope performe	Type of sensing equipment us R SURVEY ed by or Name LING LOCATIONS MARKE	Consultant B ED, M-SCOPE	/Contractor) w y (initials): D AND CLE <i>A</i>	ARED Date(s): Date(s):		
Name of Locating Ser Felephone #/ contact: Name of Operator(s)/ METAL DETECTO Drilling location clear Consultant / Contract INTRUSIVE SAMP Locations Marked M-Scope performe	Type of sensing equipment us R SURVEY ed by or Name LING LOCATIONS MARKE by: ed by:	Consultant B ED, M-SCOPE	/Contractor) w y (initials): D AND CLE <i>A</i>	ARED Date(s): Date(s):		
Name of Locating Serifelephone #/ contact: Name of Operator(s)/ METAL DETECTO Drilling location clear Consultant / Contract NTRUSIVE SAMP Locations Marked M-Scope performe	Type of sensing equipment us R SURVEY ed by or Name LING LOCATIONS MARKE by: ed by:	(Consultant B ED, M-SCOPE	/Contractor) w y (initials): D AND CLE <i>A</i>	ith a metal detecto ARED Date(s): Date(s): Date:		

CHECKLIST FOR INTRUSIVE FIELDWORK

Site Walk Sign-In Sheet

Project Name:		
Date of Site Walk:		
Name:	Organization:	Phone No.
Name.	Organization.	Priorie No.

Utility Clearance Site Walk Summary Table

Sampling Location	Neares Distance	t Utility Type	Depth	Clearance Required (Y/N)	Accepted Clearance Method	Rationale for Clearance Method	Depth of Clearance	Date Utility Cleared	Findings /Comments
				•					<u>.</u>

Signature of Site Walk Participants -	Remediation PM:	Date Site Walk Conducted:
Cons	truction Management:	
	Consultant PM:	
	Contractor:	

Vincent J. Soriano. Chief New York City Department of Environmental Protection Bureau of Water and Sewer Operations Central Mapping and Records 59-17 Junction Boulevard, 12th Floor Corona, New York 11368

UPDATED PROCEDURES FOR REQUESTING INFORMATION

Effective immediately, the guidelines listed below are to be followed when requesting information pertaining to the water and sewer system. Water information pertaining to water main size and location is processed by this office. Sewer information pertaining to requests for drainage plans (used in sewer design work, drainage work, a drainage plan will not tell you the location of the sewer), interceptors and schematic Inflow/Infiltration (I/I) maps are processed through this office. Requests for information pertaining to the locations of sewers, which are derived from as built drawings, sewer house connections, and water house (tap) connections will not be processed by this office. You must contact the specific borough Permitting and Connection office. Also requests for flow tests are not processed in this office. Requests for information can be mailed to the above address or faxed to (718) 595-5781. Information is not given nor are requests taken over the telephone. A taped message of instructions can be heard by dialing (718) 595-5779. Please do not leave requests at the end of this tape, as they will not be processed.

- 1) All requests must clearly clarify the locations and work that is being done. Specific limits or a clear site plan must be provided. Project limits marked or highlighted on a Hagstrom map, or references to address or block/lot will not be processed. Hagstroms are often illegible and our records are not filed by address and block and lot. You must submit a separate request for each borough. With the increasing amount of work being processed by the Records Unit a completed request form (a blank is attached) must be attached to each request and be completely filled out, especially the description of work being done.
- All corporate requests must be submitted on official company or agency letterhead. Copies
 of letterhead submitted via fax are acceptable.
- 3) All requests must be submitted to this office at least ten days before the work is to be started by your company/agency. Complexity of a request, DEP emergencies to name two situations can cause a slight backlog and a delay in response time. There is also closer scrutiny in the information that is requested and released. While it is understood each job is important to the individual asking for the information, requests are processed in the order in which they are received. This office will make every attempt to meet your needs, but labeling a request an "emergency" or "need it ASAP" will not help the processing, and it is unfair to the other clients.

- 4) If you are faxing your request to our office please do not follow up with a hard copy request later on. With the amount of work performed, there have been instances where staff time is used processing the same request twice.
- 5) If you request to have your records picked up after the research is done rather than have them mailed, please check off the appropriate box on the request form. Our office will hold the package for TWO business days only, and then it will be automatically mailed out. However it is stressed for you to wait for someone from the Records Unit to call and tell you the information package is ready before you come down. This will save you a needless trip if the information is not yet available.

Walk in requests are no longer accepted.

7) Requests covering large areas can no longer be processed. We ask that you break them down and submit them separately for an area no larger than eight blocks. If you have numerous locations please prioritize them and submit the requests to us in the order for the areas you need first.

Please pass this along to colleagues in your company that might also make requests to this office. I thank you in advance for your cooperation.

Vincent J. Soriano
Vincent J. Soriano, Chief
BW&SO Mapping/Records

REV 7/02

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER AND SEWER OPERATIONS CENTRAL MAPPING AND RECORDS
59-17 JUNCTION BLVD. - 12TH FL. CORONA, N.Y. 11368 FAX: (718)595-5781
REQUEST FOR INFORMATION FORM

ADDRESS		
The state of the s		and the same of th
CITY	STATE	ZIP
TELEPHONE #	FAX #	
BOROUGH (Check one)	PURPOSE OF REQUEST FOR W	ATER RECORDS (WORK BEING DONE)
ERONX ()	DRILLING/BORING/EXCAVATI	
BROOKLYN ()	DESIGN() PLANNING/ANAI	
()	PURPOSE OF REQUEST FOR S	
QUEENS ()	SEWER DESIGN() Provid	e latest adopted drainage pla
STATEN ISLAND ()	unless otherwise noted f	or the following sewer type
	STORM() SANITARY() C	
	INFLOW/INFILTRATION ANAL	
	INTERCEPTOR INFORMATION(
E TOU HAVE BEEN RETAIN	ED BY A CITY, STATE OR FEDERA	L AGENCY INDICATE NAME BELOW
AGENCY CONTRACT NUMBER		
POUTOR & BRIEF DESCRIP	tion of the project you are w	ORKING ON THE DESCRIPTIONS THE
	example, designing a new 10"	
irilling contract, etc.	NO REQUEST WILL BE PROCESSED	WITHOUT AN EXPLANATION.
	그리다 얼마 그 이렇게 되는 사람들이 가지 않는 것 같아. 그 사람들은 사람들은 사람들이 되었다.	
	DATE LOANED DA	TE RETURNED
PROJECT FOLDER	DRTE LOANED DA	TE RETURNED
ROJECT FOLDER LOCATION	DRTE LOANED DA	TE RETURNED
PROJECT FOLDER	DATE LOANED DA	TE RETURNED
ROJECT FOLDER		
ROJECT FOLDER LOCATION		
ROJECT FOLDER		
ROJECT FOLDER LOCATION		
PROJECT FOLDER		
LOCATION STREET NAME	FROM	TC.
STREET NAME		70

ATTACHMENT C

Instructions for Obtaining Drawings for Sewer and Water Utilities

From the NYC DEP

Steps for obtaining DEP water maps

- 1) Fill out a "Request for Information Form" for the NYC DEP Bureau of Water and Sewer Operations Central Mapping and Records. Specify the purpose of request and the street names. For faster result, indicate preference for picking up in person.
- 2) Fax the request form to NYC DEP at (718) 595-5781
- 3) If pick up requested, you will receive a phone call when the water maps are ready. The package can be picked up at 59-17 Junction Blvd., 12th Floor, Corona, NY 11368.
- 4) If not picked up after 2 business days, or if pick up was not requested, the package will be mailed to the address provided.

Note: These maps are based on the best information available for the water mains and appurtenances in the streets contiguous to the area specified. Water mains are normally installed at depths ranging from 42" to 48".

Steps for obtaining DEP sewer maps

- 1) Contact NYC DEP Queens borough office at 120-55 Queens Blvd., Kew Garden, NY 11424 at (718) 286-2600. [Teresa Lin]
- 2) Arrange an appointment or best time to stop by their office (1st Floor Room 802). Office hours are Monday to Friday 8:00am 4:00pm.
- 3) Prepare a sewer map request memo, using company letter head, justifying the reason for the request and signed by the project manager. Bring company ID card.
- 4) When arrive at the office, provide them with the request memo, then fill out a slip with applicant information, site location information, and the Index Map # from their hanging map for the specific streets locations.
- 5) Using the Index Map # or #s to get the index maps for sanitary, storm or combined sewers.
- 6) Find the streets on the index maps and record the stick numbers and/or file names marked on those streets.
- 7) Go to the map files room in the back of the office.
- 8) Look for the respective draws that hold each respective stick numbers. The maps are rolled tightly onto a specific numbered stick. Always look for the "Final Map". Photocopies can be made using their copying machine.
- 9) Roll the Map back tightly onto the respective stick and place it back to the correct drawer.
- 10) For the file names, look into the large drawers in the middle of the room. They should be in alphabetical order. Also, place the file back after use to the respective drawer.

Table 1 - Summary Table of Resources for Obtaining Subsurface Utility Plates and Drawings

Utility Type	County	Company	Organization	Name	Telephone Number
Electric	All	Con Edison	Electric Engineering	http://maps/AdvancedMappingSystem.htm ⁽¹⁾	
			For Questions contact:	John Ensemplare (Mgr. – B&Q)	(718) 802-5540
				Mike Mitchell (Mgr. – Manhattan)	(212) 460-1119
				Richard Mariani (Mgr. – Westchester)	(914) 925-6026
Gas	All	Con Edison	Gas Engineering	http://maps/steam.htm ⁽¹⁾	
			For Questions contact:	Mike Verlizzo (Mgr.)	(718) 319-2357
Steam	All	Con Edison	Steam Engineering	http://maps/steam.htm ⁽¹⁾	
			For Questions contact:	Tony Barbera	(212) 460-4843
Sewer /Water	NYC	NYC DEP /	Bureau of Water and Sewer Operations	Vincent Soriano/ Doug Greely	(718) 595-5330
Tunnels	Subway Crossing the East River	MTA	Outside Projects – Adjacent Work	Vasanth Battu/ Rajen Ydeshi / [If drilling in immediate vicinity of MTA structure, e.g., subway tunnel, car tunnel, etc., you will need submit a letter and plan drawing(s) to Mr. Ydeshi]	(646) 252-4473 (646) 252-3641
	Crossing the Hudson River	Port Authority of NY/NJ	Surveying	Richard Danko (rdanko@panynj.gov) Bill Kane (wkane@panynj.gov)	(201) 595-4841 (201) 595-4842

^{(1) &}quot;Maps" website listed is accessible on the Con Edison Intranet.

Attachment 2 Utility Contact Prevention Checklist





NOTE: Utility mark-out requirements vary from state to state; consult state authorities before beginning work.

Purpose: This form is intended to help the Field Lead confirm that underground or overhead utilities are identified to the extent practicable and consistent with applicable regulations **PRIOR** to site work.

INVESTIGATIONS MUST NOT OCCUR UNTIL MULTIPLE LINES OF EVIDENCE INDICATE THAT SUBSURFACE OR OVERHEAD UTILITIES ARE NOT PRESENT IN THE WORK AREA

Project Name/No:	Date:		-				
Field Lead:	Project Ad	ldress:					
Project Manager:	Health & Safety Officer:						
Emergency Contact Information for One Call:							
Duration/Summary of Work to be Performed:							
Consideration	Ch	eck	Explanation	Initial			
Has the state One Call been contacted?	☐ Yes	□ No					
Has the property owner or client been contacted for local knowledge of utilities, as applicable?	☐ Yes	□ No					
Does the property owner or client have specific utility contact prevention procedures and, if so, have they been completed?	☐ Yes	□ No					
Are any as-built drawings available? If so, do they show any utilities?	☐ Yes	□ No					
Has a visual inspection of the work area(s) been completed?	☐ Yes	□ No					
Has the potential presence of in-water utilities been assessed (shore markers, streets dead-ending at water's edge, etc.)	☐ Yes	□ No					
Is evidence of electrical utilities present? (electric meters on structures, conduits, overhead lines, light poles, etc.)	☐ Yes	□ No					
Is evidence of water/sewer utilities present? (water meter, hydrants, restrooms, grates in ground, etc.)	☐ Yes	□ No					
Is evidence of telecommunications utilities present? (fiber optic warning signs, conduits from utility poles, wall-mounted boxes, etc.)	☐ Yes	□ No					
Is other evidence of utilities present? (unknown ground markings, manholes or valve covers, "Call Before You Dig" signs, linear asphalt or concrete repair characteristics, liner subsidence of ground surface, pin flags or stakes, etc.)	☐ Yes	□ No					





Utility Contact Prevention Checklist



NOTE: Utility mark-out requirements vary from state to state; consult state authorities before beginning work.

	Ch	eck	Explanation	Initial
Has a private locating service been contacted?	☐ Yes	□ No		
Were any utilities identified and marked out through a private locating service? If so, duplicate mark-outs on site drawings.	☐ Yes	□ No		
Are there any fiber optic cables, fuel lines, or high- pressure lines within 50 feet of work locations?	☐ Yes	□ No		
If fiber optic cables, fuel lines, or high-pressure lines are within 50 feet, has an agreement with the utility owner been established?	☐ Yes	□ No		
Can a test borehole be advanced by hand digging, probing, post-hole digging, and/or air knifing to 5 feet below ground surface (bgs)?	☐ Yes	□ No		
If hand digging, probing, post-hole digging, and/or air knifing to 5 feet bgs is not possible, can a non-invasive geophysical investigation be conducted? If not, why?	☐ Yes	□ No		
Other considerations:	•	•		
NOTE: Please fill in second page and attach additio Confirmation Number:	nal reports	s, drawing	s, or other information, as ne	cessary.
Contact Name:	Organi	zation:		
Contact Date:	Organi			
-				
Contact Date:				
Contact Date:	_			
Contact Date:	_			
Contact Date:	_			
Contact Date: Response:	_		Date	
Contact Date: Response: Completed by:	_		Date	





Standard Operating Procedure

Monitoring Well Decommissioning

SOP 006

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for the decommissioning of groundwater monitoring wells. Monitoring wells may be decommissioned when it is found that they are no longer suitable for collection of groundwater data (i.e., groundwater quality or groundwater elevation) due to damaged and/or questionable construction, when they must be removed to avoid interference to/from other construction activities in the area, or when groundwater monitoring is no longer required at the location.

This SOP describes the equipment, field procedures, materials, and documentation procedures necessary to properly remove the above-mentioned wells. The details within this SOP should be used in conjunction with the project work plan.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the decommissioning procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

3. Summary of Method

This SOP covers the decommissioning of groundwater monitoring wells when a replacement well will not be installed within the same borehole. Three potential decommissioning methods (i.e., plugging in place, casing removal, and overdrilling) are described below.

4. Personnel Qualifications

The well decommissioning procedures described below will be carefully adhered to and will be conducted under the supervision of an experienced geologist, engineer, or other qualified individual. If the overdrilling decommissioning method is utilized, drilling activities will be conducted by a

qualified well driller. Training requirements for direction of well decommissioning activities include reviewing this SOP, other applicable SOPs, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and first aid and cardiopulmonary resuscitation [CPR] training) as needed.

5. Equipment List

Equipment and materials that will be used for overseeing and directing the well installation and development may include the following:

- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Water-level indicator or interface probe
- Indelible ink pen
- Well keys
- Camera
- Whiteboard with erasable markers
- Indelible ink pen
- Field logbook; well decommissioning record field forms
- Information concerning the construction of the well to be decommissioned

This list does not include equipment that will be provided by subcontracted well drillers. However, to address potential releases to the environment, the following equipment is required in addition to all necessary supplies for well decommissioning:

- Spill-containment and clean-up kit
- Secondary containment for drill rig and all equipment that contains fuels or hydraulic fluids

6. Cautions

The depth and volume of the borehole, including the over-drilling, if applicable, must be calculated, and the appropriate materials for well removal/backfill and investigation-derived waste (IDW) handling must be procured prior to drilling activities.

Special care must be taken to minimize or prevent inadvertent cross-contamination between well/borehole locations.

7. Health and Safety Considerations

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project HASP. The HASP will be followed during all activities conducted by Anchor QEA personnel and subcontractors.

The site-specific HASP and subcontracted driller's HASP will be used to guide the decommissioning of the wells in a safe manner. Job Safety Analyses (JSAs) will be prepared for well decommissioning oversight by Anchor QEA and subcontractors. The following specific health and safety issues must be considered when decommissioning the wells:

- Underground and overhead utility hazards must be mitigated prior to drilling.
- Drilling rigs and equipment present a variety of safety hazards. Drill rigs must be inspected
 each day prior to use. All personal must know where the emergency "kill" switch is, and the
 switch must be tested daily. Only the drill rig operator and helper may approach the rig
 during drilling activities.
- Air monitoring will be conducted for chemicals at action level as established in the site-specific HASP.
- Appropriate PPE must be worn.
- Potential hazards from working in a public area and potential hazards to the public by drilling and well installation activities must be addressed before activities begin and as conditions change.
- Waste generated during the well installation must be properly managed in accordance with facility and applicable regulatory requirements.

8. Procedure

Three potential well decommissioning methods (i.e., plugging in place, casing removal, and overdrilling) are described in this section. The most appropriate method will be selected and implemented for the removal of groundwater monitoring wells.

8.1 Plug-in-Place Method

The plug-in-place method is applicable at locations where available information indicates that the annular space contains an adequate seal and vertical migration of constituents across a confining layer is not a concern in the well casing and screen interval, or if other considerations (e.g., double-cased well construction) preclude removal of the well casing. The well screen is left in place and may be additionally perforated, along with the base of the well, to allow the grout seal to penetrate the surrounding filter pack.

The decommissioning process will consist of the following steps:

- 1. Perform a search of available records concerning the well to be decommissioned. The following activities should be performed to identify the location, construction, and condition of the well, and to determine the appropriate equipment to utilize based on the depth, diameter, and access to the monitoring well:
 - a. Review the existing monitoring well log to identify construction characteristics (e.g., total depth, casing diameter, initial borehole diameter, type of casing, type of material(s) used).
 - b. Locate the monitoring well in the field.
 - c. Identify if the decommissioning equipment can access the monitoring well and/or if special considerations (e.g., construction of an access road) are necessary to gain access.
 - d. Conduct total depth measurements and water level measurements.
 - e. Calculate volume of well that will need to be filled utilizing field measurements and formulas provided below.
 - f. Record all observations and measurements.
- 2. Remove the protective casing and well casing to a depth of approximately 3 to 4 feet below grade, if possible.
- 3. Perforate the base of the well screen, utilizing a length of drilling rod or other equipment.
- 4. Prepare a neat cement grout (Note: A neat cement grout is preferred for application through an in-place well, whereas a bentonite/cement grout or bentonite pellets may also be considered at locations where the well casing is removed or the well is overdrilled).
- 5. Place the cement grout in the perforated well casing via tremie method (i.e., the grout will be pumped from the bottom of the well upward). The grout will be added until the well is filled to above the top of the well casing remaining in place (i.e., typically approximately 3 to 4 feet below ground surface). Verify that the amount of grout added equals or exceeds the calculated volume of the void to be filled.
- 6. The grout will be allowed to set for a minimum of 24 hours and the remainder of the borehole will be filled with concrete and/or other surface finish materials (see Step 7 below).
- 7. Where appropriate, a concrete surface finish will be installed by constructing an above grade concrete slab a minimum of 6 inches thick, with a diameter at least 2 feet greater than the diameter of the borehole. If such a concrete surface finish is not compatible with the existing land use (e.g., roadway, parking lot, residential, etc.) the borehole shall be terminated with a minimum 1-foot-thick concrete plug above the grout and the remaining portion of the borehole shall be filled flush with grade with material(s) compatible with the surrounding land surface (e.g., asphalt, gravel, topsoil, etc.).

8.2 Casing Removal Method

The casing removal method is applicable at shallow locations where vertical migration of constituents across a confining layer is not a concern and where the integrity of the borehole is reasonably expected to be maintained following removal of the well materials.

The decommissioning process will consist of the following steps:

- 1. Perform a search of available records concerning the well to be decommissioned. The following activities should be performed to identify the location, construction, and condition of the well, and to determine the appropriate equipment to utilize based on the depth, diameter, and access to the monitoring well:
 - a. Review the existing monitoring well log to identify construction characteristics (e.g., total depth, casing diameter, initial borehole diameter, type of casing, type of material(s) used).
 - b. Locate the monitoring well in the field.
 - Identify if the decommissioning equipment can access the monitoring well and/or if special considerations (e.g., construction of an access road) are necessary to gain access.
 - d. Conduct total depth measurements and water level measurements.
 - e. Calculate volume of well that will need to be filled utilizing field measurements and formulas provided below.
 - f. Record all observations and measurements.
- 2. Remove the protective casing, if possible.
- 3. Remove the well casing (riser and screen).
- 4. Examine removed well casing to ensure that the entire section has been removed. Also ensure that borehole has not collapsed and that tremie pipe will be able to be inserted to the base of well depth. Well decommissioning should be completed by using the overdrilling method if the well casing is broken below grade and cannot be retrieved, or if the tremie pipe will not reach the base of the well.
- 5. Prepare a neat cement grout, or a bentonite/cement grout that is compatible with the soil and groundwater conditions present at the monitoring well (Note: A neat cement grout or a bentonite/cement grout is preferred for this application. Bentonite pellets or hole plug may also be considered if the entire well boring is overdrilled, similar to procedures used to abandon boreholes).
- 6. Place the cement grout in the borehole via tremie method (i.e., the grout will be pumped from the bottom of the borehole upward). The grout will be added until the borehole is filled to approximately 3 to 4 feet below ground surface. Verify that the amount of grout added equals or exceeds the calculated volume of the void to be filled.
- 7. The grout will be allowed to set for a minimum of 24 hours and the remainder of the borehole will be filled with concrete and/or other surface finish materials (see Step 8 below).

8. Where appropriate, a concrete surface finish will be installed by constructing an above grade concrete slab a minimum of 6 inches thick, with a diameter at least 2 feet greater than the diameter of the borehole. If such a concrete surface finish is not compatible with the existing land use (e.g., roadway, parking lot, residential, etc.) the borehole shall be terminated with a minimum 1-foot-thick concrete plug above the grout and the remaining portion of the borehole shall be filled flush with grade with material(s) compatible with the surrounding land surface (e.g., asphalt, gravel, topsoil, etc.).

8.3 Overdrilling Method

The over-drilling method is the most conservative decommissioning procedure and should be utilized at locations where a well has penetrated a confining layer and there is no evidence that the annular space around the well casing was adequately sealed, or if attempts to remove the well casing are unsuccessful.

The decommissioning process will consist of the following steps:

- 1. Perform a search of available records concerning the well to be decommissioned. The following activities should be performed to identify the location, construction, and condition of the well, and to determine the appropriate equipment to utilize based on the depth, diameter, and access to the monitoring well:
 - a. Review the existing monitoring well log to identify construction characteristics (e.g., total depth, casing diameter, initial borehole diameter, type of casing, type of material(s) used).
 - b. Locate the monitoring well in the field.
 - c. Identify if the decommissioning equipment can access the monitoring well and/or if special considerations (e.g., construction of an access road) are necessary to gain access.
 - d. Conduct total depth measurements and water level measurements.
 - e. Calculate volume of well that will need to be filled utilizing field measurements and formulas provided below.
 - f. Record all observations and measurements.
- 2. Remove the protective casing, if possible.
- 3. Advance a hollow stem auger or other drill casing—with an outside diameter larger than the well diameter—over the well casing to the bottom of the original borehole.
- 4. Prepare a neat cement grout, or a bentonite/cement grout that is compatible with the soil and groundwater conditions present at the monitoring well. Alternatively, bentonite pellets or hole plug may be used, similar to procedures used to abandon boreholes.
- 5. Place the cement grout in the borehole via tremie method (i.e., the grout will be pumped from the bottom of the borehole upward) at the same time the hollow-stem augers or drill casing are removed from the borehole. The grout will be added until the borehole is filled to approximately 3 to 4 feet below ground surface. Verify that amount of grout added equals or exceeds the

calculated volume of the void to be filled. If bentonite pellets are utilized, measure deposition depth with a weighted tape as the hollow-stem augers or drill casing are removed from the borehole to ensure that bridging does not occur. At certain shallow well locations installed in competent formations, it may be possible to remove the hollow-stem augers or drill casing prior to installing the sealant. If this is attempted, confirmatory measurements must be taken to verify that borehole integrity was maintained prior to plugging the hole.

- 6. The grout will be allowed to set for a minimum of 24 hours and the remainder of the borehole will be filled with concrete and/or other surface finish materials (see Step 7 below).
- 7. Where appropriate, a concrete surface finish will be installed by constructing an above grade concrete slab a minimum of 6 inches thick, with a diameter at least 2 feet greater than the diameter of the borehole. If such a concrete surface finish is not compatible with the existing land use (e.g., roadway, parking lot, residential, etc.) the borehole shall be terminated with a minimum 1-foot-thick concrete plug above the grout and the remaining portion of the borehole shall be filled flush with grade with material(s) compatible with the surrounding land surface (e.g., asphalt, gravel, topsoil, etc.).

9. Calculation/Verification of Volumes

To assure that a well is properly plugged and that there has been no bridging of the plugging materials, verification calculations and measurements are required to determine whether the volume of material placed in the well/borehole equals or exceeds the volume of the void that is being filled. Some useful formulas for calculating well and material volumes are provided below.

- 7.481 gallons = 1 cubic foot
- 202.0 gallons = 1 cubic yard
- Volume of well/borehole (in gallons) = π TIMES well/borehole radius (in feet) squared TIMES length of well/borehole (in feet) TIMES 7.481 (gallons per cubic foot)

10. Waste Management

IDW, rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

11. Data Recording and Management

All information relevant to the well decommissioning beyond the items identified in the Well Decommissioning Record (Attachment 1) will be recorded by Anchor QEA field staff using the field logbook. Field equipment decontamination activities and waste management activities will be

recorded in the field logbook. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

12. Quality Assurance

It is the responsibility of the field team leader to periodically check to ensure the procedures are in conformance with those stated in this SOP.

Attachments

Attachment 1 Well Decommissioning Record

Attachment 1 Well Decommissioning Record

MONITORING WELL DECOMMISSIONING RECORD

	WELL/BORING NO:		
PROJECT NUMBER:		START DATE:	
PROJECT NAME:		FINISH DATE:	
LOCATION:			
		DRILLING CONTRACTOR:	
CLIENT:		INSPECTOR:	
WELL SCHEMATI	C & CONSTRUCTION MATERIALS		DECOMMISSIONING INFORMATION
<u>SKETCH</u>	WELL TYPE ☐ Stickup ☐ Flushmount		CASING REMOVAL METHOD:
	OUTER CASING PVC Stainless Carbon Other	$\parallel -$	GROUTING
	BOREHOLE DIMENSION	Calculated Bor	rehole Volume:
	Diameter (in):		Cement Type:
	Total Depth (ft):	Cement	Quantity (lbs):
	SURFACE SEAL	Bentonite	Quantity (lbs):
	Concrete Cement Grout Soil	Water	Quantity (gal):
	Total Depth (ft):	Actual	Grout Volume:
	FILTER PACK SEAL Bentonite Pellets Bentonite Grout Cement Grout Other Total Depth (ft):		SURFACE FINISH
	FILTER PACK Sand Gravel Soil Other Total Depth (ft):		
	WELL CASING PVC Stainless Carbon Other Diameter (in):		COMMENTS
	Total Depth (ft): WELL SCREEN PVC Stainless Carbon		
	Other Diameter (in):	II	
	Total Depth (ft):		
	WELL CLIMP	III	
	WELL SUMP Total Depth (ft):		
	= π X well/borehole radius (in feet) squared X lengreet) X 7.481 (gallons per cubic foot)	th	



Standard Operating Procedure

Sonic Drilling and Soil Sampling

SOP 007

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for the drilling and sampling of fill and unconsolidated soils for site characterization purposes utilizing sonic drilling methods.

This SOP describes the equipment, field procedures, materials, and documentation procedures necessary to perform the above-mentioned soil investigations. The details within this SOP should be used in conjunction with the project work plan.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

3. Summary of Method

The subsurface investigations to be completed will use the sonic drilling method. This method typically uses dual casings that are independently resonated into the subsurface. Soil samples covering the entire length of the core run can be extruded from the inner core barrel. Alternatively, undisturbed soil samples can be obtained by standard sampling tools such as split-spoon samplers or Shelby tubes.

Prior to any drilling, field crews will manually clear the uppermost 5 feet at each location in accordance with the procedures described in SOP 005: Utility Clearance. Manual clearing will be accomplished with shovels or post-hole diggers provided they have fiberglass handles or via non-intrusive methods such as an air knife or soil vacuum. The objective of the manual clearing is to visually inspect the uppermost 5 feet as a final check for buried utilities not identified during the

public mark-out or private utility locate. Once the location has been manually cleared and verified by the Anchor QEA field team, then the borehole can be drilled, or the center of the cleared hole can be marked and backfilled to be drilled later.

4. Personnel Qualifications

Only qualified personnel will lead direct-push drilling and field screening activities. Training requirements for direction of these activities include reviewing this SOP, applicable SOPs provided by subcontractor and/or manufacturer, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for data and sample collection.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and at least one on-site representative from Anchor QEA and the subcontractor certified in first aid and cardiopulmonary resuscitation [CPR] training) as needed.

5. Equipment List

Equipment and materials that will be used for overseeing and directing sonic drilling activities may include the following:

- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Indelible ink pen
- Tape measure
- Putty knife or other tools for inspection of recovered soil samples
- Camera
- Whiteboard with erasable markers
- Air monitoring equipment
- Soil description aids (e.g., Munsell color chart and grain or size charts)
- Field logbook; field forms for core collection, well construction, and well development; or notebook with relevant forms
- Safety knife or scissors
- Photo-ionization device with appropriate lamp and calibration gas

This list does not include equipment that will be provided by subcontracted environmental drillers. However, to address potential releases to the environment, the following equipment is required in addition to all necessary supplies for well installation and development:

- Spill-containment and clean-up kit
- Secondary containment for drill rig and all equipment that contains fuels or hydraulic fluids

6. Cautions

The depth and volume of the borehole, including the over-drilling, if applicable, must be calculated, and the appropriate materials for investigation-derived waste (IDW) must be procured prior to drilling activities. Special care must be taken to minimize or prevent inadvertent cross-contamination between borehole locations.

No lubricating oils or grease should be used on casing threads. No glue of any type should be used to secure casing joints. Teflon O-Rings can be used to ensure a tight fit and minimize leakage; however, O-Rings made of other materials are not acceptable if the boring is going to be sampled for organic compound analyses.

7. Health and Safety Considerations

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project HASP. The HASP will be followed during all activities conducted by Anchor QEA personnel and subcontractors.

The site-specific HASP and subcontracted driller's HASP will be used to guide the installation of the wells in a safe manner. Job Safety Analyses (JSAs) will be prepared for well installation oversight by Anchor QEA and subcontractors. The following specific health and safety issues must be considered when installing the wells:

- Underground and overhead utility hazards must be mitigated prior to drilling.
- Drilling rigs and equipment present a variety of safety hazards. Drill rigs must be inspected
 each day prior to use. All personal must know where the emergency "kill" switch is, and the
 switch must be tested daily. Only the drill rig operator and helper may approach the rig
 during drilling activities.
- Air monitoring will be conducted for chemicals at action level as established in the site-specific HASP.
- Appropriate PPE must be worn.
- Potential hazards from working in a public area and potential hazards to the public by drilling and well installation activities must be addressed before activities begin and as conditions change.

 Waste generated during the well installation must be properly managed in accordance with facility and applicable regulatory requirements.

8. Soil Boring, Logging, and Sampling Procedure

Prior to initializing drilling, any surface or potential subsurface conditions (e.g., utilities) that may impact the scope of work must be documented and reported to the project manager immediately, prior to continuing work. The subsurface soil investigation procedures are outlined as follows:

- 1. A sonic drill rig will be used to position itself at each target station for soil investigation.
- 2. The borehole should be drilled as close to vertical as possible. Prior to beginning any drilling or sampling, ensure the rig is level by checking with a plumb bob or level. Deviation from plumb should be within 1°per 50 feet of depth.
- 3. The uppermost 5 feet of each boring will be excavated via hand-digging or air-knifing techniques prior to any intrusive work. Procedures are outlined in the site-specific HASP and SOP 005: Utility Clearance.
- 4. Once the uppermost 5 feet has been cleared, the inner core barrel is sonically advanced into undisturbed soils. Core runs will typically be 10 feet but may be modified based on project requirements.
- 5. Sonically override the inner core barrel with the outer casing to the same depth penetrated by the inner core barrel. This casing is utilized to maintain the borehole when the inner core barrel is removed.
- 6. Remove the inner core barrel to the surface and extrude the soil sample contained within it into plastic sleeves. Mark the top and/or bottom depth of the core run interval on the plastic sleeve and indicate the orientation of the soil core.
- 7. Transfer the bagged soil cores into a wooden core box until they can be opened for examination.
- 8. With the initial soil core removed, a cutting tool will be used to open the core liner and a visual description of the soil will be recorded onto a Soil Boring Log (Attachment 1) with the aid of a Soil Visual Description Key (Attachment 2). Cores will be screened with a photoionization detector (PID) and results will be recorded in the field notes. For each core segment, a representative photograph will be taken with a place card of the sample station, and the date. A ruler will be visible in the photograph.
- 9. If undisturbed soil samples are required, they can be collected through the outer casing.
- 10. After removing the soil core, the inner core barrel will be decontaminated and then re-inserted into the borehole through the in-place outer casing to collect the next soil core interval.
- 11. Additional casing lengths will be added to advance the inner core barrel and outer casing thru the next interval.
- 12. Repeat Steps 4 through 11 until target depth is reached or until refusal.

- 13. All material from processed cores, decontamination fluids, and used PPE will be containerized as IDW and disposed of according to SOP 011: Investigation-Derived Waste.
- 14. All field activities will be documented, including core collection activities and core processing.

9. Waste Management

Investigation derived waste (IDW), rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

10. Data Recording and Management

All information relevant to the drilling will be recorded by Anchor QEA field staff using the field logbook. Field equipment decontamination activities and waste management activities will be recorded in the field logbook. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

11. Quality Assurance

It is the responsibility of the field team leader to periodically check to ensure the procedures are in conformance with those stated in this SOP.

Attachments

Attachment 1 Soil Boring Log

Attachment 2 Soil Visual Description Key

Attachment 1 Soil Boring Log



Remarks:

CLIENT/PROJECT NAME:	BORING #
PROJECT NUMBER:	DATE BEGAN:
GEOLOGIST/ENGINEER:	DATE COMPLETED:
DRILLING CONTRACTOR:	TOTAL DEPTH:
DRILLING METHOD:	SHEET OF

LOG OF							DRILL	NG ME	THOD:	SHEET OF
EXPLORATORY BORING						HOLE	DIAME	TER:		
				MPLI		\TA			7	Field location of boring
R*	WELL OR PIEZOMETER DETAILS	LING	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)		DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	5
OTHER*	WELL PIEZC DETAI	SAMPLING METHOD	SAMP	FID / F	RECO	BLOWS / 6 INCHES	DEPTI	DEPTI	SOIL (LITHOLOGIC DESCRIPTION
									ŀ	
									1	
		-							1	
									1	
									1	
]	
		1	Ī	I	Ī	I			I	

Attachment 2 Soil Visual Description Key



Visual soil descriptions consist of the following:

Moisture content, density/consistency, color, minor constituent, MAJOR CONSTITUENT/GROUP NAME; structure descriptions (as needed); amount and shape of minor constituents (e.g., organics and anthropogenics); biota; odor; sheen

Recovered and in situ depths

Recovered = measured in the laboratory, actual soil depth from core tube

Soil Description Terminology										
1. Moisture Content										
Dry Little perceptible moisture (upland only)										
Moist	Moist Probably near-optimum moisture content, no visible water (most soil)									
Wet Visible free water, probably above optimum										
	2. Density (Core Drive Penetration and Finger Pressure)									
SAND or GRAVEL										
Density	Visual	Notes								
Very loose	Freefall	May occur at the top of a core								
Loose	Easy penetration	iviay occur at the top of a core								
Medium dense	Moderate penetration	Typically down core due to compaction or compression								
Dense	Hard penetration	Bottom of a core, typical to glacial deposits								
Very dense	Refusal	Bottoni of a core, typical to glacial deposits								
	SIL	T or CLAY								
Consistency	Visual	Notes								
Very soft	Freefall	Soupy, not cohesive								
Soft	Easy penetration	Easily penetrated, just starting to be cohesive								
Medium stiff	Moderate penetration	Cohesive, molded by finger pressure								
Stiff	Hard penetration	Can indent and mold by stiff finger pressure								
Very stiff/hard	Refusal	Modeling clay (rolls to a ball)								
		r and Shading								
Ex	kample Colors	Shades								
	Black	Light								
L.	s (olive, yellow, red)	Dark								
Grays	(gray, olive, brown)	Very dark								
		ninor color within the larger color unit								
		MAJOR Group Name								
	Gravel	Silt								
	Sand	Clay								
* MAJOR is written in a										
·	constituent precedes MAJOR const									
	or Constituents	Percent								
	ay, silt, sand, gravel)*	0 to 5								
	rey, silty, sandy, gravelly)	5 to 15								
	silty, sandy, gravelly	15 to 30								
	y, silty, sandy, gravelly)	30 to 50								
	GROUP NAME	Greater than 50								
For trace minor constituents, place after MAJOR constituent										



Soil Description Terminology									
Descriptors									
	Rounding								
Sand and Gra	vel Sorting								
	Grain color								
5. Other Minor Constituents: % by volume (e.g., organics and anthropogenics)*									
Other Mino	r Constituents*	Percent							
T	Trace	0 to 5							
Occ	casional	5 to 10							
Mo	oderate	10 to 30							
Sub	stantial	30 to 50							
	*Separate major from other	minor constituents with a period							
	6	. Biota							
	Marsh grass,	shells, worms, etc.							
	7. Odo	Descriptions							
	(No odor dete	ected unless noted)							
Int	tensity	Odor Types							
	e (faint)	Petroleum-like							
	te (obvious)	Naphthalene-like							
Strong (ov	verwhelming)	H₂S-like (Hydrogen sulfide-like)							
	<u> </u>	Septic-like							
		Solvent-like							
		Metallic-like							
	8. Vis	ual Impacts							
	8a. Sheen (No shee	n observed unless noted)							
	(Modified fro	m ASTM F2534-06)							
Components of a sheen des	scription: Start and end depths	, modifier describing relative sample surface area with sheen,							
sheen color, description of	sheen distribution (e.g., continu	ious, present as 0.5-inch spots, etc.)							
Silvery	Metallic, silver/gray color	ed							
Rainbow	Multicolored								
Dark Rainbow	Multicolored with some d	ark metallic or brown/black coloring							
Dark	Dark metallic or brown/bl	ack colored							
	Sheen Distrik	oution Terminology							
Streaks	Flat, lines of sheen (describe size and number)								
Florets	Semi-circular, flat, spots o	Semi-circular, flat, spots of sheen (described size and number)							
Covered	Sheen appears continuou	s over a portion of the sample surface							
Distinguishing hydrocarbor	n-sheen from biological-sheen:	If disturbed, a hydrocarbon-sheen will typically coalesce, where							
an inorganic sheen will brea	ak apart and has a blocky appea	rance							



Low viscosity

		odifiers						
Amo		Percent						
Tra		Less than 2						
Slig		2 to 15						
Mode	erate	15 to 40						
Moderate	to heavy	40 to 70						
Неа	avy	Greater than 70						
	Soil Descrip	tion Terminology						
	8b. Nonaqueou	s Phase Liquid (NAPL)						
frequency/percent of sample	Components of a NAPL description: Start and end depths, color, amount (droplets, covered, soaked); droplet frequency/percent of sample covered or soaked; viscosity							
Note: Observations of sheen and included in the notes sect		ipment during sampling will be recorded on the sampling log						
Blebs	•	als of NAPL, but for the most part, the soil matrix was not visibly d. Typically this is residual product. The estimated size and e reported.						
Coated		NAPL. There is not sufficient NAPL material present to saturate ree of coating should be described as light, moderate, or heavy.						
Saturated	taken to ensure that wate	pace for a sample is saturated with the NAPL. Care should be r saturating the pore spaces is not observed when using this sity, NAPL-saturated materials may freely drain from a soil						
	Relativ	ve Viscosity						
High viscosity		Taffy-like						
Viscous	No. 6	fuel oil or bunker crude-like (molasses-like)						

Nonaqueous phase liquid (NAPL): NAPL is generally classified as light NAPL (LNAPL) if the density is less than that of water (i.e., will float on water) and dense NAPL (DNAPL) if the density is greater than that of water (i.e., will sink in water). Use a shake test to identify whether observation NAPL is an LNAPL or DNAPL.

No. 2 fuel oil-like





Soil Description Terminology								
	9. Structure and Other soil Descriptions							
Hummocky	Cohesive soil that can be broken down into smaller lumps							
Gummy	Cohesive, pliable soil with high percentage of clay							
Bed	Greater than or equal to 0.5 inch thick							
Thin bed	Less than 0.5 inch thick							
Pockets	Semi-circular to circular inclusion/deposit							
Laminated beds	Thin beds (less than 0.5 inch thick) lying between or alternating within a greater unit							
Stratified beds	Beds (greater than 0.5 inch thick) lying between or alternating within a greater unit							
Organic matter	Mass of leaves, twigs, wood, etc.							
Anthropogenic material	Material originated from industrial activity such as coal fragments, slag, etc.							
Aggregates	Industrial waste products							
Anthropogenic debris	Debris originated from human activity such as trash, plastic, etc.							
Decomposed	Visible sign of decomposition or discoloration							
Fresh	No visible sign of decomposition or discoloration							
Winnowed	Loss of material that occurred during coring, creating a washed-out void space							

Notes:

@ symbol indicates one single piece of the material (when not accompanied with a "grades to" or contact) Acronyms/terms used in core logs:

NAPL = nonaqueous phase liquid

Native = Soil deposited prior to the physical influence of humans on the natural environment

PID = Photoionization detector, measures volatile organic compounds (VOCs)

^{* =} Classification of soil on logs is based on visual field observations, which include density/consistency, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification method ASTM International (ASTM) D-2488 for the description and identification of soils was used as an identification guide.

[&]quot;Grades to" indicates that all characteristics not called out stay the same as the unit above.



Standard Operating Procedure

Bedrock Core Drilling and Sampling

SOP 008

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for core drilling and sampling of bedrock for site characterization purposes.

This SOP describes the equipment, field procedures, materials, and documentation procedures necessary to perform the above-mentioned bedrock investigations. The details within this SOP should be used in conjunction with the project work plan.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

3. Summary of Method

Bedrock coring is the primary method available for collecting representative, minimally disturbed field samples from bedrock boreholes. The most common approach involves a cylindrical diamond impregnated core bit attached to an outer string of drill pipe. The entire pipe is spun at a high velocity, cutting a donut-shaped hole, leaving an intact core of rock that passes through the bit into the core barrel as drilling continues deeper. At the end of a core run (typically 5 or 10-feet long), the core is snapped off by backing the tools slightly.

Prior to any drilling, field crews will manually clear the uppermost 5 feet at each location in accordance with the procedures described in SOP 005: Utility Clearance. Manual clearing will be accomplished with shovels or post-hole diggers provided they have fiberglass handles or via non-intrusive methods such as an air knife or soil vacuum. The objective of the manual clearing is to visually inspect the uppermost 5 feet as a final check for buried utilities not identified during the

public mark-out or private utility locate. Once the location has been manually cleared and verified by the Anchor QEA field team, then the borehole can be drilled, or the center of the cleared hole can be marked and backfilled to be drilled later.

4. Personnel Qualifications

Only qualified personnel will lead direct-push drilling and field screening activities. Training requirements for direction of these activities include reviewing this SOP, applicable SOPs provided by subcontractor and/or manufacturer, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for data and sample collection.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and at least one on-site representative from Anchor QEA and the subcontractor certified in first aid and cardiopulmonary resuscitation [CPR] training) as needed.

5. Equipment List

Equipment and materials that will be used for overseeing and directing bedrock core drilling and sampling may include the following:

- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Indelible ink pen
- Tape measure and/or folding rulers graduated in both tenths of feet and inches
- Stopwatch
- Camera
- Whiteboard with erasable markers
- Air monitoring equipment
- Core description aids (e.g., Munsell color chart and grain or size charts)
- Field logbook; field forms for core collection, well construction, and well development; or notebook with relevant forms
- Photo-ionization device with appropriate lamp and calibration gas

This list does not include equipment that will be provided by subcontracted environmental drillers, such as a water source for drilling fluid, water recirculation apparatus, and core boxes. However, to

address potential releases to the environment, the following equipment is required in addition to all necessary supplies for well installation and development:

- Spill-containment and clean-up kit
- Secondary containment for drill rig and all equipment that contains fuels or hydraulic fluids

6. Cautions

The depth and volume of the borehole, including the over-drilling, if applicable, must be calculated, and the appropriate materials for investigation-derived waste (IDW) must be procured prior to drilling activities. Special care must be taken to minimize or prevent inadvertent cross-contamination between borehole locations.

No lubricating oils or grease should be used on casing threads. No glue of any type should be used to secure casing joints. Teflon O-Rings can be used to ensure a tight fit and minimize leakage; however, O-Rings made of other materials are not acceptable if the boring is going to be sampled for organic compound analyses.

7. Health and Safety Considerations

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project HASP. The HASP will be followed during all activities conducted by Anchor QEA personnel and subcontractors.

The site-specific HASP and subcontracted driller's HASP will be used to guide the installation of the wells in a safe manner. Job Safety Analyses (JSAs) will be prepared for well installation oversight by Anchor QEA and subcontractors. The following specific health and safety issues must be considered when installing the wells:

- Underground and overhead utility hazards must be mitigated prior to drilling.
- Drilling rigs and equipment present a variety of safety hazards. Drill rigs must be inspected
 each day prior to use. All personal must know where the emergency "kill" switch is, and the
 switch must be tested daily. Only the drill rig operator and helper may approach the rig
 during drilling activities.
- Air monitoring will be conducted for chemicals at action level as established in the site-specific HASP.
- Appropriate PPE must be worn.
- Potential hazards from working in a public area and potential hazards to the public by drilling and well installation activities must be addressed before activities begin and as conditions change.
- Waste generated during the well installation must be properly managed in accordance with facility and applicable regulatory requirements.

8. Soil Boring, Logging, and Sampling Procedure

Prior to initializing drilling, any surface or potential subsurface conditions (e.g., utilities) that may impact the scope of work must be documented and reported to the project manager immediately, prior to continuing work. The subsurface soil investigation procedures are outlined as follows:

- 1. A drill rig will be used to position itself at each target station for soil investigation.
- 2. The borehole should be drilled as close to vertical as possible. Prior to beginning any drilling or sampling, ensure the rig is level by checking with a plumb bob or level. Deviation from plumb should be within 1°per 50 feet of depth.
- 3. The uppermost 5 feet of each boring will be excavated via hand-digging or air-knifing techniques prior to any intrusive work. Procedures are outlined in the site-specific HASP and SOP 005: Utility Clearance.
- 4. Once the uppermost 5 feet has been cleared, the boring will be advanced through the unconsolidated overburden in accordance with the SOP for the selected soil boring and sampling method (e.g., hollow stem augers, sonic drilling, direct push).
- 5. The soil boring will be advanced until refusal at the bedrock interface or the top of competent bedrock if a fractured and weathered bedrock layer is present.
- 6. Once refusal is reached the borehole may be widened to accommodate a temporary or grouted casing to control drill fluid circulation. Alternatively, the hollow stem auger string or drill casing may be utilized if they are of sufficient diameter to accommodate the bedrock core barrel:

Common Wireline Core Barrel System Dimensions (inches)

	NQ	HQ	PQ
Core Diameter	1.875	2.500	3.345
Hole Diameter	2.980	3.790	4.827

Note: If there is potential for contaminant drawdown between the overburden and bedrock, the borehole should be widened to a diameter of approximately eight inches, creating a rock socket between three and five feet into competent bedrock. A 4- to 6-inch diameter steel casing will be installed within the rock socket and grouted in place with a cement/bentonite grout and allowed to cure for a period of at least 24 hours. This will allow coring to continue within the grouted casing without environmental impact from constituents within the overburden.

- 7. Drilling will continue through the installed casing (or augers) using rock coring methods (HQ or NQ core barrels, as appropriate) until the bedrock boring is completed.
- 8. The depth of the borehole should be measured before the start of coring and periodically between core runs to verify the depths of the cores that are obtained.

- 9. The following information should be recorded while bedrock is being cored:
 - The time for each foot of advancement of the core barrel. Significant changes in the drilling rate may indicate a change in lithology or weathering.
 - b. Depth(s) where drilling water is lost to the borehole, which could indicate the presence of a fracture.
 - c. The rig operating settings during coring (e.g., gear, throttle/rotational rate, feed pressure)
 - d. Any other changes noted during the core run, such as bit drops, change in color of return water, etc.
- 10. Once a core run is complete, the bedrock core will be retrieved and placed in a wooden core box with increasing depths aligned left to right and top to bottom. If possible, place the top of each core run in a new row in the core box to facilitate the collection of standardized core photographs.
- 11. The top and bottom of the core run should be labelled in the core box, along with the run number and start/end depths of the core run.
- 12. The following information should be recorded following placement of the bedrock core in the core box:
 - a. The measured length of core recovered and the percentage of recovery relative to the length of the core run.
 - b. The Rock Quality Designation (RQD), which is the sum of all unfractured core pieces greater than four inches in length (excluding mechanical breaks) divided by the total length of the core run.
 - c. The total number of pieces that comprise the rock core. A piece is defined as a section of rock core that is unfractured across the width of the core but is bound by fractures or mechanical breaks at the top and bottom.
 - d. The total length of rock chips and fragments throughout the core run.
 - e. Photoionization detector (PID) screening results, sheen/NAPL presence, or other observations of potential contamination.
 - f. The rock type, using terminology consistent with local mapping, if available.
 - q. The depths, orientation, and signs of weathering on any fractures observed.
 - h. The color, degree of weathering, bedding thickness, and hardness, which can be described with the aid of a Bedrock Visual Description Key (Attachment 2).

Note: If multiple core runs are being collected, it may not be feasible to collect all of the above information in real time in the field. If that is the case, Items a. through e. should immediately be recorded on the core box lid, since those values may change as the core box is transported if the contents shift. The remaining information can be obtained during a subsequent examination of the cores following the conclusion of field collection.

- 13. For each core run, representative photographs will be taken with a place card of the boring ID, run number, and the depth range. A ruler scaled in tenths of feet will be visible in the photograph. A minimum of three photographs will be taken per core:
 - a. A photo of the entire core run from top to bottom.
 - b. A close-up photo of the upper portion of the core (typically the top 2.5 feet of a 5-foot core run).
 - c. A close-up photo of the lower portion of the core (typically the bottom 2.5 feet of a 5-foot core run).
- 14. Additional photos may be taken if close-ups of particular features are needed.
- 15. The inner core box lid should be labelled with a permanent marker. A table or grid should be drawn representing each row of rock cores and identifying the boring ID, run number, depth, core length/recovery percentage, RQD, number of pieces, and length of rock chips and fragments.
- 16. The outside of the core box should be labelled with a permanent marker indicating the site or project name, borehole IDs, run numbers, depth intervals, date drilled, and box number (e.g., "Box #1 of 3"). This information should be written on the top lid and on at least one side of the core box to allow location in case multiple core boxes are staked for storage.
- 17. Core boxes should be stored in a secure area under cover and stacked on pallets to keep them off of the ground. Boxes should be stacked so that the labelled sides are visible and facing the same direction.

9. Waste Management

Investigation derived waste (IDW), rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

10. Data Recording and Management

All information relevant to the drilling will be recorded by Anchor QEA field staff using the field logbook. Field equipment decontamination activities and waste management activities will be recorded in the field logbook. The information recorded will be transferred onto a Soil Boring Log (Attachment 1), along with other data related to the boring (e.g., survey coordinates). Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

11. Quality Assurance

It is the responsibility of the field team leader to periodically check to ensure the procedures are in conformance with those stated in this SOP.

Attachments

Attachment 1 Soil Boring Log

Attachment 2 Bedrock Visual Description Key

Attachment 1 Soil Boring Log



Remarks:

CLIENT/PROJECT NAME:	BORING #
PROJECT NUMBER:	DATE BEGAN:
GEOLOGIST/ENGINEER:	DATE COMPLETED:
DRILLING CONTRACTOR:	TOTAL DEPTH:
DRILLING METHOD:	SHEET OF

LOG OF							DRILL	NG ME	THOD:	SHEET OF
EXPLORATORY BORING						HOLE	DIAME	TER:		
				MPLI		\TA			7	Field location of boring
R*	WELL OR PIEZOMETER DETAILS	LING	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)		DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	5
OTHER*	WELL PIEZC DETAI	SAMPLING METHOD	SAMP	FID / F	RECO	BLOWS / 6 INCHES	DEPTI	DEPTI	SOIL (LITHOLOGIC DESCRIPTION
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Attachment 2 Bedrock Visual Description Key



Visual bedrock descriptions consist of the following:

Color, MAJOR CONSTITUENT/GROUP NAME; minor constituent, weathering; bedding; hardness; fracturing; voids; odor; sheen

Recovered and in situ depths

Recovered = measured in the laboratory, actual soil depth from core tube

Recovered = measured in the laboratory, actual soil depth from core tube Bedrock Description Terminology								
	1. Weathering							
Fresh								
Slightly Weathered	Slight discoloration inwards from o	pen fractures, otherwise similar to Fresh.						
Moderately Weathered	_	minerals (e.g. feldspar) may be decomposed. Strength cores cannot be broken by hand or scrapped with knife.						
Highly Weathered	•	osed. Specimens can be broken by hand with effort or shaved ock mass. Texture becoming indistinct but fabric preserved.						
Completely Weathered	Minerals decomposed to soil, but for crumbled or penetrated.	abric and structure preserved (e.g. saprolite). Specimens easily						
Decomposed/Residual Soil	Advanced state of decomposition r destroyed.	esulting in plastic soils. Rock fabric and structure completely						
	2.	Bedding						
	(Divisional planes and/or surface	es separating layers above and below)						
Th	inly Laminated	Less than 0.1 inch						
	Laminated	0.1 to 1 inch						
Т	hinly Bedded	1 inch to 4 inches						
M	edium bedded	4 inches to 12 inches						
T	hickly Bedded	12 inches to 48 inches						
	Massive	Greater than 48 inches						
	3. I	Hardness						
Soft	, -	under firm blows with a geologic pick.						
Medium Soft	Shallow indentations (1 to 3 mm) c with a pocketknife with difficulty.	an be made by firm blows of a geologic pick. Can be peeled						
Medium Hard		steel nail. Can't be peeled or scraped with knife.						
Hard	hammer to break.	fe or steel nail. Requires more than one blow with a geologic						
Very Hard	Cannot be scratched by penknife or geologic hammer.	r steel nail. Breaks only by repeated heavy blows with a						
	4. Voids							
Porous	Smaller than a pinhead.							
Pitted	Pinhead size to 0.25 inch.							
Vug	0.25 inch to diameter of the core (the upper limit will vary with core size).							
Cavity	Larger than the diameter of the core							



5. Engineering Classification of in-situ Rock Quality								
Rock Quality Designation (RQD) %	Rock Quality Term							
0 to 25	Very Poor							
25 to 50	Poor							
50 to 75	Fair							
75 to 90	Good							
90 to 100	Excellent							
	6. Colo	r and Shading						
Ex	kample Colors	Shades						
	Black	Light						
	s (olive, yellow, red)	Dark						
Grays ((gray, olive, brown)	Very dark						
	Mottling: Streaks or spots of a m	ninor color within the larger color unit						
		ption Terminology						
		plume (e.g., organics and anthropogenics)*						
Other N	Ainor Constituents*	Percent						
	Trace	0 to 5						
	Occasional	5 to 10						
	Moderate	10 to 30						
	Substantial	30 to 50						
	•	minor constituents with a period						
		Descriptions cted unless noted*)						
	Intensity	Odor Types						
	Trace (faint)	Petroleum-like						
Mod	derate (obvious)	Naphthalene-like						
Stron	g (overwhelming)	H ₂ S-like (Hydrogen sulfide-like)						
		Septic-like						
		Solvent-like						
	Metallic-like							
*If an	odor is noted, the depth at which th	ne odor is no longer present should be recorded						



Other Description Terminology			
3. Visual Impacts			
3a. Sheen (No sheen observed unless noted*)			
(Modified from ASTM F2534-06)			
Components of a sheen description: Start and end depths, modifier describing relative sample surface area with sheen,			
sheen color, description of sheen distribution (e.g., continuous, present as 0.5-inch spots, etc.)			
Silvery	Metallic, silver/gray colored		
Rainbow	Multicolored		
Dark Rainbow	Multicolored with some dark metallic or brown/black coloring		
Dark	Dark metallic or brown/black colored		
Sheen Distribution Terminology			
Streaks	Flat, lines of sheen (describe size and number)		
Florets	Semi-circular, flat, spots of sheen (described size and number)		
Covered	Sheen appears continuous over a portion of the sample surface		
Distinguishing hydrocarbon-sheen from biological-sheen: If disturbed, a hydrocarbon-sheen will typically coalesce,			
where an inorganic sheen will break apart and has a blocky appearance			
Modifiers			
Amount		Percent	
Trace	2	Less than 2	
Sligh	t	2 to 15	
Moderate		15 to 40	
Moderate to heavy		40 to 70	
Heavy		Greater than 70	
*If a sheen is noted, the depth at which the sheen is no longer present should be recorded		e sheen is no longer present should be recorded	
3b. Nonaqueous Phase Liquid (NAPL)			
Components of a NAPL descrip frequency/percent of sample co	•	color, amount (droplets, covered, soaked); droplet	
Note: Observations of sheen or NAPL on the sampling equipment during sampling will be recorded on the sampling log			
and included in the notes section of the core log.			
Blebs	Observed discrete sphericals of NAPL, but for the most part, the soil matrix was not visibly contaminated or saturated. Typically this is residual product. The estimated size and number of blebs should be reported.		
Coated	soil grains are coated with NAPL. There is not sufficient NAPL material present to saturate the pore spaces. The degree of coating should be described as light, moderate, or heavy.		
Saturated	The entirety of the pore space for a sample is saturated with the NAPL. Care should be taken to ensure that water saturating the pore spaces is not observed when using this term. Depending on viscosity, NAPL-saturated materials may freely drain from a soil sample.		



Bedrock Visual Description Key

Other Description Terminology			
Relative Viscosity			
High viscosity	Taffy-like		
Viscous	No. 6 fuel oil or bunker crude-like (molasses-like)		
Low viscosity	No. 2 fuel oil-like		

Nonaqueous phase liquid (NAPL): NAPL is generally classified as light NAPL (LNAPL) if the density is less than that of water (i.e., will float on water) and dense NAPL (DNAPL) if the density is greater than that of water (i.e., will sink in water). Use a shake test to identify whether observation NAPL is an LNAPL or DNAPL.

Notes:

* = Classification of bedrock on logs is based on visual field observations and should not be construed to imply field nor laboratory testing unless presented herein.

Acronyms/terms used in core logs:

NAPL = nonaqueous phase liquid

Native = Soil deposited prior to the physical influence of humans on the natural environment

PID = Photoionization detector, measures volatile organic compounds (VOCs)



Standard Operating Procedure

Monitoring Well Installation and Development

SOP 009

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for the installation and development of groundwater monitoring wells in fill, unconsolidated soils or bedrock.

This SOP describes the equipment, field procedures, materials, and documentation procedures necessary to install the above-mentioned wells. The details within this SOP should be used in conjunction with the project work plan.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the installation procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

3. Summary of Method

General procedures for the installation of overburden or bedrock borings using a variety of drilling methodologies are presented below. Additional details related to the primary drilling methods that may be utilized (i.e., hollow stem augers, sonic drilling, direct-push methodologies, and bedrock coring) are provided in SOPs applicable to those drilling methods.

Following borehole drilling, an overburden groundwater monitoring well is constructed in the augers or other temporary casing in the boring. The well casing and screen are inserted into the casing. The temporary casing allows the passage of the tremie pipe for well grout placement, as well as free passage of filter sands and bentonite pellets dropped through the casing. The wells are finished with a flush mount vault and a lockable cap. For monitoring wells installed within bedrock, an additional

casing may be grouted in place at the bedrock interface and additional options are available for the construction of the monitoring well, as discussed below.

Well development is conducted to remove residual materials remaining in the monitoring wells after installation has been completed and to re-establish the natural hydraulic flow conditions of the formations that were disturbed during well construction. The well is developed until the column of water in the well is free of visible soil and the pH, temperature, turbidity, and specific conductivity have stabilized.

4. Personnel Qualifications

Only qualified personnel will direct well installation activities. Training requirements for direction of well installation activities include reviewing this SOP, other applicable SOPs, guidance documents, and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for sample collection.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, and first aid and cardiopulmonary resuscitation [CPR] training) as needed.

5. Equipment List

Equipment and materials that will be used for overseeing and directing the well installation and development may include the following:

- Appropriate personal protective equipment (PPE), as specified in the site Health and Safety Plan (HASP)
- Water-level indicator or interface probe
- Indelible ink pen
- Tape measure
- Stopwatch
- Small-diameter water-level indicator
- Peristaltic, small-diameter bladder or Waterra inertial lift pump (or similar) with dedicated polyethylene tubing
- Silicone flexible tubing (for peristaltic pump)
- Marine battery
- Multi-parameter water quality meter and manufacturer's operating manual
- Calibration standards
 - pH (4.0, 7.0, and 10.0 standard buffer solutions)

- Conductivity
- Turbidity standards (0 nephelometric turbidity units [NTU], 40 NTU, and 100 NTU)
- Miscellaneous others (as necessary)
- Camera
- Whiteboard with erasable markers
- Air monitoring equipment
- Field logbook; field forms for core collection, well construction, and well development; or notebook with relevant forms
- Safety knife or scissors
- Photo-ionization device with appropriate lamp and calibration gas

This list does not include equipment that will be provided by subcontracted well drillers. However, to address potential releases to the environment, the following equipment is required in addition to all necessary supplies for well installation and development:

- Spill-containment and clean-up kit
- Secondary containment for drill rig and all equipment that contains fuels or hydraulic fluids

6. Cautions

The depth and volume of the borehole, including the over-drilling, if applicable, must be calculated, and the appropriate materials for well construction and investigation-derived waste (IDW) must be procured prior to drilling activities.

Special care must be taken to minimize or prevent inadvertent cross-contamination between borehole locations.

No lubricating oils or grease should be used on casing threads. No glue of any type should be used to secure casing joints. Teflon O-Rings can be used to ensure a tight fit and minimize leakage; however, O-Rings made of other materials are not acceptable if the well is going to be sampled for organic compound analyses.

7. Health and Safety Considerations

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the project HASP. The HASP will be followed during all activities conducted by Anchor QEA personnel and subcontractors.

The site-specific HASP and subcontracted driller's HASP will be used to guide the installation of the wells in a safe manner. Job Safety Analyses (JSAs) will be prepared for well installation oversight by

Anchor QEA and subcontractors. The following specific health and safety issues must be considered when installing the wells:

- Underground and overhead utility hazards must be mitigated prior to drilling.
- Drilling rigs and equipment present a variety of safety hazards. Drill rigs must be inspected each day prior to use. All personal must know where the emergency "kill" switch is, and the switch must be tested daily. Only the drill rig operator and helper may approach the rig during drilling activities.
- Air monitoring will be conducted for chemicals at action level as established in the site-specific HASP.
- Appropriate PPE must be worn.
- Potential hazards from working in a public area and potential hazards to the public by drilling and well installation activities must be addressed before activities begin and as conditions change.
- Waste generated during the well installation must be properly managed in accordance with facility and applicable regulatory requirements.

8. Procedure

The following general activities and procedures will be implemented for groundwater monitoring wells.

8.1 Overburden Well Installation – Direct Push Method

Geoprobe direct push machine is a vehicle-mounted, hydraulically powered machine that uses static force and percussion to advance small-diameter sampling tools into the subsurface for collecting soil core, soil gas, or groundwater samples. The Geoprobe refers to both machines and tools manufactured by Geoprobe Systems, Salina, Kansas.

Following borehole drilling, a groundwater monitoring well is constructed in the temporary Geoprobe casing in the boring. The well casing and screen are inserted into the casing. The temporary casing allows the passage of the tremie pipe for well grout placement, as well as free passage of filter sands and bentonite pellets dropped through the casing. The wells are finished with a flush mount vault and a lockable cap.

- After notification of appropriate parties and clearance of potential conflicts with underground utility lines, the drilling subcontractor will install the monitoring wells. The work areas will be cordoned off and a traffic plan implemented to direct road traffic as necessary.
- 2. A decontamination area will be established.
- 3. Once drilling activities commence, soil cores will be collected at each location by using a Geoprobe drill rig or similar drill rig. Soil samples may be collected using a dual tube sampling system equipped with core liners to be advanced into the soil by a hydraulic hammer.

Page 5

- 4. During soil sample collection, one set of drill rods will be advanced and serve as an outer casing. This will prevent the boring from collapsing and will allow for continuous extraction and sampling. The process for dual-tube sampling is generally described as follows:
 - a. Once positioned, the initial soil core will be collected beginning at the ground surface and advancing the length of the core barrel (typically 4 or 5 feet).
 - b. Before removal of the initial soil core, a second drill string will be advanced downward, outside of the initial soil core. This will serve as the outer casing (4.5-inch outer diameter and 3.75-inch inner diameter).
 - c. Once the outer casing is in place, the initial soil core will be removed for visual description.
 - d. After removing the initial soil core, the core barrel will be decontaminated and then re-inserted into the borehole through the in-place outer casing to collect the second soil core interval.
 - e. Prior to removing the second soil core, the outer casing will be advanced the length of the core barrel to prevent the boring from collapsing.
 - f. These steps will be repeated until target depth is reached.
- 5. A cutting tool will be used to open core liners, and a physical description of the sediment and depth of native material will be recorded.
- 6. Borings will be advanced into the soils to a pre-determined target depth below ground surface.
- 7. After soil core collection and processing, a monitoring well will be installed in the existing borehole, or the borehole can be re-drilled and widened using appropriately sized augers or casing.
- 8. A 10-foot-long, 2-inch-diameter, 0.010-inch slot monitoring well (typical) will be installed within the borehole. The flush-thread riser pipe will be connected to the well screen and continue to the surface.
- 9. An appropriately sized filter sand will be placed around the well screen to a height within the borehole of approximately two feet above the top of the well screen.
- 10. Above the filter sand, a seal consisting of bentonite chips or fine-grained sand (No. 00 or similar) will be placed above the well screen until at least a 1 foot of thickness is reached.
- 11. Cement and bentonite grout will then be placed above the seal to the ground surface where a flush-mount type surface completion will be installed.
- 12. Completed monitoring wells will be surveyed by a licensed surveyor to establish the elevation of the well casing for use in groundwater level monitoring.
- 13. All information relevant to the drilling and well installation beyond the items identified in the Well Construction Log (Attachment 1).

8.2 Overburden Well Installation – Auger/Sonic Drilling Methods

When hollow stem augers or sonic drilling methodologies are employed, soil cores will be collected using standard 2-inch by 2-foot split-spoons driven by a 140-pound hammer, standard Shelby tubes, or sampling tube system, unless otherwise specified in the project-specific work plan. The sampling tools will be advanced to the depth specified in the project-specific work plan.

Following borehole drilling, a groundwater monitoring well is constructed in the boring. The hollow stem auge or outer sonic casing allows the passage of the tremie pipe for well grout placement, as well as free passage of filter sands and bentonite pellets dropped through the casing. The wells are finished with a flush mount vault and a lockable cap.

- 1. After notification of appropriate parties and clearance of potential conflicts with underground utility lines, the drilling subcontractor will install the monitoring wells. The work areas will be cordoned off and a traffic plan implemented to direct road traffic as necessary.
- 2. A decontamination area will be established.
- 3. Once drilling activities commence, soil cores will be collected at each location by using a hollow stem auger drill rig, sonic drill rig, or similar drill rig. Soil samples may be collected using split-spoon samples (for hollow stem auger rigs) or a dual tube sampling system (for sonic drill rigs).
- 4. During soil sample collection, the hollow stem augers or outer sonic casing will be advanced and serve as an outer casing. This will prevent the boring from collapsing and will allow for continuous extraction and sampling.
- 5. Borings will be advanced into the soils to a pre-determined target depth below ground surface.
- 6. After soil core collection and processing, a monitoring well will be installed in the existing borehole, or the borehole can be re-drilled and widened using appropriately sized augers.
- 7. A 10-foot-long, 2-inch-diameter, 0.010-inch slot monitoring well will be installed within the borehole. The flush-thread riser pipe will be connected to the well screen and continue to the surface.
- 8. An appropriately sized filter sand will be placed around the well screen to a height within the borehole of approximately two feet above the top of the well screen.
- 9. Above the filter sand, a seal consisting of bentonite chips or fine-grained sand (No. 00 or similar) will be placed above the well screen until at least a 1 foot of thickness is reached.
- 10. Cement and bentonite grout will then be placed above the seal to the ground surface where a flush-mount type surface completion will be installed.
- 11. Completed monitoring wells will be surveyed by a licensed surveyor to establish the elevation of the well casing for use in groundwater level monitoring.
- 12. All information relevant to the drilling and well installation beyond the items identified in the Well Construction Log (Attachment 1).

8.3 Bedrock Well Installation

If an overburden/bedrock interface well is to be installed the above procedures for hollow stem augers or sonic drilling methodologies will be employed. Otherwise, soil cores will be collected using standard 2-inch by 2-foot split-spoons driven by a 140-pound hammer, standard Shelby tubes, or sampling tube system, unless otherwise specified in the project-specific work plan. The soil sampling tools will be advanced to the top of bedrock surface or point of refusal if a fractured/weathered bedrock layer is present. A bedrock core will be collected to a depth of five feet into the top of competent bedrock, after which the core hole will be widened, and a casing installed and grouted in place. Bedrock coring will then continue within the casing to the final depth of the well to be installed.

Following borehole drilling and coring, a groundwater monitoring well is constructed in the cased boring. The outer core barrel and/or the grouted casing allows the passage of the tremie pipe for well grout placement, as well as free passage of filter sands and bentonite pellets dropped through the casing. The wells are finished with a flush mount vault and a lockable cap.

- 1. After notification of appropriate parties and clearance of potential conflicts with underground utility lines, the drilling subcontractor will install the monitoring wells. The work areas will be cordoned off and a traffic plan implemented to direct road traffic as necessary.
- 2. A decontamination area will be established.
- 3. Once drilling activities commence, soil cores will be collected at each location by using a hollow stem auger drill rig, sonic drill rig, Geoprobe drill rig, or similar drill rig. Soil samples may be collected using split-spoon samples (for hollow stem auger rigs) or a dual tube sampling system (for sonic or direct push drill rigs).
- 4. Borings will be advanced into the soils to the top of bedrock surface or point of refusal if a fractured/weathered bedrock layer is present.
- 5. The presence and depth of competent bedrock will be confirmed by HQ or NQ rock coring. At least one five-foot core run will be advanced.
- 6. The core hole will be widened to a diameter of approximately 8 inches, creating a rock socket between 3 and 5 feet into competent bedrock.
- 7. A 4- to 6-inch diameter steel casing will be installed within the rock socket and grouted in place with a cement/bentonite grout.
- 8. Following curing of the grout, bedrock coring will resume by HQ or NQ rock coring to a predetermined target depth below ground surface or depth where water-bearing fractures are observed in the retrieved bedrock cores.
- 9. After bedrock core collection and processing, a monitoring well will be installed within the grouted casing and existing borehole. Depending on the casing and well diameter, the borehole will be prepared using one of the following methods:

- a. The borehole can be re-drilled and widened using appropriately sized casings and roller bits
- b. The well can be installed through the outer core barrel.
- c. Coring tools can be removed, and the well can be installed within the open bedrock core hole.
- 10. A 10-foot-long, 2-inch-diameter, 0.010-inch slot monitoring (typical) well will be installed within the borehole. The flush-thread riser pipe will be connected to the well screen and continue to the surface.
- 11. An appropriately sized filter sand will be placed around the well screen to a height within the borehole of two feet above the top of the well screen.
- 12. Above the filter sand, a seal consisting of bentonite chips or fine-grained sand (No. 00 or similar) will be placed above the well screen until at least a 1 foot of thickness is reached.
- 13. Cement and bentonite grout will then be placed above the seal to the ground surface where a flush-mount type surface completion will be installed.
- 14. Completed monitoring wells will be surveyed by a licensed surveyor to establish the elevation of the well casing for use in groundwater level monitoring.
- 15. All information relevant to the drilling and well installation beyond the items identified in the Well Construction Log (Attachment 1).

8.4 Well Development

- 1. The installed monitoring well will not be developed for at least 12 to 24 hours after the cement grout has been installed.
- 2. After the appropriate amount of time has passed, assemble the necessary equipment on a plastic sheet surrounding the well. Record pertinent information on the Well Development Log (Attachment 2).
- 3. Open monitoring well and take air reading at the top of casing and in the breathing zone as appropriate.
- 4. Measure depth to water and the total depth of the monitoring well. Calculate the water column volume of the well.
- 5. Surge the well using appropriately sized surge block to loosen soil buildup in well within the surrounding filter pack. Following the removal of suspended sand-sized soil, the well development process should include over-pumping the well (that is, pumping the well at a higher rate where drawdown is induced). Using a downhole pump, begin development and measure the initial pH, temperature, turbidity, and specific conductivity of the water and record on the field Well Development Log (Attachment 2). Note the initial color, clarity, and odor of the water.
- 6. Continue to develop the well (alternating pumping and surging the well) and periodically measure the water quality parameters indicated in Step 5 (above). Development will proceed

until water quality parameters stabilize or until the water has a turbidity of less than 50 NTUs for three consecutive readings are recorded or a maximum of 5 well volumes have been purged from the well. Anchor QEA personnel will record well development measurements and observations in Well Development Log (Attachment 2).

7. All water produced by development must be containerized or treated. Each container must be clearly labeled with the location ID and date collected. Determination of the appropriate disposal method will be based on the analytical results from each well.

8.5 Well Abandonment

Should a monitoring well need to be removed, the monitoring wells can be abandoned by one of the following methods:

- 1. Removing the well casing and monitoring screen if possible and backfilling the borehole with bentonite pellets or cement and bentonite grout to a depth of approximately 1 foot below ground surface and then placing a 1-foot-thick concrete patch.
- 2. Filling the monitoring well with bentonite pellets or cement and bentonite grout to the ground surface and completing the abandonment as described previously.
- 3. Overdrilling the well borehole with appropriately sized hollow stem augers or casing and completing the abandonment as described previously.

9. Waste Management

Investigation derived waste (IDW), rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

10. Data Recording and Management

All information relevant to the drilling and well installation beyond the items identified in the Well Construction Log (Attachment 1) will be recorded by Anchor QEA field staff using the field logbook. Field equipment decontamination activities and waste management activities will be recorded in the field logbook. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

11. Quality Assurance

It is the responsibility of the field team leader to periodically check to ensure the procedures are in conformance with those stated in this SOP.

Attachments

Attachment 1 Well Construction Log Attachment 2 Well Development Log

Attachment 1 Well Construction Log

MONITORING WELL CONSTRUCTION DATA

DATE:	CLIENT:		PROJECT NO:	
WELL/BORING NO:		STATE PLANE COORDINATES:		
			NORTH	
PROJECT NAME:			EAST	
ADDRESS:		TOP OF SLAE	B ELEVATION:	
WELL CONTRACTOR:		TOP OF CASI	NG ELEVATION:	
			CONSTRUCTION DATA	
WEL	L SCHEMATIC	<u>C.</u>	ASING INFORMATION	
Г	TOP OF CASING		MATERIAL: ☐ PVC ☐ STAINLESS ☐ CARBON	
PROTECTIVE CASING			☐ OTHER DIAMETER: ☐ 2" ☐ 4" ☐ 6"	
TOP OF CONCRETE PAD	LENGTH OF STICKUP FT.		OTHER IN. JOINTS: THREADED WELDED	
GROUND SURFACE			☐ SCREWED ☐ COUPLED	
<u> </u>	<u> </u>	1	OTHERSCHEDULE:	
		<u>S</u> (CREEN INFORMATION	
CEMENT/BENTONITE			MATERIAL: PVC STAINLESS	
GROUT	DEPTH TO BASE OF		☐ TEFLON ☐ OTHER	
	GROUT SEAL FT.		DIAMETER: 2"	
TOTAL BOREHOLE			☐ 6" ☐ OTHER IN	
BOREHOLE DIAMETER		1	SLOT: 0.010	
FROM IN.	LENGTH OF		☐ 0.020 ☐ OTHERIN	
GRADEFT.	RISER FT.		CENTRALIZER: YES NO	
SEAL		1	SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC	
FT.		<u>FI</u>	ILTER PACK MATERIAL 20/40 SAND □	
		OTAL	OTHER	
		WELL SI	ECONDARY FILTER PACK MATERIAL SUGAR SAND □	
	F	ROM	OTHER	
	G	FT.		
FILTER	LENGTH	<u>BI</u>	ENTONITE WELL SEAL ☐ 1/2-INCH PELLETS	
PACK FT.	OF SCREEN		☐ 1/4-INCH PELLETS ☐ CHIPS	
	FT.		OTHER	
			URFACE PROTECTION ONCRETE PAD: 3'X3'	
			☐ 4'X4' ☐ OTHER FT	
	WELL SUMP/CAP	W	/ELL SUMP/CAP	
			YES	
			LENGTHFT.	
ALL ELEVATIONS ARE IN FEET NGVI	D			

Anchor QEA of North Carolina, PLLC
231 Haywood Street
Asheville, North Carolina 28801
828.281.3350



Attachment 2 Well Development Log



Well Development Log

FACILITY	NAME:					_	DATE:			
LOCATIO	N:					_	ARRIVE TIME	:		
FIELD PI	ERSONNEL:					_	WEATHER:			
WELL N	UMBER:					WELL DE	PTH IN FEET	(WD):	STAI	RT TIME:
WELL DIAMETER:					WATER LEVEL IN FEET (WL):					
TYPE OF CASING:					LENGTH OF WATER COLUMN : FEET					
MEASU	RING POINT:					(WD)	- (WL) = (LW	C)		
FLUSH MOUNT / STICK-UP					ONE CASING VOLUME: (GALLONS			
COMME	NTS:					(LWC) x (WCV)			
			_			THREE C	ASING VOLUM	MES:	GALLONS	
			_			ACTUAL \	OLUME DEV	ELOPED:	GALLONS	
				\A/E	LL CASING V	OLLINATO (WOV			
	2" =	0.17 Gal/Ft 3" =	0.38 Gal/F1					" = 2.6 Gal/Ft 2	12" = 5.8 Gal/Ft	
TIME	DEVELOPMENT	ESTIMATED FLOW		рН	SPECIFIC		DISSOLVED		TURBIDITY (NTU)	DEPTH TO
	METHOD	RATE (gpm)	PURGED	UNITS	COND.	(C°)	OXYGEN	REDUCTION		WATER
					(µS)		(mg/L)	POTENTIAL (mV)		(feet TOC)
PROTEC	CTIVE CASING:	PAD: LC	CK:	VEGETAT	TION:	ACCESS:				
Field Pe	Field Personnel Signature: Date:									

Comments:

Notes: μ S = micro-Siemen Method Reference: Temperature: SM 2550 B-2000

C° = degrees Celsius Specific conductivity: EPA Method 120.1, Rev. 1982

mg/L = milligrams per liter D0: SM 4500 0 G-2001 mV = millivolt pH: SM 4500-H $^+$ B-2000

NTU = nephelometric turbidity units



Standard Operating Procedure

Equipment Decontamination

SOP 010

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

This Standard Operating Procedure (SOP) describes the decontamination of non-dedicated sampling equipment, instruments, and other materials used during implementation of field tasks at the project site that come in contact with contaminated site media. Decontamination is the process of neutralizing, washing, and rinsing field sampling equipment to clean field equipment and minimize the potential for sample cross-contamination.

Personnel performing decontamination activities shall wear appropriate personal protective equipment (PPE), as presented in the site-specific Health and Safety Plan (HASP).

Procedures for equipment decontamination outlined in this SOP are expected to be followed. Substantive deviations from the procedures detailed in this SOP will be recorded on the Daily Field Log and communicated to task and project management.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations, or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or reports. If changes to the installation procedures are required due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and will be documented in the final project report.

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with sample media must meet high standards of cleanliness. All equipment and instruments that are in direct contact with the sample medium will be decontaminated prior to use in the field.

3. Equipment List

- Personal protective equipment, as required by the HASP
- Scrub brushes

- Plastic wash and rinse buckets or tubs
- Phosphate-free biodegradable detergent (e.g., Liquinox or Alconox)
- Deionized (DI) water (or distilled water)
- Spray bottles
- Aluminum foil
- Tap water source (any treated municipal water supply)
- Investigation-derived waste (IDW) storage containers (refer to SOP 011: Investigation-Derived Waste Handling)

4. Summary of Method

Generally, dedicated sampling equipment will be used during the investigations (i.e., stainless-steel trowels and shovels, plastic scoops, ground-water sample bailers). However, equipment that is not dedicated (i.e., non-dedicated drilling equipment) will be decontaminated prior to each use to mitigate the potential for cross-contamination of the samples collected for laboratory analysis.

The following steps will be used to decontaminate supporting equipment that are not in direct contact with samples or mercury contaminated media:

- 1. Equipment will be rinsed with tap water or wiped down as appropriate.
- 2. Rinse water will be contained, and any wipes used to clean containerized as IDW.

The following decontamination steps will be used to decontaminate sampling equipment that come into contact with sample media in areas of suspected impacts. Decontamination of all items will follow the *Field Branches Quality Management Plan* (USEPA 2009) and *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846 protocols; USEPA 2013). The decontamination procedure for sampling equipment is as follows:

- 1. Rinse in phosphate-free wash and sufficiently scrub to remove any remaining sample material.
- 2. Rinse with tap water.
- 3. Rinse with distilled water. If significant contamination is anticipated, the following steps may be added:
 - a. Rinse with 10% Nitric acid (when sampling for metals).
 - b. Rinse with methanol rinse (when sampling for volatiles).
- 4. Rinse with hexane (when sampling for PCBs).
- 5. Rinse with distilled water.
- 6. Air dry sampling equipment.
- Use immediately or cover all decontaminated items with aluminum foil once dry.

The following decontamination steps will be used to decontaminate sampling equipment that come into contact with sample media and is being removed from the work area. The decontamination procedure for sampling equipment is as follows:

- 1. Rinse in phosphate-free wash and sufficiently scrubbed to remove any remaining sample material.
- 2. Rinse with tap water.
- 3. Rinse with distilled water.
- 4. Air dry sampling equipment.
- 5. Screen equipment for mercury vapors following the screening protocol outlined in SOP-012: Monitoring Well Decommissioning.

All used decontamination fluids will be collected and placed in labeled, designated containers suitable for disposal in accordance with IDW procedures outlined in SOP 011: Investigation-Derived Waste.

5. Waste Management

IDW, rinse water, PPE, NAPL, and other waste materials generated during field activities (waste) must be placed in appropriate containers and labeled. Be sure to segregate those waste items impacted with NAPL from those that did not come into contact with NAPL. Waste materials will be stored securely in a client-approved location. Handling and disposal of waste procedures are documented in the site-specific work plan and in SOP 011: Investigation-Derived Waste.

6. Data Recording and Management

All activities conducted under this SOP will be documented, at a minimum, in a project specific field book or on daily log field forms. Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

7. Quality Assurance/Quality Control

It is the responsibility of the Field Team Leader to periodically check to ensure that the procedures are in conformance with those stated in this SOP. As described in the QAPP, equipment blanks will be collected periodically to validate the effectiveness of decontamination procedures.

References

USEPA (U.S. Environmental Protection Agency), 2009. *Field Branches Quality Management Plan*. May 8, 2009.

USEPA, 2013. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. USEPA SW-846. Available from: http://www.epa.gov/osw/hazard/testmethods/sw846/online/index.htm.



Standard Operating Procedure

Investigation-Derived Waste

SOP 011

Project: Cedar Street Works Former MGP

Revision Date: February 2022

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures for the proper disposal of investigation-derived waste (IDW; i.e., soil, water, personal protective equipment [PPE], and other potentially contaminated materials) generated during implementation of fieldwork. Procedures for IDW handling and disposal outlined in this SOP are expected to be followed. Substantive deviations from the procedures detailed in the SOP will be recorded on the Daily Log (see SOP 001: Field Records). The details within this SOP should be used in conjunction with project work plan.

2. Scope and Applicability

This SOP applies to task orders and projects associated with Anchor QEA. This SOP may be modified, as required, depending on site-specific conditions, equipment limitations or limitations imposed by the procedure. The ultimate procedure employed will be documented in the appropriate project work plan or report. If there are changes made to the IDW handling and disposal due to unanticipated field conditions, the changes will be discussed with the project manager as soon as practicable and documented in the project report.

3. Personnel Qualifications

Only qualified personnel will direct IDW handling and disposal activities. Training requirements for IDW handling and disposal activities include reviewing this SOP and other applicable SOPs and/or guidance documents and health and safety training.

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP. Additionally, field personnel will be under the direct supervision of qualified professionals who are experienced in performing the tasks required for IDW handling and disposal.

Anchor QEA field personnel and subcontractors will have completed current company-required health and safety training (e.g., 40-hour Hazardous Waste Operations training, site-specific training, first aid and cardiopulmonary resuscitation [CPR] training), as needed.

4. Equipment List

The following is a list of equipment that may be necessary to carry out the procedures contained in this SOP. Additional equipment may be required, pending field conditions may include, but are not limited to, the following:

- Appropriate PPE, as specified in the site Health and Safety Plan (HASP)
- U.S. Department of Transportation (DOT)-approved 55-gallon open-top or closed-top drums,
 roll-off or Baker tank with lid for collection of solids and liquids
- Garbage bags
- 5- to 10-gallon buckets or carboys to be used as satellite waste-collection containers
- 55-gallon DOT chemical drums (as needed)
- Drum pad or secondary containment
- Drum cart
- Bung tool to open closed-top drums (as needed)
- Drum wrenches to tighten open-top drum lids
- Spill kits
- Labels and tags
- Drum log forms
- Drum marking crayons (or similar)

5. Health and Safety Considerations

Health and safety issues for the work associated with this SOP, including physical, chemical, and biological hazards, are addressed in the site-specific HASP. The HASP will be followed during all activities conducted by Anchor QEA personnel and its subcontractors.

The site-specific HASP will be used to guide the IDW handling in a safe manner. Job Safety Analyses will be prepared as part of the HASP for IDW handling. The following specific health and safety issues must be considered for management of IDW:

- IDW should be placed in secondary containment to minimize risk of a release to the environment whenever practical.
- Appropriate PPE must be worn to avoid contact with chemicals during IDW handling activities.
- Potential hazards from management of IDW in a public area and potential hazards to public must be addressed before activities begin and as conditions change (e.g., waste secured away from public).

6. Secondary Containment

Prior to storage of IDW, a secondary containment area should be established as follows:

- 1. Identify a location where IDW can be stored. The area should be relatively flat and secure so that any IDW and associated equipment to be stored is not at risk of being disturbed, stolen, or tampered with.
- 2. Once the storage area has been selected, construct a secondary containment. Pre-made secondary containments can be used or new containments can be constructed, but either should able to contain solids and/or liquids spilled within the secondary containment.
- 3. If a secondary containment is constructed, a minimum of 2x4-inch lumber or similar material will be used and wrapped in plastic. The lumber will be arranged into a square or rectangular shape so that the plastic wraps over the lumber, creating a lip with plastic stretching between.
- 4. Once the plastic sheeting has been stretched, IDW drums can be placed within the secondary containment.

7. Waste Disposal Procedures

Materials that are known or suspected to be contaminated with hazardous substances through the actions of sample collection or personnel and equipment decontamination are said to be IDW. These wastes are classified into the following three categories:

- 1. Solid materials consisting of soils, used core tubes, used PPE, and other materials used in the handling, processing, and storage of soil
- 2. Liquid wastes, such as waste water and decontamination water
- 3. Spent and residual chemicals (liquids) from decontamination

Each type of material will be handled in a manner described in this SOP.

7.1 Solid Waste

Solid residual wastes generated during field activities will consist of two types of materials—soil and non-soil solids. Soil wastes could include discarded soil or waste soil generated during drilling activities. Non-soil wastes may include items such as used PPE (e.g., gloves, Tyvek suits, and plastic sheeting). Non-soil and soil wastes will be segregated and stored in separate containers pending characterization and disposal. Loose soil will be removed from non-soil waste items prior to disposal, to the extent practical.

Soil and non-soil wastes will be segregated and containerized in closed 5-gallon buckets or trash bags, as necessary and appropriate, and secured until transferred into labeled 55-gallon drums (or dedicated roll-off container). Soil and non-soil wastes placed in labeled 55-gallon drums (or dedicated roll-off container) will be stored temporarily pending characterization and transfer to an approved disposal facility.

7.2 Waste Water

Waste water will be generated during sample collection, well installation, decontamination, and well development activities. Soils recovered during this process will be handled as solid waste as described above. Waste water will be collected in 55-gallon closed-top drums or in a large, contaminated-liquid waste tank until the material is characterized and transferred off site for disposal.

7.3 IDW Management

Soil and non-soil wastes generated will be placed in labeled drums or dedicated roll-off containers. Individual drums will be tracked using sequential numbers. Sequential drum numbers and the type of material placed in each drum will be indicated on the top and sides of the drums using a drum-marking crayon and a log recording this information. Placement of soil, non-soil, and/or liquid waste into sequentially numbered disposal drums will be documented in IDW logs (see example of IDW log in Attachment 1) listing the sample ID from which waste material originated. Information recorded on the IDW logs will include the following:

- Sequential drum number
- Type of waste stored in drum (e.g., wet soil or water)
- Accumulation start and end dates
- Hazardous waste manifest number and date
- Transport contractor name and date of pickup

A composite sample may be collected and analyzed for compounds specific to the project disposal facility at the frequency required by the disposal facility or project manager/client.

8. Data Recording and Management

Anchor QEA field sampling personnel will record all IDW in the IDW log (Attachment 1). Records generated as a result of implementing this SOP will be controlled and maintained in the project record files in accordance with client-specific requirements.

9. Quality Assurance/Quality Control

It is the responsibility of the Field Team Leader to periodically check and ensure that IDW handling and disposal procedures are in conformance with those stated in this SOP.

Attachment

Attachment 1 Investigation-Derived Waste Log

Attachment 1 Investigation-Derived Waste Log



Investigation-derived Waste Drum Log

Drum Number:	Investigation-derived Waste (IDW) Medium:				
Accumulation Start Date:		Manifest Number:			
Accumulation End Date:		Manifest Date:			
Transport Contractor:		Lab ID Number:			
Transport Pick-up Date:		Haz Characterization Date:			
Manifest Copy Received from Waste Facility:		Date:			
Samples placed in Drum	Date of Placement	Comment	Initials		
			l		

IDW Medium:

Soil

Soiled PPE