
INTERIM REMEDIAL MEASURES WORK PLAN

for

**144-150 BARROW STREET
New York, New York
NYSDEC BCP No. C231092**

Prepared For:

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1.0 INTRODUCTION

1.1 General

A Brownfield Cleanup Agreement (BCA) was executed on June 16, 2015 between 144-150 Barrow Street LLC (the Participant) and the New York State Department of Environmental Conservation (NYSDEC) to investigate and remediate a 0.17-acre property located at 144-150 Barrow Street in the Greenwich Village neighborhood of the borough of Manhattan, New York (the site). The site is also identified as Tax Block 604, Lots 1 and 30. Lot 1 is improved with the landmarked Keller Hotel building, a vacant six-story structure constructed in 1920 with a basement level. A vacant one-story, slab-on-grade garage structure, previously used as an auto repair facility, occupies Lot 30 in its entirety. A site location map is provided as Figure 1.

This interim remedial measures work plan (IRMWP) was prepared to address the source of NYSDEC Spill No. 9400447 prior to implementation of a Remedial Action Work Plan (RAWP) for the final remedy. The scope of this IRMWP includes the following:

- Asbestos abatement and building demolition on Lot 30.
- Performance of a geophysical survey to identify remnant buried tank structures and associated piping;
- Excavation and off-site disposal of petroleum-impacted soil, to the extent practical on Lot 30;
- Decommission underground storage tanks (USTs), if encountered; and
- Backfilling the excavation with recycled concrete aggregate (RCA) to restore the site until the RAWP is implemented.

The location of the suspected USTs are shown on the site layout plan provided as Figure 2. Asbestos abatement and building demolition are not expected to begin until August 2016.

This IRMWP has been prepared in accordance with requirements of the New York State Brownfield Cleanup Program (BCP) and NYSDEC's May 2010 Division of Environmental Remediation (DER)-10 - Technical Guidance for Site Investigation and Remediation. The IRM will be completed in advance of completing a final remedy, which will be outlined in detail in the forthcoming RAWP. This is in accordance with the definition of an IRM (May 2010 DER-10):

***"Interim remedial measure" or "IRM"** means activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation and evaluation, to prevent, mitigate or remedy environmental damage or*

the consequences of environmental damage attributable to a site, including, but not limited to, the following activities: construction of diversion ditches; collection systems; drum removal; leachate collection systems; construction of fences or other barriers; installation of water filters; provision of alternative water systems; the removal of source areas; or plume control.

1.2 Site Description

The site is located at 144-150 Barrow Street in the Greenwich Village section of New York, New York, and is identified as Block 604, Lots 1 and 30 on the New York City Tax Map. Figure 1 shows the site location. The site is approximately 7,300 square feet in area. Lot 1 is improved with the landmarked Keller Hotel building, a vacant six-story structure constructed in 1920 with a basement level. A vacant one-story, slab-on-grade garage structure, previously used as an auto repair facility, occupies Lot 30 in its entirety. The site is bound by multiple-story residential buildings and a vacant lot to the north, Barrow Street to the south, multiple-story residential buildings to the east, and West Street to the west. A Site Plan is provided as Figure 2.

1.3 Site History

Both site lots were occupied by a coal yard in the late 1800s and early 1900s. The landmarked Keller Hotel building was built in 1920 and has been vacant since about the 1970s. Lot 30 was historically occupied as an automobile repair shop as early as 1930 and has also been vacant since some time after 1998. The most recent occupants of Lot 30 were an auto repair garage in 1993 and a towing company in 1998. The exact year of vacancy of both properties is unknown. Two gasoline USTs were documented on Lot 30 from 1950 to 1983 in historical Sanborn Maps. Suspect UST locations are presented on Figure 2.

NYSDEC Spill No. 9400447 was assigned to Lot 30 on April 11, 1994 as a result of gasoline odor encountered during excavation. Petroleum-related volatile organic compounds (VOCs) were identified in soil at about 5 feet below grade surface (bgs) and extend to about 16 feet into groundwater at concentrations exceeding their applicable NYSDEC soil and groundwater quality standards. Petroleum impacted soil and groundwater are attributed to the spill and the spill remains open.

1.4 Remedial Investigation

An RI was implemented between July 30 and August 22, 2012 and between November 25 and December 4, 2014 in accordance with NYSDEC DER-10, the NYSDEC Draft BCP Guide (May

2004), and the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). The RI included:

- Performance of a geophysical survey to identify remnant buried tank structures and associated piping and provide utility clearance for borings;
- Advancement of 13 soil borings (EB-1 through EB-13), and collection of 16 soil samples, including one duplicate sample, from nine of the borings (EB-1 through EB-8 and EB-13) for chemical analysis to evaluate soil quality. Soil borings EB-9 through EB-12 were advanced for delineation purposes only and were not sampled;
- Installation of six permanent groundwater monitoring wells (MW-1 through MW-6) and three temporary monitoring wells (TMW-1 through TMW-3) and collection of 10 groundwater samples, including a duplicate sample, for chemical analysis to evaluate groundwater quality;
- Performance of an elevation survey of permanent groundwater monitoring wells to evaluate groundwater flow direction;
- Installation of four soil vapor probes (SV-1 through SV-4) and collection of one ambient air and four soil vapor samples for chemical analysis to evaluate soil vapor quality; and
- Sampling of three drums containing soil and an oil/water mixture for waste characterization/disposal purposes. These drums were observed by Langan during a site walk prior to the RI.

1.4.1 Site Geology

The original shoreline of the Hudson River extended further eastward of its current location near the eastern portion of the site. The shoreline moved westward in the 1800s using imported fill material, bringing the area to its current configuration. The site is underlain by historic fill material predominately comprised of gray, black, and brown, coarse to fine sand with varying amounts of silt, gravel, concrete, brick, coal, and shell fragments. The fill layer extends to 12 to 16 feet below sidewalk grade and is underlain by a layer of fine brown sand and medium to coarse reddish brown sand.

Bedrock was not encountered during the RI. Based on a review of the Bedrock and Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York and Parts of Bergen and Hudson Counties New Jersey, by Charles A. Baskerville, dated 1994 (Baskerville Map), the site is underlain by bedrock of the Cambrian Manhattan Schist

formation, which consists of interbedded mica schist, gneiss, quartz, and amphibolite. Based on the Baskerville Map, bedrock is presumed to be about 100 feet bgs.

1.4.2 Hydrogeologic Conditions

On August 22, 2012, groundwater elevations ranged from el -5.68 to el - 5.85 feet (elevations herein are relative to Manhattan Highway Datum, which is 2.75 feet above the National Geodetic Survey Datum of 1929, Mean Sea Level, Sandy Hook, New Jersey), with a calculated flow toward the northeast, in contrast to the presumed westerly flow toward the Hudson River. By October 4, 2012, when groundwater was gauged a second time, groundwater levels were depressed another about 6 feet to el -11.95 and el -12.23. After measuring this drop in groundwater elevation, properties in the vicinity of the site were inspected and the groundwater depression was attributed to dewatering associated with a 40-foot deep excavation at the 160 Charles Street construction project, located about 420 feet northeast of the site.

After installing three additional wells, subsequent well gauging on January 26, 2015 resulted in groundwater elevations ranging from about el -2.17 to el -2.65 feet (about 7-10 feet bgs). Based on historic and current gauging results, groundwater appears to flow toward the east; however, regional groundwater is presumed to flow west towards the Hudson River. Given the fluctuation in groundwater depth (about 10 ft), it is presumed that the excavation dewatering project at 160 Charles Street influenced the groundwater flow direction. After the groundwater table returns to its static elevation, flow is expected to be to the west, towards the Hudson River.

1.4.3 Contaminant Conditions

The site was originally part of the Hudson River and the original shoreline was about at the eastern extent of the site. The area was filled in with material of unknown origin in the 1800s to bring the site and surrounding area to development grade. Semi-volatile organic compounds (SVOCs) and metals attributed to historic fill were detected at concentrations above NYSDEC Title 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Unrestricted Use (UU) Soil Cleanup Objectives (SCOs) to depths of up to 13 feet bgs. The detected concentrations are considered typical of historic fill material in New York City. SVOCs were detected in groundwater above Technical and Operational Guidance Series (TOGS) 1.1.1. Ambient Water Quality Standards (AWQS) and are attributable to a combination of the historic petroleum release and quality of historic fill.

Petroleum-like impacts, including odors, staining, and photoionization detector (PID) readings above background levels, were apparent in several borings located in the eastern portion of the

site. PID readings of the petroleum-impacted material ranged from 21.8 to 13,232 parts per million (ppm), with the highest reading recorded near the northeast part of the garage on Lot 30. The petroleum-impacted soil appeared to straddle the groundwater table and occurred at depths ranging from about 5 to 16 feet bgs.

Petroleum-like odors were apparent in groundwater at monitoring wells near the eastern portion of the site. PID headspace readings ranged from 0.0 to 3.6 ppm during the RI groundwater sampling. Groundwater in the petroleum-impacted area had dissolved petroleum-related VOC concentrations that exceed their respective TOGS Class GA AWQS. Petroleum-related VOCs were also detected in groundwater throughout the site at decreasing concentrations to the west and down-gradient of the presumed source. The highest concentrations of petroleum-related VOCs were detected in MW-6 located on the Barrow Street sidewalk in front of the eastern portion of the garage on Lot 30.

Several VOCs, including petroleum-related compounds, were detected in soil vapor. Carbon tetrachloride and PCE were detected above the minimum concentration at which mitigation is recommended, according to NYSDOH Decision Matrices in the 2006 Guidance for Evaluating Soil Vapor Intrusion. A site source of PCE and carbon tetrachloride was not identified.

The presence of petroleum compounds in soil, groundwater, and soil vapor is likely due to NYSDEC Spill No. 9400447. Soil, groundwater, and soil vapor sample location and results maps from the RI are provided as Figures 3 to 5.

1.5 Proposed Development

The purpose of the project is to develop an underutilized, contaminated parcel while implementing remedial measures that are protective of human health and the environment. The design is still in the early stages, but the proposed development is expected to include the demolition of the garage on Lot 30 and construction of a new 7-story building with at least one cellar level. The new building will be interconnected to the Keller Hotel Building, which will be fully renovated as part of the development. It is our understanding the development may include a hotel, private residences, and/or retail space.

2.0 SUMMARY OF INTERIM REMEDIAL MEASURES

The proposed IRM consists of the following tasks:

- Asbestos abatement and building demolition on Lot 30.
- Performance of a geophysical survey to identify remnant buried tank structures and associated piping;

- Excavation and off-site disposal of petroleum-impacted soil, to the extent practical on Lot 30;
- Decommission underground storage tanks (USTs), if encountered; and
- Backfilling the excavation with recycled concrete aggregate (RCA) to restore the site until the RAWP is implemented.

Asbestos abatement and building demolition are not expected to begin until August 2016. The IRM described herein will be performed in accordance with applicable federal, state, and city regulations. A Construction Health and Safety Plan (CHASP) and Community Air Monitoring Plan (CAMP) will be implemented during the IRM. The IRM construction schedule is provided in Appendix A. Proposed changes, delays or deviations will be promptly notified to the NYSDEC. A CHASP is provided as Appendix B and the CAMP is provided as Appendix C.

2.1 Objectives and Rationale

The objective of the IRM is to remove sources of petroleum contamination and prevent additional environmental impacts to site media (soil, groundwater, and soil vapor) through the removal of the USTs, associated fuel lines, pumps, and appurtenances and surrounding petroleum-impacted soil, to the extent practical. Removal of petroleum-impacted soil under this IRMWPs would facilitate removal of source material in a more timely manner than waiting until after the forthcoming RAWP is issued and approved (after the project design progresses).

2.1.1 Site Preparation

The proposed work will be completed on Lot 30. Site preparation to be completed by the Contractor(s) for implementation of the IRMWPs will include, but not be limited to, acquiring necessary permits, establishment of work zones, addition of support facilities, implementation of erosion control measures, and implementation of site security measures (i.e. security barricades around work zones and staging areas). The Contractor will ensure that soil erosion control and sediment control measures are in operation prior to the commencement of, and during all work operations contained in this IRMWPs.

Prior to intrusive activities, Dig Safely New York (811) will be contacted by the Contractor a minimum of three business days in advance of the work. Dig Safely New York will be informed of the nature of the work and the intent to perform excavation at the Site.

2.1.2 Fill and Soil Removal

Petroleum-impacted historic fill and soil was observed primarily in the eastern part of the garage building on Lot 30 between 5 and 16 feet bgs. Excavation for the proposed

development will likely include at least one cellar level; however, this IRM proposes excavation of petroleum-impacted historic fill and soil, to the extent practical on Lot 30. The planned excavation area is shown on Figure 6. In the context of excavation, the phrase “to the extent practical” will mean that:

- Excavation will be limited to not undermine site or adjoining building foundations;
- The excavation shall not extend outside the property line;
- The excavation shall not require additional support beyond basic support of excavation design (i.e. sloping and trench boxes); and
- Following completion of the IRM, the excavation will be backfilled with RCA from a registered NYSDEC Part 360 facility, which will remain in place until the forthcoming RAWP is implemented.

Dewatering will not be completed during the IRM. Excavated material will be temporarily staged in roll-off containers. The estimated volume of petroleum-impacted historic fill and soil that will be excavated and transported to an off-site disposal facility is about 700 to 1,000 cubic yards. The excavation will be covered with poly sheeting when complete to help prevent nuisance odors. Material excavated during implementation of the IRMWPs will not be reused on site.

2.1.3 Underground Storage Tank Removal

Based on previous environmental reports, two buried gasoline USTs were historically located in Lot 30 and may still remain. A previous geophysical survey did not identify USTs, but may have been limited by automobiles and other items stored in the garage. If USTs are encountered during excavation, they will be decommissioned and removed. Removal of the USTs will be performed in accordance with NYSDEC CP-51 Soil Cleanup Guidance and other applicable NYSDEC UST closure requirements. All tanks removed from the site will be cleaned prior to off-site transport. Decommissioned UST registrations will be updated with the NYSDEC Petroleum Bulk Storage (PBS) unit.

2.1.4 Documentation Sampling

Per NYSDEC Division of Environmental Remediation (DER) policy, documentation soil sample collection would be completed from the excavation base at a frequency of one sample per 900 square feet of base and one per 30 linear feet of sidewall. Based on these criteria, about 3

base confirmation samples and 7 sidewall samples, plus required quality assurance/quality control (QA/QC) samples, are anticipated. Base confirmation samples will not be collected when water (groundwater or accumulated rainwater) is present.

Documentation samples will be analyzed for Part 375 listed VOCs, SVOCs, pesticides and metals. Soil cleanup objectives (SCOs) have not yet been established for the site; however, results will be compared to Restricted Use (RU) – Restricted Residential (RR) SCOs.

2.2 Remedial Activity Oversight

The Remediation Engineer (RE), Langan, will oversee the IRM planning and implementation. The RE is responsible for documenting that the contractor performs the work as specified in the IRMWP and provides the proper documentation required by NYSDEC. These contractor documents will be submitted to the NYSDEC in the Construction Completion Report (CCR); which is described in Section 3.0. The RE will provide full-time oversight of IRMWP implementation. The activities that occur during the IRM will be documented in monthly BCP progress reports, periodic correspondence with the NYSDEC, and in the CCR.

2.3 Soil Screening Methods

Visual, olfactory and instrumental soil screening and assessment will be performed under the supervision of a qualified environmental professional during the IRM excavations into known or potentially impacted material. Instrumental screening will be performed with a PID equipped with a 10.6 electron Volt (eV) bulb and will be calibrated daily.

2.4 Waste Characterization

Waste characterization samples will be collected from the material excavated during implementation of the IRMWP per disposal facility requirements. This activity will be coordinated and overseen by the RE. Samples will be collected to be representative of the material requiring disposal at a frequency consistent with disposal facility requirements. Samples may be collected from stockpiled excavated materials.

Waste characterization samples will be submitted to a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory for analysis in accordance with the Quality Assurance Project Plan (QAPP) provided in Appendix D. Waste characterization samples will be analyzed for parameters that are typically required by disposal facilities, including, TCL VOCs, TCL SVOCs, Resource Conservation and Recovery Act (RCRA) metals, polychlorinated biphenyls (PCBs), pesticides, herbicides, total petroleum hydrocarbons (TPH) diesel range

organics (DRO) and gasoline range organics (GRO), Toxicity Characteristic Leaching Procedure (TCLP) VOCs, SVOCs, pesticides, and metals, ignitability, corrosivity, reactivity, and paint filter.

Excavated material will be transported off-site and disposed at a permitted facility. Sampling and analytical methods, sampling frequency, analytical results and QA/QC methods will be reported in the CCR upon completion of the IRM and in the Final Engineering Report (FER) upon completion of the final remedy.

2.5 Material Load Out, Transport, and Disposal

Non-hazardous, petroleum-impacted material will be handled, transported and disposed by a licensed hauler in accordance with applicable 6 NYCRR Part 360, General Provisions and 6 NYCRR Part 364, Waste Transporter Permit regulations and other applicable federal, state and local regulations. The waste removal contractor will provide the appropriate permits, certifications, and written commitments from disposal facilities to accept the material throughout the duration of the project, including the facility's acknowledgement that the site is enrolled in the BCP. The RE will review submittals for proposed disposal facilities before any materials leave the site to verify that the facility has the proper permits and to review their acceptance requirements.

Petroleum-impacted material will be transported by a waste removal contractor who possesses a valid New York State Part 364 Waste Transporter Permit. Waste manifests will be used to track the material that is transported off-site. Haulers will be appropriately licensed and trucks will be properly placarded.

The RE will oversee the load-out of excavated material. Once the loading of a container, dump truck, or trailer has been completed, the material will be transported to the approved off-site disposal facility. Loaded vehicles leaving the site will be appropriately covered, and manifested in accordance with appropriate federal, state, local, and New York State Department of Transportation (NYSDOT) requirements (or other applicable transportation requirements). If loads contain wet material capable of producing free liquid, truck liners will be used.

Equipment and the sidewalk will be decontaminated using dry methods (i.e., sweeping and shoveling). Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site sediment tracking. Proposed in-bound and out-bound truck routes to the site are shown in Figure 7.

2.6 Importation and Backfill of Clean Fill Material

The excavation will be backfilled with recycled concrete aggregate (RCA) from a registered New York State Part 360 recycling facility. Prior to its placement, imported material will be screened for evidence of contamination (visual, olfactory and instrument). Materials proposed for import onto the site will be approved by the Remediation Engineer and will be in compliance with provisions in this IRM Work Plan prior to receipt at the Site.

2.7 Dust, Odor, Vapor and Nuisance Control Plan

This dust, odor, organic vapor and nuisance control plan was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan (CAMP) and OSHA standards for construction (29 CFR 1926). Remediation and construction activities will be monitored for dust and odors by the RE's field inspector. Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust will be required for all ground intrusive activities, such as soil excavation and handling activities. The work zone is defined as the general area in which machinery is operating in support of remediation activities. A portable PID will be used to monitor the work zone during excavation and UST removal and for periodic monitoring for VOCs during post-excavation soil sampling. The site perimeter will be monitored for fugitive dust emissions by visual observations as well as instrumentation measurements. Particulate or dust will be monitored continuously with real-time field instrumentation that will meet, at a minimum, the performance standards from DER-10 Appendix 1B. Action levels for site worker respiratory use are set forth in Section 4.3 of the CHASP, included in Appendix B and the CAMP provided in Appendix C. Action levels for the protection of the community and visitors are discussed in Section 2.7.1.

2.7.1 Dust, Odor and Vapor Control

Work practices to minimize odors and organic vapors include limiting the time that the excavations remain open, wetting exposed fill or soil, minimizing stockpiling of impacted-source soil, and minimizing the handling of impacted material. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or petroleum source areas. Foam suppressants may include biodegradable foams that are applied over the source material for short-term control of the odor.

VOCs will be monitored with a handheld PID in accordance with the CHASP and CAMP. If the action level is exceeded and adequate ventilation cannot be provided, work will cease and the potential affected portion of the work area will be evacuated until adequate mechanical ventilation can be implemented to control the hazard. Level C respiratory protection may be

donned in accordance with the CHASP if untrained personnel are not present and the action level is exceeded. The following actions will be taken based on VOC levels measured:

- If total VOC levels exceed 5 parts per million (ppm) above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the hot zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will resume provided that the total organic vapor level 200 feet downwind of the hot 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 above background for the 15-minute average.
- If the total VOC level is above 25 ppm at the perimeter of the hot zone, activities will be shut down.

The following actions will be taken based on visual observations and measured dust levels using a quantitative meter following minimum performance standards from DER-10 Appendix 1B:

- If the downwind particulate level is $100 \mu\text{g}/\text{m}^3$ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind PM10 levels do not exceed $150 \mu\text{g}/\text{m}^3$ above the background level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than $150 \mu\text{g}/\text{m}^3$ above the background 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 PM10 concentration to within $150 \mu\text{g}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

This plan will be implemented to control emissions of VOCs and nuisance odors. Specific VOC and odor control methods to be used on a routine basis will include limiting the time that the excavations remain open, minimizing stockpiling of impacted-source soil, and minimizing the

handling of impacted material. If nuisance odors or vapors exceeding action levels set forth in the IRM Work Plan are identified off-site, work will be halted and the source of odors will be identified and corrected. Work will not resume until all VOCs or nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor and vapor events and of all other complaints about the project. Implementation of all odor and vapor controls, including the halting of work, will be the responsibility of the Remediation Contractor under the oversight of the RE, who is responsible for certifying the CCR.

2.8 Construction Health and Safety Plan

The RE prepared a site-specific CHASP for the IRM, which is included as Appendix B. The CHASP provides a mechanism for establishing on-site safe working conditions, safety organization, procedures, and personal protective equipment requirements. The CHASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). The CHASP includes, but is not limited to, the following components listed below:

- Organization and Identification of key personnel;
- Training requirements;
- Medical surveillance requirements;
- List of Site hazards;
- Excavation safety;
- Work zone descriptions and monitoring procedures;
- Personal safety equipment and protective clothing requirements;
- Decontamination requirements;
- Standard operating procedures;
- Contingency Plan; and
- Material Safety Data Sheets.

2.8 Quality Assurance Project Plan

The RE prepared a QAPP, which includes proposed sampling procedures and analytical methods for waste characterization samples. The QAPP is provided as Appendix D.

2.9 Notification

The NYSDEC will be notified prior to commencement of work related to the IRM. A pre-construction meeting will be coordinated between the RE, the Remediation Contractor, and the NYSDEC. This meeting must take place prior to the implementation of this IRM Work Plan.

3.0 REPORTING

Upon completion of the IRM, a CCR will be prepared and submitted to the NYSDEC. The RE responsible for certifying all reports will be an individual licensed to practice engineering in the State of New York. Jason Hayes, P.E. of Langan will have this responsibility. Should Mr. Hayes become unable to fulfill this responsibility, another suitably qualified New York State professional engineer will take his place. All project reports will be submitted to the NYSDEC electronically as PDFs. Laboratory analytical data for documentation samples will be submitted in an electronic data deliverable (EDD) format that complies with the NYSDEC's electronic data warehouse standards.

3.1 Daily Reports

Daily reports will be prepared for the project file and for review by Project Managers. Daily reports will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the site;
- References to map for site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions; and
- An explanation of notable site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the IRM Work Plan or other sensitive or time critical information; however, such conditions will also be included in the daily reports. Emergency conditions and changes to the IRM Work Plan will be addressed directly to the NYSDEC Project Manager via personal communication. If site conditions warrant, the RE may request to change from daily to weekly reports that include the above information.

3.2 Construction Completion Report

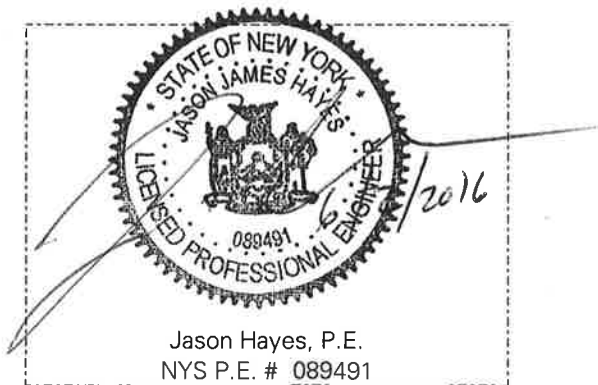
A CCR will be submitted to the NYSDEC Project Managers within 90 days of completing the interim remedial action. The CCR will document the implementation of the remedial action undertaken as an IRM. The CCR will be incorporated into and referenced in the FER for the Site when issued. The CCR will provide the following information:

1. The RE will certify that:
 - a. Data generated was useable and met the remedial requirements;
 - b. The remedial work conformed to the IRM Work Plan;

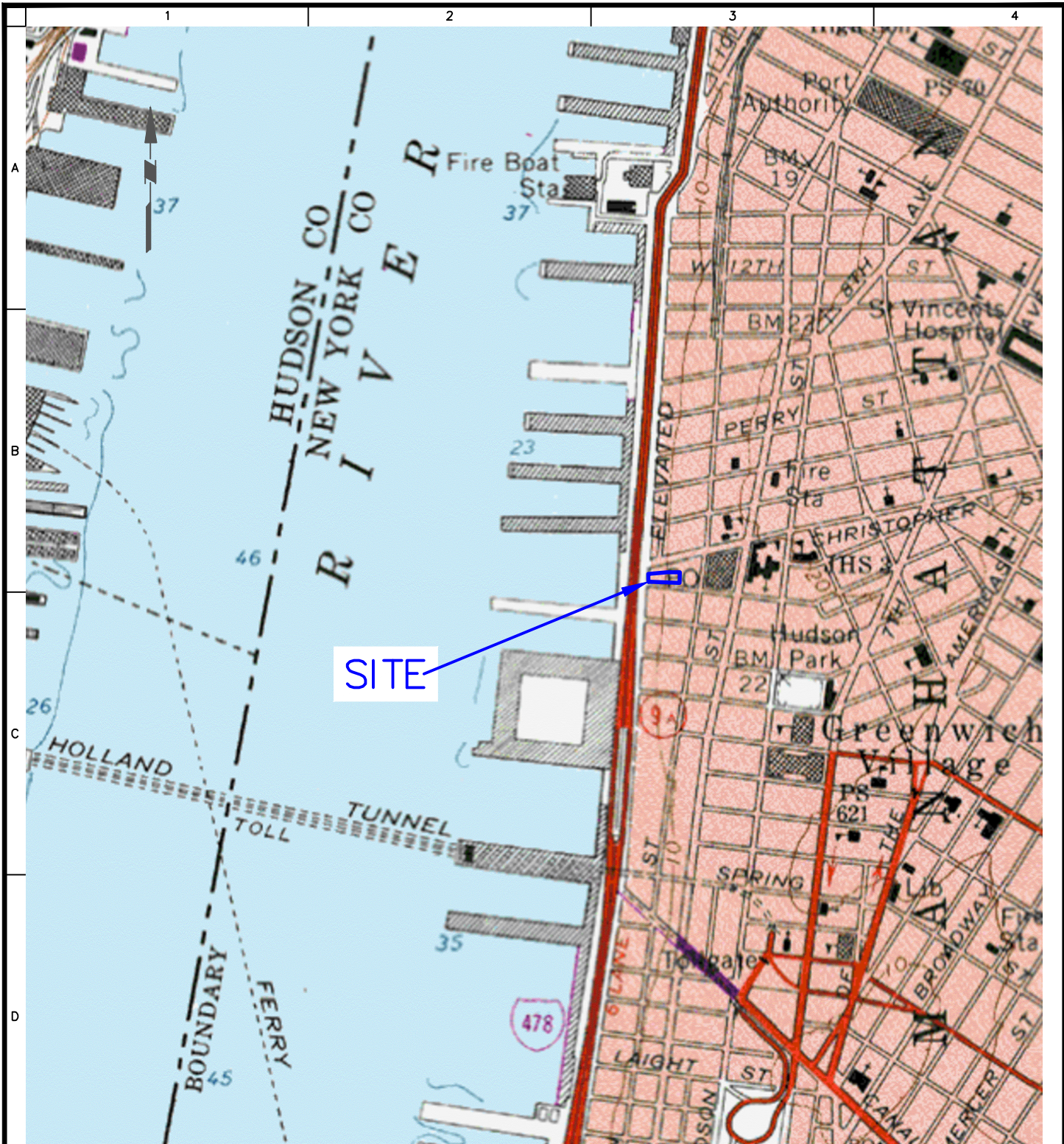
- c. Dust, odor, and vapor control measures were implemented during invasive work and conformed with the IRM Work Plan;
 - d. Remediation waste was transported and disposed in accordance with the IRM Work Plan;
 - e. Source approval and sampling of imported acceptable fill was completed in a manner consistent with the methodology of the IRM Work Plan;
2. Description of any problems encountered and their resolutions;
3. Description of changes in the IRM from the elements provided in the IRM Work Plan and associated design documents and the reasons for them;
4. Description of the deviations from the approved IRM Work Plan;
5. Listing of waste streams, quantity of materials disposed, and where they were disposed;
6. List of the remediation standards applied to the remedial actions;
7. Description of source and quality of fill;
8. A summary of all residual impacted material left on the site;
9. A tabular summary of all sampling results and all material characterization results and other sampling and chemical analysis performed as part of the IRM;
10. Written and photographic documentation of all remedial work performed under this remedy;
11. Copies of all the submitted progress reports;
12. Certifications, manifests, and bills of lading for excavated materials transported off-site;
13. An accounting of the destination of all material removed from the Site, including excavated impacted soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids; and
14. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

4.0 CERTIFICATION

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

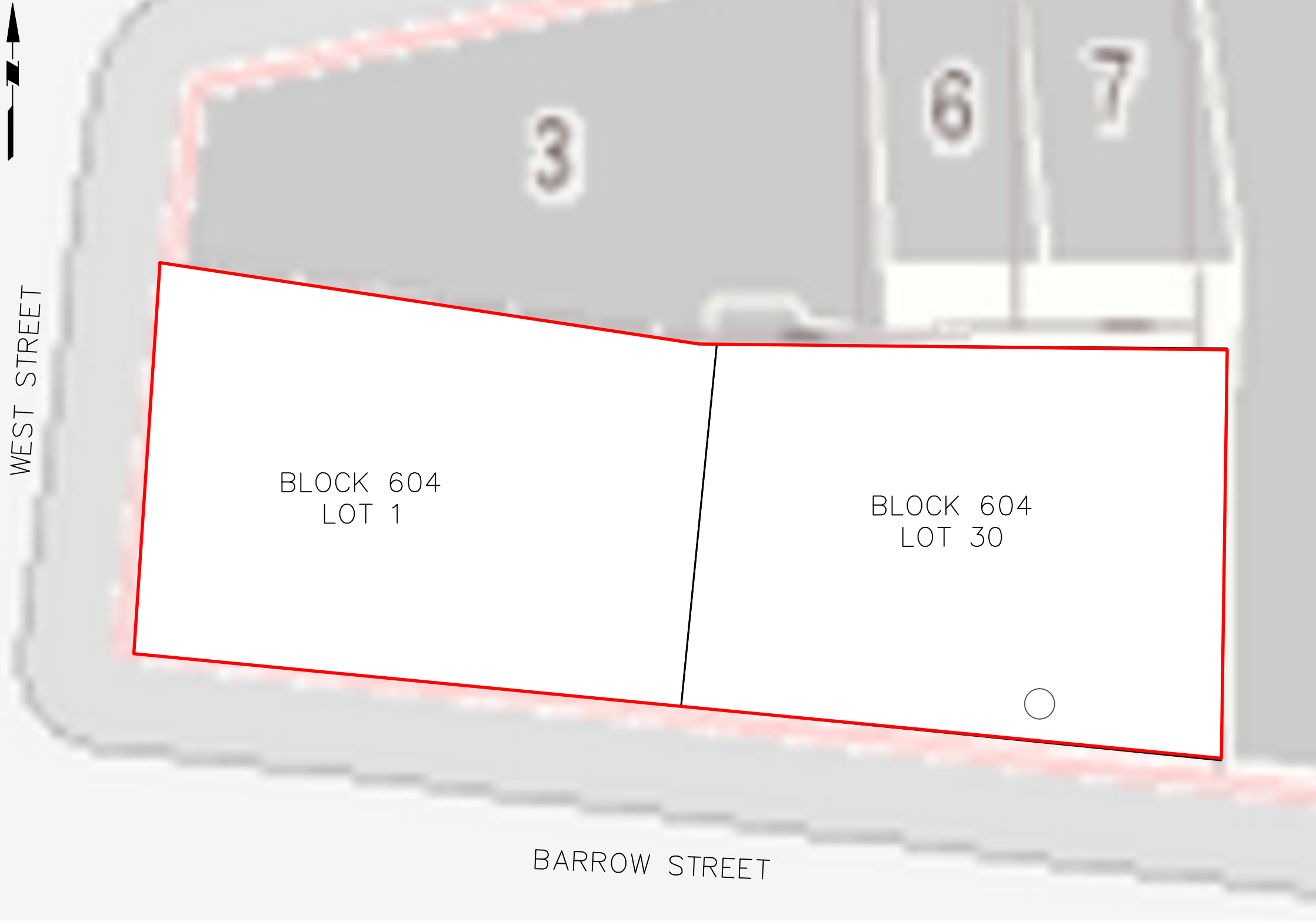


FIGURES



NOTES: BASE MAP IS REFERENCED FROM USGS TOPOGRAPHIC MAP, PORTIONS OF JERSEY CITY DATED, 1967, REVISED 1981 AND BROOKLYN QUADRANGLE, DATED 1967, REVISED 1979.

<p>21 Penn Plaza, 360 West 31st Street, 8th Floor New York, NY 10001 T: 212.479.5400 F: 212.479.5444 www.langan.com</p> <p>Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan Engineering and Environmental Services, Inc. Langan International LLC</p> <p>Collectively known as Langan</p>	Project	Figure Title	Project No.	Figure No.	
	<p>KELLER HOTEL SITE 144-150 BARROW STREET</p> <p>BLOCK No. 604 LOT Nos. 1 and 30 MANHATTAN</p> <p>NEW YORK NEW YORK</p>	<p>SITE LOCATION MAP</p>	170170901	<p>1</p>	
			Date		10/21/2015
			Scale		NTS
			Drawn By		JL
Submission Date		Sheet 1 of 7			



LEGEND:



SITE BOUNDARY



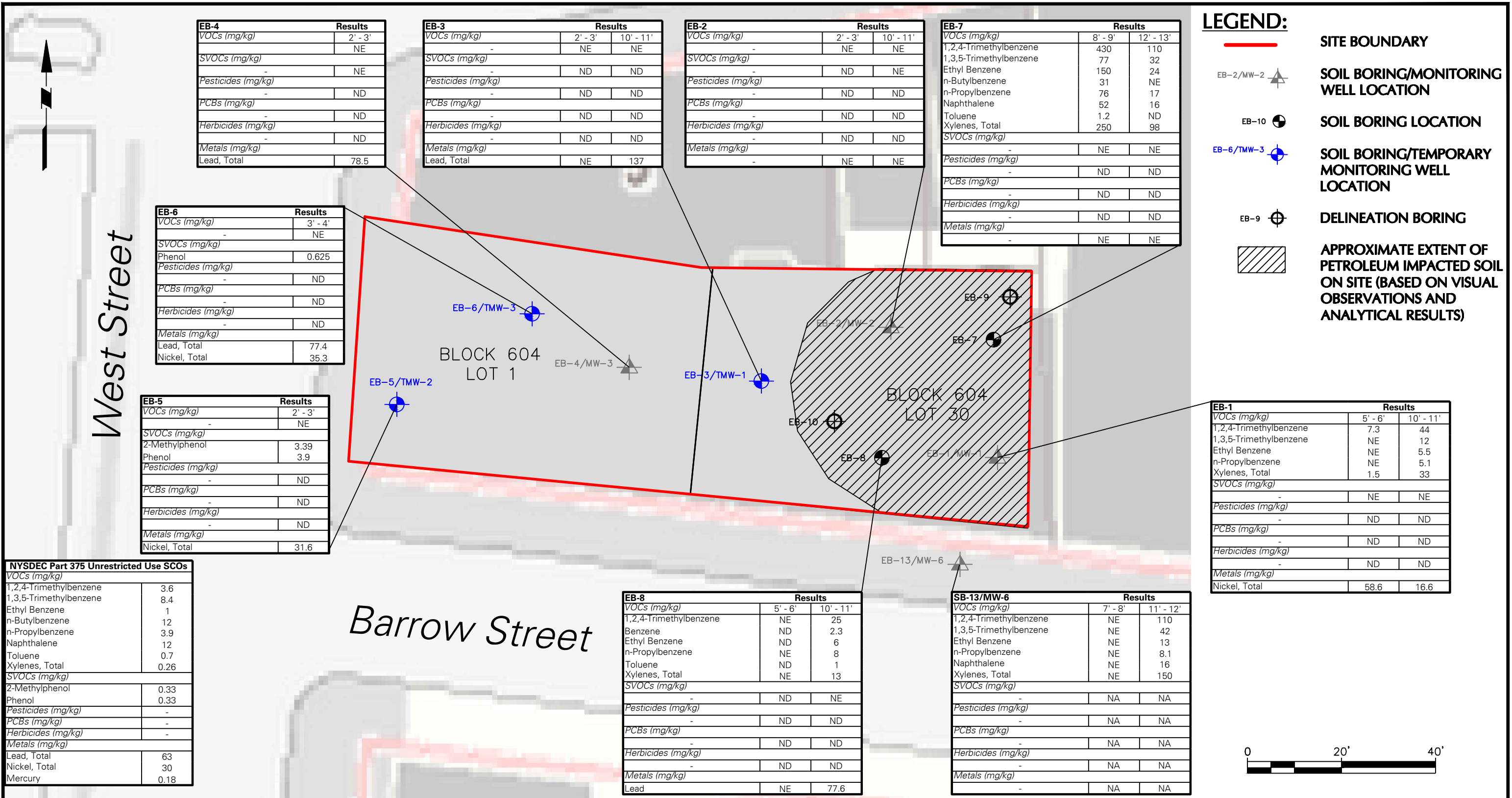
APPROXIMATE UST LOCATION

NOTES:

1. BACKGROUND IS TAKEN FROM NYC OASIS MAPS (WWW.OASISNYC.NET/MAPS.ASPX).



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	<p>KELLER HOTEL SITE 144-150 BARROW STREET</p> <p>NEW YORK NEW YORK</p>	<p>SITE LAYOUT PLAN</p>	170170901	<p>2</p>	
			Date		10/21/2015
			Scale		1" = 20'
			Drawn By		JL
Submission Date		Sheet 2 of 7			



LEGEND:

- SITE BOUNDARY
- EB-2/MW-2 SOIL BORING/MONITORING WELL LOCATION
- EB-10 SOIL BORING LOCATION
- EB-6/TMW-3 SOIL BORING/TEMPORARY MONITORING WELL LOCATION
- EB-9 DELINEATION BORING
- APPROXIMATE EXTENT OF PETROLEUM IMPACTED SOIL ON SITE (BASED ON VISUAL OBSERVATIONS AND ANALYTICAL RESULTS)

EB-4		Results	
VOCs (mg/kg)	2' - 3'	NE	
SVOCs (mg/kg)		NE	
Pesticides (mg/kg)		NE	
PCBs (mg/kg)		ND	
Herbicides (mg/kg)		ND	
Metals (mg/kg)		ND	
Lead, Total		78.5	

EB-3		Results	
VOCs (mg/kg)	2' - 3'	10' - 11'	
SVOCs (mg/kg)		NE	NE
Pesticides (mg/kg)		ND	ND
PCBs (mg/kg)		ND	ND
Herbicides (mg/kg)		ND	ND
Metals (mg/kg)		ND	ND
Lead, Total		NE	137

EB-2		Results	
VOCs (mg/kg)	2' - 3'	10' - 11'	
SVOCs (mg/kg)		NE	NE
Pesticides (mg/kg)		ND	NE
PCBs (mg/kg)		ND	ND
Herbicides (mg/kg)		ND	ND
Metals (mg/kg)		ND	ND

EB-7		Results	
VOCs (mg/kg)	8' - 9'	12' - 13'	
1,2,4-Trimethylbenzene	430	110	
1,3,5-Trimethylbenzene	77	32	
Ethyl Benzene	150	24	
n-Butylbenzene	31	NE	
n-Propylbenzene	76	17	
Naphthalene	52	16	
Toluene	1.2	ND	
Xylenes, Total	250	98	
SVOCs (mg/kg)		NE	NE
Pesticides (mg/kg)		ND	ND
PCBs (mg/kg)		ND	ND
Herbicides (mg/kg)		ND	ND
Metals (mg/kg)		ND	ND

EB-6		Results	
VOCs (mg/kg)	3' - 4'	NE	
SVOCs (mg/kg)		NE	
Phenol		0.625	
Pesticides (mg/kg)		ND	
PCBs (mg/kg)		ND	
Herbicides (mg/kg)		ND	
Metals (mg/kg)		ND	
Lead, Total		77.4	
Nickel, Total		35.3	

EB-5		Results	
VOCs (mg/kg)	2' - 3'	NE	
SVOCs (mg/kg)		NE	
2-Methylphenol		3.39	
Phenol		3.9	
Pesticides (mg/kg)		ND	
PCBs (mg/kg)		ND	
Herbicides (mg/kg)		ND	
Metals (mg/kg)		ND	
Nickel, Total		31.6	

EB-8		Results	
VOCs (mg/kg)	5' - 6'	10' - 11'	
1,2,4-Trimethylbenzene	NE	25	
Benzene	ND	2.3	
Ethyl Benzene	ND	6	
n-Propylbenzene	NE	8	
Toluene	ND	1	
Xylenes, Total	NE	13	
SVOCs (mg/kg)		ND	NE
Pesticides (mg/kg)		ND	ND
PCBs (mg/kg)		ND	ND
Herbicides (mg/kg)		ND	ND
Metals (mg/kg)		ND	ND
Lead		NE	77.6

SB-13/MW-6		Results	
VOCs (mg/kg)	7' - 8'	11' - 12'	
1,2,4-Trimethylbenzene	NE	110	
1,3,5-Trimethylbenzene	NE	42	
Ethyl Benzene	NE	13	
n-Propylbenzene	NE	8.1	
Naphthalene	NE	16	
Xylenes, Total	NE	150	
SVOCs (mg/kg)		NA	NA
Pesticides (mg/kg)		NA	NA
PCBs (mg/kg)		NA	NA
Herbicides (mg/kg)		NA	NA
Metals (mg/kg)		NA	NA

EB-1		Results	
VOCs (mg/kg)	5' - 6'	10' - 11'	
1,2,4-Trimethylbenzene	7.3	44	
1,3,5-Trimethylbenzene	NE	12	
Ethyl Benzene	NE	5.5	
n-Propylbenzene	NE	5.1	
Xylenes, Total	1.5	33	
SVOCs (mg/kg)		NE	NE
Pesticides (mg/kg)		ND	ND
PCBs (mg/kg)		ND	ND
Herbicides (mg/kg)		ND	ND
Metals (mg/kg)		ND	ND
Nickel, Total		58.6	16.6

NYSDEC Part 375 Unrestricted Use SCOs	
VOCs (mg/kg)	
1,2,4-Trimethylbenzene	3.6
1,3,5-Trimethylbenzene	8.4
Ethyl Benzene	1
n-Butylbenzene	12
n-Propylbenzene	3.9
Naphthalene	12
Toluene	0.7
Xylenes, Total	0.26
SVOCs (mg/kg)	
2-Methylphenol	0.33
Phenol	0.33
Pesticides (mg/kg)	-
PCBs (mg/kg)	-
Herbicides (mg/kg)	-
Metals (mg/kg)	
Lead, Total	63
Nickel, Total	30
Mercury	0.18

NOTES:
 1. BACKGROUND IS TAKEN FROM NYC OASIS MAPS (WWW.OASISNYC.NET/MAPS.ASPX).
 2. SOIL ANALYTICAL RESULTS ARE COMPARED TO NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (SCOs).
 3. ONLY CONCENTRATIONS THAT EXCEED PART 375 UNRESTRICTED USE SCOs ARE SHOWN.
 4. SOIL SAMPLES WERE NOT COLLECTED FROM BORING EB-9 AND EB-10. THESE BORINGS WERE ADVANCED FOR FIELD DELINEATION PURPOSES ONLY.
 VOC = VOLATILE ORGANIC COMPOUND
 SVOC = SEMI-VOLATILE ORGANIC COMPOUND
 PCB = POLYCHLORINATED BIPHENYLS
 mg/kg = MILLIGRAM PER KILOGRAM
 ND = NOT DETECTED
 NE = NO EXCEEDANCES
 NA = NOT ANALYZED

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Project
KELLER HOTEL SITE
144-150 BARROW STREET
BLOCK No. 604, LOTS No. 1 AND 30
NEW YORK NEW YORK

Figure Title
SOIL SAMPLE LOCATION AND RESULTS MAP

Project No. 170170901	Figure No. 3
Date 10/21/2015	
Scale 1" = 20'	
Drawn By JL	
Submission Date	Sheet 3 of 7



WEST STREET

BLOCK 604 LOT 1

BLOCK 604 LOT 30

BARROW STREET

MW-4 Results		
Parameter	MW4-120314	DU01_120314
VOCs (ug/L)		
Benzene	1.3	1.3
Isopropylbenzene	8.2	8.4
Tetrachloroethene	11	9.1
SVOCs (ug/L)		
-	NE	NE
Pesticides (ug/L)		
-	NA	NA
Herbicides (ug/L)		
-	NA	NA
PCBs (ug/L)		
-	NA	NA
Dissolved Metals (ug/L)		
-	NA	NA
Total Metals (ug/L)		
-	NA	NA

TMW-3 Results	
VOCs (ug/L)	
Benzene	1.4
Chloroform	19
Naphthalene	250
SVOCs (ug/L)	
2,4-Dimethylphenol	67.2
2-Methylphenol	52.6
Naphthalene	198
Phenol	89
Pesticides (ug/L)	
-	ND
Herbicides (ug/L)	
-	ND
PCBs (ug/L)	
-	ND
Dissolved Metals (ug/L)	
Selenium	16
Sodium	236000
Total Metals (ug/L)	
Iron	3700
Lead	84
Selenium	14
Sodium	235000

MW-3 Results	
VOCs (ug/L)	
Naphthalene	53
SVOCs (ug/L)	
Benzo(a)anthracene	0.189
Chrysene	0.156
Pesticides (ug/L)	
-	ND
Herbicides (ug/L)	
-	ND
PCBs (ug/L)	
-	ND
Dissolved Metals (ug/L)	
Magnesium	55500
Manganese	1820
Sodium	393000
Total Metals (ug/L)	
Iron	19200
Lead	69
Magnesium	59700
Manganese	2270
Sodium	399000

TMW-1 Results	
VOCs (ug/L)	
-	ND
SVOCs (ug/L)	
-	ND
Pesticides (ug/L)	
-	ND
Herbicides (ug/L)	
-	ND
PCBs (ug/L)	
-	ND
Dissolved Metals (ug/L)	
Iron	12400
Manganese	4650
Selenium	12
Sodium	146000
Total Metals (ug/L)	
Iron	13100
Lead	26
Manganese	4710
Selenium	22
Sodium	144000
Thallium	3

MW-2 Results	
VOCs (ug/L)	
1,2,4-Trimethylbenzene	160
1,3,5-Trimethylbenzene	53
Benzene	82
Ethyl Benzene	110
Isopropylbenzene	69
n-Butylbenzene	15
n-Propylbenzene	130
Naphthalene	110
o-Xylene	29
p- & m- Xylenes	320
sec-Butylbenzene	8.7
Toluene	44
Xylenes, Total	340
SVOCs (ug/L)	
Naphthalene	52.4
Pesticides (ug/L)	
-	ND
Herbicides (ug/L)	
-	ND
PCBs (ug/L)	
-	ND
Dissolved Metals (ug/L)	
Iron	5580
Manganese	6920
Selenium	25
Sodium	29900
Total Metals (ug/L)	
Arsenic	34
Iron	20600
Manganese	7150
Selenium	22
Sodium	30100

MW-1 Results	
VOCs (ug/L)	
1,2,4-Trimethylbenzene	240
1,3,5-Trimethylbenzene	66
Benzene	23
Ethyl Benzene	100
Isopropylbenzene	17
Methylene chloride	13
n-Butylbenzene	6.5
n-Propylbenzene	26
Naphthalene	29
o-Xylene	200
p- & m- Xylenes	520
Toluene	69
Xylenes, Total	720
SVOCs (ug/L)	
Naphthalene	17.1
Pesticides (ug/L)	
-	ND
Herbicides (ug/L)	
-	ND
PCBs (ug/L)	
-	ND
Dissolved Metals (ug/L)	
Manganese	12000
Selenium	21
Sodium	106000
Thallium	10
Total Metals (ug/L)	
Iron	852
Manganese	12100
Selenium	17
Sodium	105000
Thallium	3





NYSDEC TOGS CLASS GA AWQS AND GUIDANCE VALUES	
VOCs (ug/L)	
1,2,4-Trimethylbenzene	5
1,3,5-Trimethylbenzene	5
Benzene	1
Chloroform	7
Ethyl Benzene	5
Isopropylbenzene	5
n-Butylbenzene	5
n-Propylbenzene	5
Naphthalene	10
o-Xylene	5
p- & m- Xylenes	5
sec-Butylbenzene	5
Toluene	5
Xylenes, Total	5
SVOCs (ug/L)	
2,4-Dimethylphenol	50
2-Methylphenol	1
Naphthalene	10
Benzo(a)anthracene	0.002
Phenol	1
Chrysene	0.002
Pesticides (ug/L)	
-	-
Herbicides (ug/L)	
-	-
PCBs (ug/L)	
-	-
Metals (ug/L)	
Arsenic	25
Iron	300
Lead	25
Magnesium	35000
Manganese	300
Selenium	10
Sodium	20000
Thallium	0.5

TMW-2 Results	
VOCs (ug/L)	
1,2,4-Trimethylbenzene	14
Benzene	22
Ethyl Benzene	10
Methylene chloride	35
Naphthalene	1700
o-Xylene	14
p- & m- Xylenes	24
Toluene	40
Xylenes, Total	38
SVOCs (ug/L)	
2,4-Dimethylphenol	1490
2-Methylphenol	781
Naphthalene	1090
Phenol	469
Pesticides (ug/L)	
-	ND
Herbicides (ug/L)	
-	ND
PCBs (ug/L)	
-	ND
Dissolved Metals (ug/L)	
Sodium	388000
Total Metals (ug/L)	
Sodium	393000

MW-6 Results	
VOCs (ug/L)	
1,2,4-Trimethylbenzene	2800
1,3,5-Trimethylbenzene	690
Benzene	64
o-Xylene	14
Ethyl Benzene	790
Isopropylbenzene	71
n-Butylbenzene	50
n-Propylbenzene	130
Naphthalene	540
o-Xylene	470
p- & m- Xylenes	6400
Toluene	79
Xylenes, Total	6900
SVOCs (ug/L)	
2,4-Dimethylphenol	78
Bis(2-ethylhexyl)phthalate	8.3
Naphthalene	250
Pesticides (ug/L)	
-	NA
Herbicides (ug/L)	
-	NA
PCBs (ug/L)	
-	NA
Dissolved Metals (ug/L)	
-	NA
Total Metals (ug/L)	
-	NA

MW-5 Results	
VOCs (ug/L)	
-	ND
SVOCs (ug/L)	
-	NE
Pesticides (ug/L)	
-	NA
Herbicides (ug/L)	
-	NA
PCBs (ug/L)	
-	NA
Dissolved Metals (ug/L)	
-	NA
Total Metals (ug/L)	
-	NA

LEGEND:

-  SITE BOUNDARY
-  EB-2/MW-2 SOIL BORING/MONITORING WELL LOCATION
-  EB-6/TMW-3 SOIL BORING/TEMPORARY MONITORING WELL LOCATION
-  APPROXIMATE EXTENT OF PETROLEUM IMPACTED SOIL ON SITE (BASED ON VISUAL OBSERVATIONS & ANALYTICAL RESULTS)

- NOTES:**
- BACKGROUND IS TAKEN FROM NYC OASIS MAPS (WWW.OASISNYC.NET/MAPS.ASPX).
 - GROUNDWATER ANALYTICAL RESULTS ARE COMPARED TO NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TECHNICAL OPERATIONAL GUIDANCE SERIES (TOGS) CLASS GA (DRINKING WATER) AMBIENT WATER QUALITY STANDARDS (AWQS) AND GUIDANCE VALUES.
 - ONLY CONCENTRATIONS THAT EXCEED TOGS CLASS GA STANDARDS OR GUIDANCE VALUES ARE SHOWN.

- VOC = VOLATILE ORGANIC COMPOUND
- SVOC = SEMI-VOLATILE ORGANIC COMPOUND
- PCB = POLYCHLORINATED BIPHENYLS
- ug/L = MICROGRAM PER LITER
- NE = NO EXCEEDENCES
- ND = NOT DETECTED
- NA = NOT ANALYZED






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Project
KELLER HOTEL SITE
144-150 BARROW STREET
 BLOCK No. 604, LOTS No. 1 AND 30
 NEW YORK NEW YORK

Figure Title
GROUNDWATER SAMPLE LOCATION AND RESULTS MAP

Project No. 170170901	Figure No. 4
Date 12/19/2014	
Scale 1" = 20'	
Drawn By ML	
Submission Date	Sheet 4 of 7

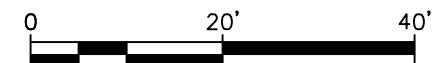
LEGEND:

-  SITE BOUNDARY
-  SOIL VAPOR SAMPLE LOCATION
-  APPROXIMATE EXTENT OF PETROLEUM IMPACTED SOIL ON SITE (BASED ON VISUAL OBSERVATIONS AND ANALYTICAL RESULTS)

NOTES:

1. BACKGROUND IS TAKEN FROM NYC OASIS MAPS (WWW.OASISNYC.NET/MAPS.ASPX).
2. SOIL VAPOR ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) DECISION MATRIX MINIMUM CONCENTRATIONS THAT MAY REQUIRE MITIGATION PER THE 2006 GUIDANCE FOR EVALUATING SOIL VAPOR.
3. ONLY CONCENTRATIONS THAT EXCEED THE NOTED NYSDOH MATRIX VALUES ARE SHOWN.

VOC = VOLATILE ORGANIC COMPOUND
 µg/m³ = MICROGRAM PER CUBIC METER



SV-2	Results
VOCs TO-15, Full List (µg/m ³)	
Total VOCs	NE

SV-4	Results
VOCs TO-15, Full List (µg/m ³)	
Total VOCs	NE

SV-3	Results
VOCs TO-15, Full List (µg/m ³)	
Tetrachloroethylene	230

SV-1	Results
VOCs TO-15, Full List (µg/m ³)	
Carbon tetrachloride	5.6

	Minimum Action Level for Monitoring or Mitigation
1,1,1,-Trichloroethane	100
Carbon tetrachloride	5
Tetrachloroethylene	100
Trichloroethylene	5

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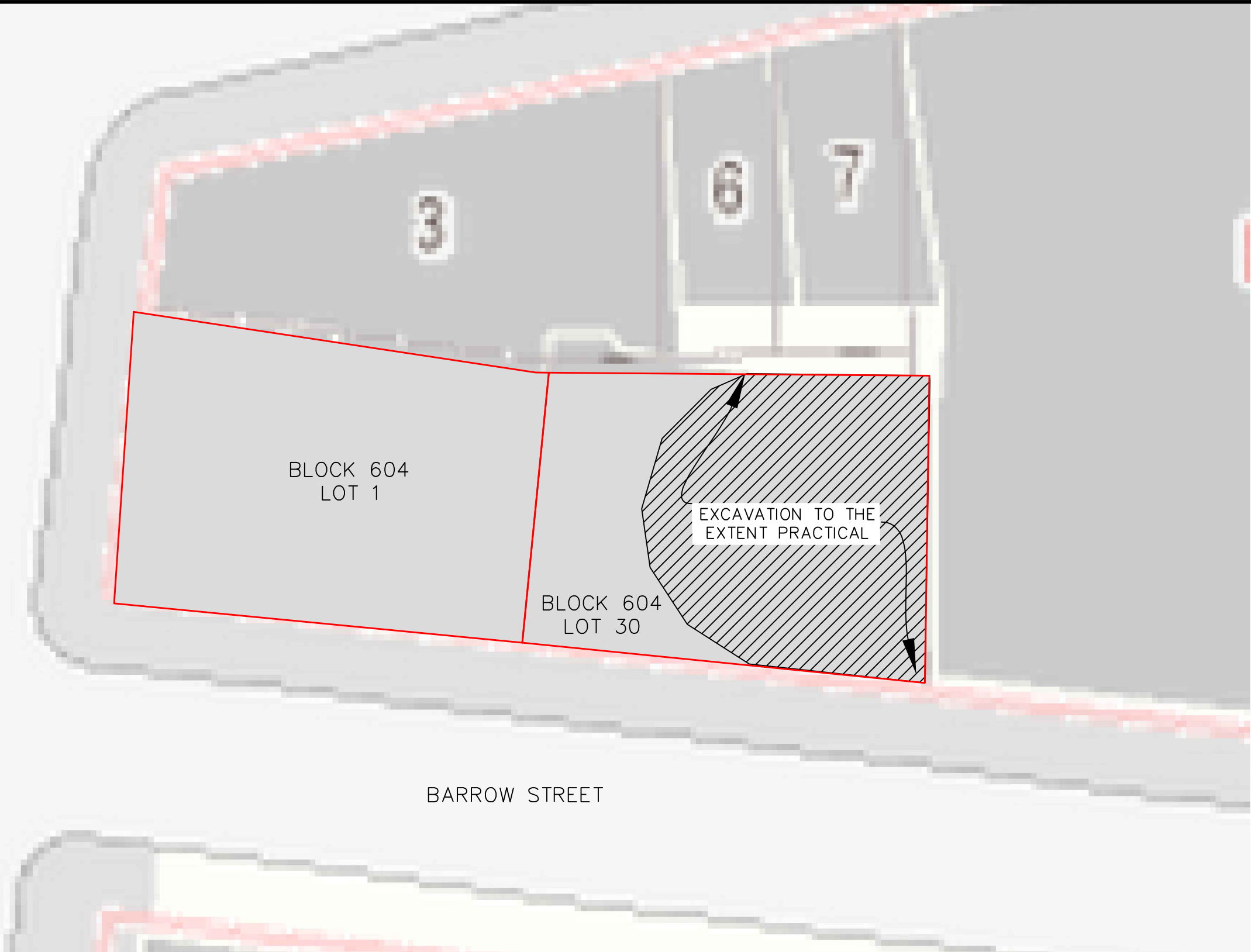
Project
KELLER HOTEL SITE
144-150 BARROW STREET
 BLOCK No. 604, LOTS No. 1 AND 30
 NEW YORK NEW YORK

Figure Title
SOIL VAPOR SAMPLE
LOCATION AND RESULTS
MAP

Project No.
 170170901
 Date
 1/23/2015
 Scale
 1" = 20'
 Drawn By
 MB
 Submission Date

Figure No.
5
 Sheet 5 of 7

WEST STREET



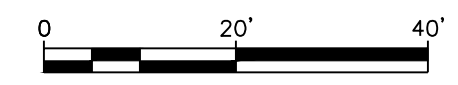
LEGEND:

-  SITE BOUNDARY
-  APPROXIMATE EXTENT OF PETROLEUM-IMPACTED SOIL

NOTES:

1. THE EXCAVATION WILL BE BENCHED AT LEAST 5 FEET FROM THE PROPERTY LINE OR EXISTING STRUCTURES AND SLOPED ON A 1:1 RATIO TO NOT UNDERMINE ADJACENT STRUCTURES OR SIDEWALK. TRENCH BOXES MAY BE UTILIZED BUT EXCAVATION SUPPORT WILL NOT BE INSTALLED.

BARROW STREET



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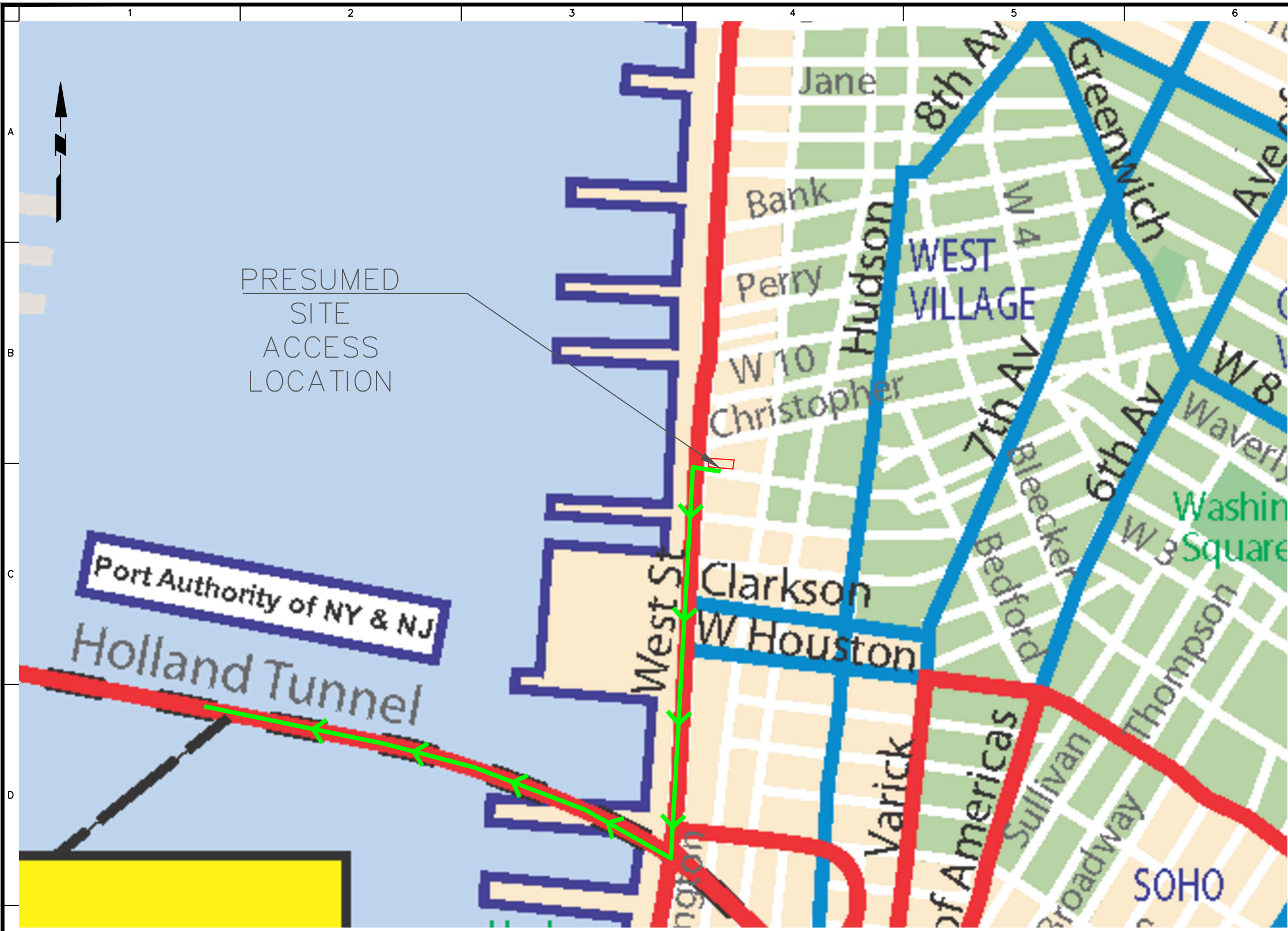
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Project
KELLER HOTEL SITE
144-150 BARROW STREET
BLOCK No. 604, LOT Nos. 1 AND 30
MANHATTAN
NEW YORK **NEW YORK**

Figure Title
SITE EXCAVATION
PLAN

Project No.
170170901
 Date
10/21/2015
 Scale
AS SHOWN
 Drawn By
JL
 Submission Date

Figure No.
6
 Sheet 6 of 7



LEGEND:

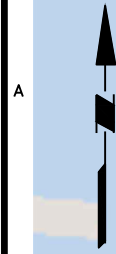
- SITE BOUNDARY
- TRUCK ROUTE
- LOCAL TRUCK ROUTES
- THROUGH TRUCK ROUTES ON EXPRESSWAY

NOTES:

1. TRUCK ROUTE MAP ADAPTED FROM THE NEW YORK CITY DEPARTMENT OF TRANSPORTATION 2011-2012 NEW YORK CITY TRUCK ROUTE MAP.
2. SITE ACCESS GATE LOCATION MAY CHANGE BASED ON CONSTRUCTION LOGISTICS.
3. ONLY TRI-AXLE TRUCKS WILL BE USED IN THE HOLLAND TUNNEL.

Port Authority of NY & NJ
Holland Tunnel

PRESUMED
SITE
ACCESS
LOCATION



A
B
C
D
E

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Project
**KELLER HOTEL SITE
144-150 BARROW STREET**
BLOCK No. 604, LOTS No. 1 AND 30
NEW YORK NEW YORK

Figure Title
TRUCK ROUTE MAP

Project No. 170170901	Figure No.
Date 10/21/2015	7
Scale NTS	
Drawn By JL	
Submission Date	Sheet 7 of 7

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

APPENDIX A

**Keller Hotel
Interim Remedial Measures Schedule
Last Updated December 7, 2015**

		2015		2016											
Item	Action	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<u>144-150 Barrow Street</u>															
1	IRMWP Preparation and DEC Review (assumes public comment period not required)														
2	IRMWP Implementation (following building demolition)														
3	Construction Completion Report Preparation and DEC Review														

Notes:

APPENDIX B

**Construction Health and Safety Plan
for
144-150 BARROW STREET
New York, New York
NYSDEC BCP No. C231092**

Prepared For:

**144-150 Barrow Street LLC
544 Hudson Street
New York, New York 10014**

Prepared By:

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LANGAN

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SECTION 1 CONSTRUCTION HEALTH AND SAFETY PLAN (CHASP) SUMMARY

Emergency Contacts

Emergency contacts are listed on Table 1.

Emergency Procedures

Emergency procedures are described in Section 6.

Site Specific Hazards and Training

Site Specific Hazards are described in Section 2.

The Field Safety Officer (FSO) will be responsible for providing site-specific training to all personnel that work at the site. This training will cover the following topics:

- Names of personnel responsible for site safety and health.
- Hazards potentially present at the site.
- Proper use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Acute effects of compounds at the site.
- Decontamination procedures.

Personnel will be required to sign and date the Site-Specific Training Form provided in Attachment B prior to working on-site.

General Health and Safety Requirements

Personnel will be required to sign and date the Health and Safety Plan and Work Plan Acceptance Form provided in Attachment B prior to working on-site.

Personnel Protective Equipment

Level D protection will be worn for initial entry on-site and for all activities except as noted in Section 3. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses or goggles
- Nitrile outer gloves and PVC or nitrile inner gloves must be worn during all sampling activities
- Hard hat (must be worn during all sampling activities)

Modified Level D protection may be required under conditions where potential contact of the skin or clothes with significant contamination occurs. Modified Level D is the same as Level D but includes Tyvek coveralls and disposable polyethylene overboots.

Level C protection, unless otherwise specified in Section 3, will consist of Level D equipment and the following additional equipment:

- Full-face or half-mask air-purifying respirator (APR)
- Combination dust/organic vapor cartridges
- Tyvek coveralls if particulate hazard present
- PE-Coated Tyvek coverall if liquid contamination present
- PVC or nitrile inner and nitrile outer gloves
- 5-minute escape SCBA

Level B protection, unless otherwise specified in Section 3, will consist of Level D equipment and the following additional equipment:

- Hard hat
- Positive Pressure SCBA or positive pressure air line and respirator with escape SCBA
- PE-Coated Tyvek coverall
- Nitrile outer and PVC or nitrile inner gloves
- Nitrile boot covers

Air Monitoring

A summary of the action levels and restrictions is presented on Table 0.2.

FIGURE 1-HOSPITAL ROUTE PLAN (Lenox Health Greenwich Village)

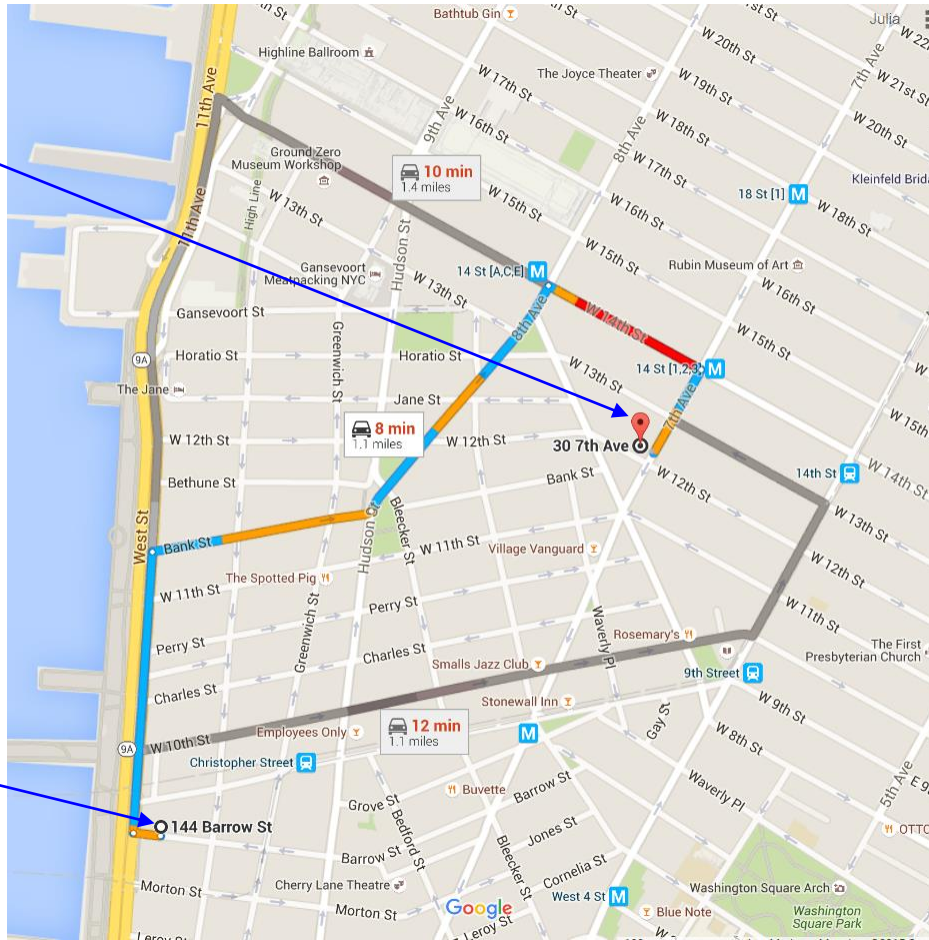
Site Location: 144 Barrow Street, New York, NY

Hospital Location: 30 7th Avenue, New York City, NY

Main Number (646) 665-6000

HOSPITAL

SITE



Route to Hospital

From 144 Barrow Street New York, New York to Lenox Health Greenwich Village, located at 30 7th Avenue, New York, New York.

- 1:** Head **west** on **Barrow St** toward **West St**
- 2:** Turn right onto **West St**
- 3:** Turn right onto **Bank St**
- 4:** Slight left onto **8th Ave/Abingdon Square**
- 5:** Turn right onto **W 14th St**
- 6.** Turn right at the 1st cross street onto **7th Ave**

Total Est. Time: 8 minutes **Total Est. Distance:** 1.1 miles

**TABLE 1
EMERGENCY CONTACTS**

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations, contact should first be made with the Field Team Leader (or designee) and the Site Safety Officer, who will notify emergency personnel who will then contact the appropriate response teams. This emergency contacts list must be in an easily accessible location at the site.

<u>Emergency Contacts</u>	<u>Phone Number</u>
Fire Department:	911
Police:	911
New York City-Long Island One Call Center: (3 day notice required for utility markouts)	(800) 272-4480
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
 <u>Medical Emergency</u>	
Ambulance Service:	911
Hospital Name:	Downtown Hospital
Hospital Phone Number:	(212) 312-5000
Hospital Address:	170 William Street New York, New York 10038
Route to Hospital:	See Page 3 and 4
Travel Time From Site:	8 minutes
 <u>Langan Contacts</u>	
Principal/Associate:	Michael Burke, CHMM (212) 479-5413
Project Manager:	Jennifer Armstrong (212) 479-5537
Langan Health & Safety Officer:	Tony Moffa, CHMM (215) 756-2523
Field Safety Officer	William Bohrer (212) 479-5533
Field Team Leader	Julia Leung, P.E. (212) 479-5537
Quality Assurance Officer	William Bohrer (212) 479-5533

TABLE 2
SUMMARY OF ACTION LEVELS AND RESTRICTIONS²

Conditions for Level D:

All areas

- PID readings < 25 ppm and benzene < 1 ppm
- No visible fugitive dust emissions from site activities

Conditions for Level C:

All areas

- Where PID readings > 25 ppm (sustained for 15 minutes in the breathing zone) to 200 ppm and benzene < 5ppm, and/or
- Any visible fugitive dust emissions from site activities that disturb contaminated soil.

Conditions for Level B (or retreat):

All areas

- Where PID readings > 500 ppm or benzene > 25 ppm,
- Visible fugitive dust emissions from site activities cloud the surrounding air.

SECTION 2 INTRODUCTION

2.1 PURPOSE AND POLICY

The purpose of this Construction Health and Safety Plan (CHASP) is to establish personnel protection standards and mandatory safety practices and procedures for the implementation of an Interim Remedial Measures (IRM) Work Plan at the site at 144-150 Barrow Street (the "Site") in New York, New York. The IRM Work Plan includes excavation of petroleum-impacted soil to the extent practical, decommissioning of underground storage tanks (USTs), if encountered, backfilling with recycled concrete aggregate (RCA), air monitoring, and collection of waste characterization samples and endpoint soil samples. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted during construction and remedial excavation activities at the site.

The provisions of the plan are mandatory for all on-site personnel. Contractors shall prepare their own CHASP that at a minimum adheres to the requirements of this plan. All personnel who engage in project activities must be familiar with this plan, comply with its requirements, and sign the Plan Acceptance Form (Attachment B), page number B-5, prior to working on the site. The Plan Acceptance Form must be submitted to the Langan Field Safety Officer (FSO). In addition to this plan, all work shall be performed in accordance with all applicable federal, state and local regulations.

2.2 SITE DESCRIPTION

The Site is located at 144-150 Barrow Street in the Greenwich section of Manhattan, New York and is identified as Block 604 and Lots 1 and 30 on the New York City Tax Map. The site is approximately 7,300 square feet in area and is bound by multiple-story residential buildings and a vacant lot to the north, Barrow Street to the south, multiple-story residential buildings to the east, and West Street to the west. Lot 1 is improved with the landmarked Keller Hotel building, a vacant six-story structure constructed in 1920 with a basement level. A vacant one-story, slab-on-grade garage structure, previously used as an auto repair facility, occupies Lot 30 in its entirety.

The surrounding property usage is summarized below:

Direction	Adjoining Properties	Surrounding Properties
North	Six-story residential building and vacant lot	Multiple-story residential and commercial buildings
South	Barrow Street followed by six-story residential building	
East	Four-story residential building	
West	West Street, followed by the Hudson River Park and Hudson River.	

2.3 SCOPE OF WORK

The scope of this Interim Remedial Measures (IRM) Work Plan includes the following:

- Performance of a geophysical survey, after the contents of building on Lot 30 are removed, to identify remnant buried tank structures and associated piping;
- Excavation and off-site disposal of petroleum-impacted soil, to the extent practical within the garage building on Lot 30.
- Decommission underground storage tanks (USTs), if encountered.
- Backfill the excavation with RCA.

A Langan engineer will supervise urban fill excavation, monitor air for particulates and organic vapors, and collect soil and groundwater samples.

2.4 LANGAN PROJECT TEAM ORGANIZATION

Table 1.1 describes the responsibilities of Langan on-site personnel associated with this project. The names of principal personnel associated with this project are:

Principal/Associate:	Michael Burke, CHMM	(212) 479-5413
Program Manager Project Manager:	Jennifer Armstrong	(212) 479-5537
Langan Health & Safety Officer:	Tony Moffa	(215) 756-2523
Field Safety Officer	William Bohrer	(212) 479-5533
Field Team Leader	Julia Leung	(212) 479-5452
Quality Assurance Officer	William Bohrer	(212) 479-5533

All Langan personnel have been appropriately trained in first aid and hazardous waste safety procedures, including the operating and fitting of personal protective equipment, and are experienced with the field operations planned for this site.

TABLE 2.1
ON-SITE PERSONNEL AND RESPONSIBILITIES

PROJECT MANAGER – Assumes control over site activities. Reports to upper-level management. Has authority to direct response operations.

Responsibilities:

- Prepares and organizes the background review of the situation, the Work Plan, the Site Construction Health and Safety Plan, and the field team.
- Obtains permission for site access and coordinates activities with appropriate officials.
- Ensures that the Work Plan is executed and on schedule.
- Briefs the field team on their specific assignments.
- Coordinates with the site Health and Safety Officer (HSO) to ensure that health and safety requirements are met.
- Prepares the final report and support files on the response activities.
- Serves as the liaison with public officials.

FIELD SAFETY OFFICER (FSO) – Advises the HSO and Project Manager on aspects of health and safety on site. Stops work if operations threaten worker or public health or safety.

Responsibilities:

- Ensures that all necessary Health and Safety Equipment is available on-site. Ensures that all equipment is functional.
- Periodically inspects protective clothing and equipment.
- Ensures that protective clothing and equipment are properly stored and maintained.
- Controls entry and exit at the Access Control Points.
- Coordinates health and safety program activities with the Project HSO.
- Confirms each team member's suitability for work based on a physician's recommendation.
- Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue.
- Implements the Site Construction Health and Safety Plan.
- Conducts periodic inspections to determine if the Site Construction Health and Safety Plan is being followed.
- Enforces the "buddy" system.

TABLE 2.1 – CONTINUED
ON-SITE PERSONNEL AND RESPONSIBILITIES

Field Safety Officer Responsibilities (continued)

- Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
- Notifies, when necessary, local public emergency officials.
- Coordinates emergency medical care.
- Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on the site.
- Controls the decontamination of all equipment, personnel, and samples from the contaminated areas.
- Assures proper disposal of contaminated clothing and materials.
- Ensures that all required equipment is available.
- Advises medical personnel of potential exposures and consequences.
- Notifies emergency response personnel by telephone or radio in the event of an emergency.

FIELD TEAM LEADER – Advises on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety. Is directly responsible for the field team and the safety of site operations.

Responsibilities:

- Manages field operations.
- Executes the Work Plan and schedule.
- Enforces safety procedures.
- Coordinates with the Site Safety Officer in determining protection level.
- Enforces site control.
- Documents field activities and sample collection.
- Serves as a liaison with public officials.

WORK TEAM – Operators, laborers, samplers. The work party must consist of at least two people.

Responsibilities:

- Safely completes the on-site tasks required to fulfill the Work Plan.
- Complies with Site Safety Plan.
- Notifies Site Safety Officer or supervisor of suspected unsafe condition

SECTION 3 RISK ANALYSIS

3.1 CHEMICAL HAZARDS

The primary potential chemical hazard is exposure to volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. Other compounds that may be encountered are site equipment fuels (gasoline, diesel, etc.) that also contain volatile components. Relevant properties of these compounds are outlined in Table 2.1.

Dust with chemical constituents will likely be generated during IRM Work Plan implementation; air will be monitored for particulates and organic vapors to prevent fugitive dust generation.

Material Safety Data Sheets for substances that will be used on site are included in Attachment C.

**TABLE 3.1
RELEVANT PROPERTIES OF VOLATILES (PETROLEUM [GASOLINE, DIESEL, ETC.]), METALS AND
SEMIVOLATILES KNOWN OR SUSPECTED
AT THE SITE**

Compound (Synonym)	OSHA PEL ⁽¹⁾ (ppm)	IDLH (ppm)	LEL (%)	Odor Threshold⁽²⁾ (ppm)	Odor Character	Vapor Pressure (mm Hg)	Physical State	Detectable w/ 10.6 eV lamp PID (I.P. eV)
Polynuclear Aromatic Hydrocarbons (PAHs)	0.2	80(CA)	Varies	Varies	Varies	Varies	Combustible Solid	No
1,2,4-Trimethylbenzene	NA	NA	0.9	2.4	Aromatic	2.1	Flammable Liquid	Yes
1,3,5-Trimethylbenzene	NA	NA	NA	2.4	Aromatic	2.1	Flammable Liquid	Yes
Benzene	1	500	1.2	4.7	Aromatic	NA	Flammable Liquid	Yes
Ethylbenzene	100	800	0.8	2.3	Gasoline Smell	7	Flammable Liquid	Yes
Xylenes	100	900	Varies	1	Aromatic	Varies	Flammable Liquid	Yes
n-Propylbenzene	NA	NA	NA	NA	Aromatic	NA	Flammable Liquid	Yes
Toluene	200	500	1.1	2.9	Sweet Smell	28.4	Flammable Liquid	Yes
Arsenic (As)	0.01	5	NA	NA	NA	0 (approx)	Noncombustible Solid (3)	NA

**TABLE 3.1
RELEVANT PROPERTIES OF VOLATILES (PETROLEUM [GASOLINE, DIESEL, ETC.]), METALS AND
SEMIVOLATILES KNOWN OR SUSPECTED
AT THE SITE**

Chromium	0.5	250	NA	NA	NA	0 (approx.)	Noncombustible Solid (3)	NA
Barium	5	50	NA	NA	NA	0 (approx)	Noncombustible	NA
Manganese (Mn)	5	500	NA	NA	NA	0 (approx)	Combustible Solid	NA
Lead (Pb)	0.05	11	NA	NA	NA	0 (approx)	Noncombustible Solid	NA
Copper	1	100	NA	NA	NA	1	Noncombustible	NA
Iron	5	NA	NA	NA	NA	NA	Noncombustible	NA
Magnesium (Mg)	5	500	NA	NA	NA	0 (approx)	Combustible Solid	NA
Mercury	0.1	10	NA	NA	NA	0 (approx)	Noncombustible	NA
Nickel (Ni)	1	10	NA	NA	NA	0 (approx)	Combustible Solid(4)	NA
Sodium	2	10	NA	NA	NA	0 (approx)	Noncombustible Solid	NA
Selenium	.2	100	NA	NA	NA	NA	Noncombustible Solid	NA
Zinc (Zn)	5	50	NA	NA	NA	0 (approx)	Combustible Solid(5)	NA

**TABLE 3.1
RELEVANT PROPERTIES OF VOLATILES (PETROLEUM [GASOLINE, DIESEL, ETC.]), METALS AND
SEMIVOLATILES KNOWN OR SUSPECTED
AT THE SITE**

Naphthalene	10	500	900	.084	Mothballs	0.082	Combustible Solid(3)	Yes
Tetrachloroethene	100	150	NA	5-50	Sweet Smell	18.7	Liquid	Yes

-
- (1) 29 CFR 1910, June 30, 1993 (8-hour Time weighted average unless otherwise specified.)
(2) ACGIH 1989 Highest reported value of acceptable odor threshold range.
(3) Slight explosive hazard if dust is exposed to flame
(4) Sponge catalyst may ignite spontaneously in the air.
(5) Powder may ignite spontaneously in the air, and can continue burning under water.
[IDLH] Immediately dangerous to life or health
[CA] Suspect carcinogen - Minimize all possible exposures

3.2 RADIATION HAZARDS

No radiation hazards are known or expected at the site.

3.3 BIOLOGICAL HAZARDS

3.3.1 Animals

During site operations, animals such as dogs, cats, pigeons, sea gulls, mice, and rats may be encountered. Workers will use discretion and avoid all contact with animals. Bites and scratches from dogs can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis; cryptococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

3.3.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, and spiders, may be present at this site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis. Personnel that have been bitten or stung by an insect at the Site should notify the HSO or FSO of such immediately. The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and or as often as needed throughout the shift.
- Wear proper protective clothing (work boots, socks and light colored pants).
- When walking in wooded areas, to the extent possible avoid contact with bushes, tall grass, or brush.
- Field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on Site.

The HSO or FSO will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the Site.

3.4 PHYSICAL HAZARDS

3.4.1 Explosion

No explosion hazards are expected for the scope of work at this site.

3.4.2 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72°F or above. Table 2.2 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature

increases or as slow recovery rates are observed. Refer to the Table 2.3 below to assist in assessing when the risk for heat related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be performed by the Field Safety Officer, who shall be able to recognize symptoms related to heat stress.

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Prickly Heat** (Heat rash)
 - Painful, itchy red rash. Occurs during sweating, on skin covered by clothing.
- **Heat Cramps**
 - Painful spasm of arm, leg or abdominal muscles, during or after work.
- **Heat Exhaustion**
 - Headache, nausea, dizziness. Cool, clammy, moist skin. Heavy sweating. Weak, fast pulse. Shallow respiration, normal temperature.
- **Heat Fatigue**
 - Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control.
- **Heat Syncope** (Heat Collapse)
 - Fainting while standing in a hot environment.
- **Heat Stroke**
 - Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. **This is a life threatening condition.**

Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
- If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
- If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
 - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6°F.
 - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
 - Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
 - Maintain water temperature 50° to 60°F (10° to 16.6°C).
 - Provide small disposal cups that hold about four ounces (0.1 liter).
 - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
 - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
 - Train workers to recognize the symptoms of heat related illness.

3.4.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally called frostbite.

Hypothermia - Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

Frostbite - Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

Prevention of Cold-Related Illness - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors:
- Assure the availability of enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Assure the availability of warm drinks.
- Start (oral) temperature recording at the job site:
 - At the FSO or Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
 - At a worker's request.
 - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation).
 - As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

3.4.4 Noise

The operation of drilling equipment may result in momentary high noise levels during advancement of soil borings. Hearing protection (e.g., ear plugs, headphones) will be used as necessary.

3.4.5 Hand and Power Tools

In order to adjust drilling equipment and sever PVC riser, personnel will utilize hand and/or power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for power tools.

3.4.6 Slips, Trips and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, pits, facility equipment, and soil piles contribute to tripping hazards and fall hazards. To the extent possible, all hazards should be identified and marked on the Site, with hazards communicated to all workers in the area.

3.4.7 Utilities (Electrocution and Fire Hazards)

The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. All intrusive work will be preceded by notification of the subsurface work to the N.Y. One Call Center. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

3.5 TASK HAZARD ANALYSIS

3.5.1 Excavation

Excavation of contaminated urban fill exposes site personnel to a number of hazards including trip and fall hazards and potential collision with excavation equipment.

Chemical exposure may occur as workers encounter soil and groundwater across the site, or are exposed to products used at the site including gasoline, diesel and motor oil. Soil and groundwater sampling presents similar potential exposure hazard. Activities will be conducted initially in Level D but may be upgraded to Modified Level D. Although not anticipated, there will be a Level C and B contingency should pockets of contaminants be brought to the surface and breathing zone air become contaminated.

If evidence of historic or unknown contamination, such as oily materials, high PID readings, etc., is encountered during intrusive work, the FSO will determine the appropriate level of personnel protection.

3.5.2 Well Installation and Sampling

Operation of drilling equipment and advancement is inherently dangerous. Mechanical and electrical field equipment should be properly inspected for defects, and the location of any underground utilities should be established and communicated to all on-site personnel prior to advancement of soil borings.

Chemical exposure may occur as workers encounter soil and groundwater across the site, or are exposed to products used at the site including gasoline, diesel and motor oil. Soil and groundwater sampling presents similar potential exposure hazard.

Activities will be conducted initially in Level D but may be upgraded to Modified Level D. Although not anticipated, there will be a Level C and B contingency should pockets of contaminants be brought to the surface and breathing zone air become contaminated.

If evidence of historic or unknown contamination, such as oily materials, high PID readings, etc., is encountered during intrusive work, the FSO will determine the appropriate level of personnel protection.

Table 3.2
Suggested Frequency of Physiological Monitoring
For Fit and Acclimated Workers^a

Adjusted Temperature^b	Normal Work Ensemble^c	Impermeable Ensemble
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

Table 3.3 - HEAT INDEX

ENVIRONMENTAL TEMPERATURE (Fahrenheit)

RELATIVE HUMIDITY	70	75	80	85	90	95	100	105	110	115	120
	APPARENT TEMPERATURE*										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	130
30%	67	73	78	84	90	96	104	113	123	135	148
40%	68	74	79	86	93	101	110	123	137	151	
50%	69	75	81	88	96	107	120	135	150		
60%	70	76	82	90	100	114	132	149			
70%	70	77	85	93	106	124	144				
80%	71	78	86	97	113	136					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:

1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

Note: Exposure to full sunshine can increase Heat Index values by up to 15 degrees F.

Apparent Temperature	Heat Stress Risk with Physical Activity and/or Prolonged Exposure
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heatstroke Highly Likely

SECTION 4 PERSONNEL PROTECTION AND MONITORING

4.1 OSHA TRAINING

On-site personnel directly involved in excavation, handling, characterization of hazardous waste or petroleum-contaminated soil must have completed hazardous waste operations-related training, as required by OSHA Regulations 29 CFR 1910.120. Personnel who completed this training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Documentation of OSHA training for project personnel must be provided to Langan prior to starting work.

4.2 SITE-SPECIFIC TRAINING

The Field Safety Officer will be responsible for developing a site-specific occupational hazard training program and providing training to all personnel that are to work at the site. This training will be conducted prior to starting field work and will consist of the following topics:

- Names of personnel responsible for site safety and health.
- Hazards potentially present at the site.
- Proper use of personal protective equipment.
- Requirements of this CHASP.
- Work practices by which the employee can minimize risk from hazards. This may include a specific review of heavy equipment safety, safety during inclement weather, changes in common escape rendezvous point, site security measures, or other site-specific issues that need to be addressed before work begins.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds present at the site.
- Decontamination procedures.

Upon completion of site-specific training, workers will sign the Site-Specific-Training Form provided in Attachment B. A copy of the completed Site-Specific Training Form will be included in the project files for future reference.

4.3 ODOR, VAPOR AND DUST MONITORING AND RESPONSE

4.3.1 Work Zone Area Monitoring

The contractor is responsible for completing their own health and safety plan. General contractor and sub-contractor site worker monitoring will be the responsibility of the respective contractor.

VOC

Continuous monitoring for VOCs will be conducted during all ground intrusive activities (i.e., excavation). The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total organic vapor levels at the perimeter of the hot zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will resume provided that the total organic vapor outside the hot zone is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the hot zone, activities will be shutdown.

Dust

Particulate or dust will be monitoring continuously with real-time field instrumentation during earthwork operations. NYSDEC issues a 1989 memorandum on controlling fugitive dust emissions during “ground intrusive activities” (e.g. excavation, drilling). The National Ambient Air Quality Standard for Respirable Particulates, which are defined as particles 10µg (PM10) in diameter or less, is 150 µg/m³. Based on this standard, dust exposure from excavation activities should not exceed 150 µg/m³ above background and monitoring should be within the work area if exceedances of this standard are anticipated.

The NYSDEC defines fugitive dust as particulate matter that is not from a specific source and could include discrete particles, droplets, and solids over a wide range of sizes. Most continuous dust monitors are designed to provide maximum response to PM10 particulate, since these particles are considered respirable.

Based on the air monitoring results, dust suppression may need to be implemented. This could include the following:

- Applying water to the excavation surface
- Wetting equipment
- Spraying work area
- Utilizing alternate work methods
- Implementing site speed restrictions

Background dust monitoring shall be performed prior to the start of the workday. Sampling shall be performed outside of the work zone for a minimum of fifteen minutes. Sampling shall be performed continuously within the work zone. Monitoring results shall be kept in a logbook and used to initiate additional dust control measures as necessary.

4.4 COMMUNITY AIR MONITORING PLAN (CAMP)

This CAMP was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan.

VOC Monitoring, response Levels, and Actions

VOCs must be monitored at perimeter of the work zone and at upwind and downwind locations at the site perimeter on a continuous basis during remediation and construction activities until the ground is completely capped with clean soil or impervious barrier. Upwind concentrations should be measured to establish background conditions. The monitoring work will be performed using equipment appropriate to the known contaminants on the Site. This equipment should be calibrated daily and should be capable of calculating 15-minute running averages. All 15-minute readings will be recorded and be available for State personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded. The measured 15-minute averages will be compared to the levels below:

1. If the ambient air concentration of total VOCs at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15 minute average, work activities must be halted until the levels readily decreases below 5 ppm (per instantaneous readings).
2. If the total VOCs at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work must be halted. The source of vapors must be identified and corrective actions must be taken to abate the emissions. Work activities can only resume provided that the concentration is less than 5 ppm over a 15 minute average period.
3. If the total VOC level is above 25 ppm at the perimeter of the work area, all activities must be shut down and work methods and controls will be re-evaluated.

Particulate Monitoring, Response Levels, and Actions

Dust or particulate concentrations should be monitored continuously at the upwind and downwind perimeters at the site perimeter. 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. In addition, fugitive dust migration should be visually assessed during all work activities. All readings will be recorded and be available for state personnel review. Corrective action is determined by the following levels:

1. If the downwind PM-10 at a site perimeter location is 100 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) greater than background for the 15 minute period of if airborne dust is observed at the site perimeter from excavation activity, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that the downwind PM-10 particulate level does not exceed 150 $\mu\text{g}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the excavation work area.
2. If, after implementing dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu\text{g}/\text{m}^3$ above the upwind level, work

must be stopped and re-evaluation of work 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 µg/m³ of the upwind level and in preventing visible dust migration.

4.4.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the hot zone, work activities will be halted or odor controls will be employed, and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume, provided:

- The organic vapor level outside the hot zone is below 1 ppm over background, and
- More frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

If the organic vapor level is greater than 5 ppm above background at the perimeter of the hot zone, work activities must be shut down or odor controls must be employed. When work shut-down occurs, downwind air monitoring as directed by the Site Health and Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

4.4.2 Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or odor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the hot zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented.

- Sustained organic vapor levels approaching 5 ppm above background for a period of more than 30 minutes, or
- Organic vapor levels greater than 5 ppm above background for any time period.

4.4.3 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

- The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation;
 - Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer; and
- All Emergency contacts will go into effect as appropriate.

4.5 SUMMARY OF ACTION LEVELS AND RESTRICTIONS

A PID such as the RaeSystems MiniRae 2000, equipped with a 10.6 eV lamp shall be used to screen for total VOCs. All readings pertain to sustained readings for 15 minutes in the worker breathing zone. The following conditions shall apply to each level of protection.

Conditions for Level D:

All areas where PID readings < 25 ppm and Benzene < 1 ppm

Conditions for Level C:

- All areas where PID readings > 25 ppm or Benzene > 1 ppm (sustained for 15 minutes in the breathing zone) to 200 ppm

Conditions for Level B (or retreat):

All areas where PID readings > 500 ppm or Benzene > 20 ppm

4.5.1 Level D and Modified Level D

Level D protection will be worn for initial entry on-site and initially for all activities. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses (goggles must be worn when splash hazard is present)
- Nitrile gloves must be worn during all activities requiring contact with saturated soils.
- Hard hat (must be worn during all site activities)

Modified Level D is the same as Level D but includes Tyvek coveralls and disposable polyethylene overboots to contact with the skin or clothes if significant contamination is present in subsurface materials.

4.5.2 Level C

The level of personal protection will be upgraded to Level C if the concentration of volatile organic compounds which can be detected with a photoionization detector (PID) in the breathing zone equals or exceeds the specified action limits and the contaminants of concern have characteristic warning properties appropriate for air purifying respirators (e.g. taste, odor). Level C protection will consist of the following equipment:

- Full-face or half-mask air-purifying respirator (APR) or powered air purifier (PAPR), depending on presence and abundance of airborne toxic constituents of concern
- Combination HEPA filter/organic vapor cartridges
- Tyvek coveralls must be worn if particulate hazard present
- PE-coated Tyvek coveralls if liquid contamination present

- Steel-toe safety boots
- Nitrile outer gloves must be worn during all activities requiring contact with saturated soil.
- Hard hat (must be worn during all site activities)

Cartridges will be disposed at the end of each day's use.

4.5.3 Level B (Retreat)

If the concentration of volatile organics which can be detected with a PID equals or exceeds the specified action levels, all field personnel associated with the project will immediately retreat to a location up-wind of the source of contamination. At this point the Site Safety Officer must consult with the Langan HSO to discuss appropriate actions.

4.5.4 OSHA Requirements for Personal Protective Equipment

All personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133 29 CFR 1926.102	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134 29 CFR 1926.103	ANSI Z88.1-1980
Head	29 CFR 1910.135 29 CFR 1926.100	ANSI Z89.1-1969
Foot	29 CFR 1910.136 29 CFR 1926.96	ANSI Z41.1-1967

ANSI = American National Standards Institute

Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.1025; 29 CFR 1910.134).

Based on performance criteria of air purifying respirators, they cannot be worn under the following conditions:

- Oxygen deficiency;
- Immediately Dangerous to Life or Health (IDLH) concentrations;
- High relative humidity; and
- If contaminant levels exceed designated use concentrations

SECTION 5 WORK ZONES AND DECONTAMINATION

5.1 SITE WORK ZONES

To reduce the spread of contaminated materials by workers from potentially contaminated areas to the clean areas, work zones will be delineated at the site. The flow of personnel between the zones should be controlled. The establishment of the work zones will help ensure that personnel are properly protected against the hazards present where they are working, and ensure that work activities and contamination are confined to the appropriate areas. The work zones described below may be modified in the field depending on field conditions.

5.1.1 Hot Zone

Hot zones will be established within the delineated petroleum-impacted area in the eastern portion of the Site. All personnel within the hot zone must don the appropriate levels of personal protection as set forth by the FSO. It is not anticipated that Level C or higher will be required for this site.

All personnel within the hot zone will be required to use the specified level of protection. No food, drink, or smoking will be allowed in the hot or warm zones.

5.1.2 Warm Zone

Should PID action levels be exceeded or obvious indications of contamination (by sight or odor) be encountered, a warm zone will be established and utilized during the field activities. This zone will be established between the hot zone and the cold zone (discussed below), and will include the personnel and equipment necessary for decontamination of equipment and personnel exiting the hot zone. Personnel and equipment in the hot zone must pass through this zone before entering the cold zone. This zone should always be located upwind of the hot zone.

5.1.3 Cold Zone

The cold zone will include the remaining areas of the job site. Break areas and support facilities (include equipment storage and maintenance areas) will be located in this zone. No equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone (if necessitated). Eating and drinking will be allowed only in this area.

5.2 DECONTAMINATION

Generally, any water used in decontamination procedures will be placed in containers, temporarily stored on-site, and properly characterized and disposed.

5.2.1 Decontamination of Personnel

Decontamination of personnel will be necessary if Level C or Level B protection is used, which is not anticipated based on current knowledge of the Site history. Decontamination will not be necessary if only Level D protection is used. However, disposable gloves used during sampling activities should be removed and bagged; personnel should be encouraged to remove clothing and shower as soon as is

practicable at the end of the day. All clothing should be machine-washed. All personnel will wash hands and face prior to eating and before and after using the restroom.

5.2.2 Decontamination of Field Equipment

Decontamination of field equipment will be necessary for all equipment in contact with contaminated materials. Decontamination activities shall be performed in a designated area lined with polyethylene sheeting that is designed to collect the decontamination rinsate.

5.3 REMEDIAL ACTIVITY-DERIVED WASTE

All PPE-related remedial activity-derived waste materials (PPE, decontamination waste) will be placed in labeled containers and appropriately disposed.

Soil will be stockpiled on Site. Stockpiles will be placed on, and covered with poly sheeting to reduce possible fugitive dust emission. Stockpiles will be removed from site as quickly as possible and will be limited to a maximum of 1,000 cubic yards per pile.

SECTION 6 ACCIDENT PREVENTION AND CONTINGENCY PLAN

6.1 ACCIDENT PREVENTION

6.1.1 Site-Specific Training

All field personnel will receive health and safety training prior to the initiation of any site activities. The site-specific training form provided in Attachment B must be signed, dated, and returned to the Langan Field Safety Officer. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, a regular meeting should be held. Discussion should include:

- Tasks to be performed;
- Time constraints (e.g., rest breaks, cartridge changes);
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals; and
- Emergency procedures.

6.1.2 Vehicles and Heavy Equipment

Working with large motor vehicles and heavy equipment could be a major hazard at this site. Injuries can result from equipment hitting or running over personnel, impacts from flying objects, or overturning of vehicles. Vehicle and heavy equipment design and operation will be in accordance with 29 CFR, Subpart O, 1926.600 through 1926.602. In particular, the following precautions will be utilized to help prevent injuries/accidents.

- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked at the beginning of each shift.
- Large construction motor vehicles will not be backed up unless:
 - The vehicle has a reverse signal alarm audible above the surrounding noise level; or
 - The vehicle is backed up only when an observer signals that it is safe to do so.
- Heavy equipment or motor vehicle cable will be kept free of all nonessential items, and all loose items will be secured.
- Large construction motor vehicles and heavy equipment will be provided with necessary safety equipment (such as seat belts, roll-over protection, emergency shut-off in case of roll-over, backup warning lights and audible alarms).
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment or vehicles.

6.2 SPILL CONTROL PLAN

All personnel must take every precaution to minimize the potential for spills during site operations. Any spill shall be reported immediately to the FSO. Spill control apparatus (sorbent materials) will be located on-site. All materials used for the clean up of spills will be containerized and labeled separately from other wastes.

6.3 CONTINGENCY PLAN

6.3.1 Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site.
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General emergency procedures, and specific procedures for personal injury, chemical exposure and radiation exposure, are described below.

6.3.2 Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the Langan Health and Safety Officer. The Field Safety Officer or Field Team Leader is responsible for completing the accident report.

6.3.3 Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- Another team member (buddy) should signal the Field Team Leader that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.

- The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- For less severe cases, the individual can be taken to the site dispensary.
- The Field Team Leader or Field Safety Officer is responsible for making certain that an Accident Report Form is completed. This form is to be submitted to the Langan Health and Safety Officer. Follow-up action should be taken to correct the situation that caused the accident.
- Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported.

A first-aid kit and blood-borne pathogens kit will be kept on-site during the field activities.

6.3.4 Evacuation Procedures

- The Field Team Leader will initiate evacuation procedures by signaling to leave the site.
- All personnel in the work area should evacuate the area and meet in the common designated area.
- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts or missing persons determined immediately.
- The Field Team Leader will then give further instruction.

6.3.5 Procedures Implemented in the Event of a Major Fire, Explosion, or Emergency

- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire;
- Keep the area surrounding the problem source clear after the incident occurs;

Complete accident report for and distribute to appropriate personnel.

ATTACHMENT A

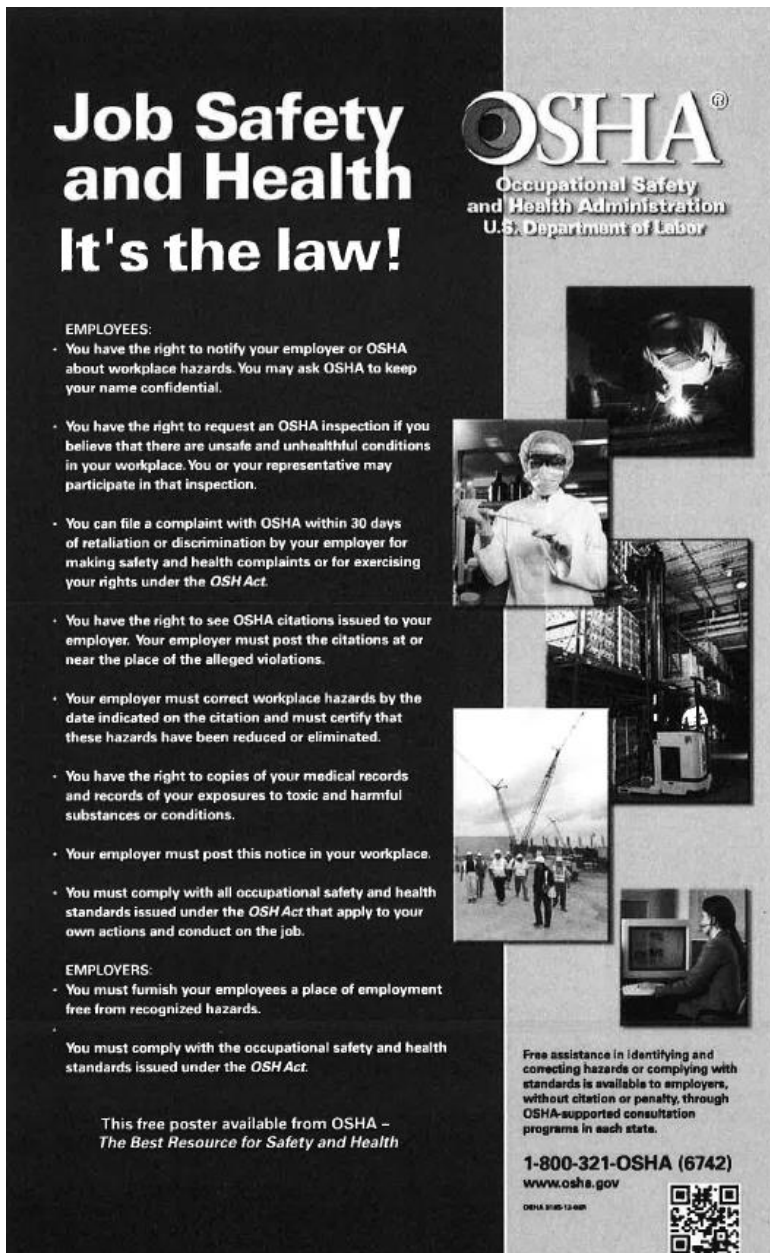
Air Monitoring Equipment Calibration and Maintenance

All monitoring instruments must be calibrated and maintained periodically. Calibration and on-site maintenance records will be kept in the field log book. The operator must understand the limitations and possible sources of errors for each instrument. It is important that the operator checks that the instrument responds properly to the substances it was designed to monitor. Air quality monitoring equipment, including photoionization detectors (PIDs) and DustTraks or DataRAMs must be calibrated at least once each day. The specific instructions for calibration and maintenance provided for each instrument should be followed.

ATTACHMENT B

Forms for Health and Safety Related Activity

Note: The OSHA Job Safety and Health Protection Poster must be posted prominently during field activities. The following page is an example of the poster to be used in the field. The actual poster must be an 11 inch by 17 inch size version of this page. The OSHA 300 Log of injuries and illnesses is maintained in the home office of each Langan employee.



**Job Safety and Health
It's the law!**

OSHA®
Occupational Safety and Health Administration
U.S. Department of Labor

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.


EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
The Best Resource for Safety and Health

Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA (6742)
www.osha.gov
OSHA 3145-12-008



Project Name: _____

Injured or Ill Employee

1. Name _____ Social Security # _____
(First) (Middle) (Last)

2. Home Address _____
(No. and Street) (City or Town) (State and Zip)

3. Age _____ 4. Sex: Male () Female ()

5. Occupation _____
(Specific job title, not the specific activity employee was performing at time of injury)

6. Department _____
(Enter name of department in which injured person is employed, even though they may have been temporarily working in another department at the time of injury)

Employer

7. Name _____

8. Mailing Address _____
(No. and Street) (City or Town) (State and Zip)

9. Location (if different from mailing address): _____

The Accident or Exposure to Occupational Illness

10. Place of accident or exposure _____
(No. and Street) (City or Town) (State and Zip)

11. Was place of accident or exposure on employer's premises? _____(Yes/No)

12. What was the employee doing when injured? _____

(Be specific - was employee using tools or equipment or handling material?)

13. How did the accident occur? _____
(Describe fully the events that resulted in the injury

or

_____ occupational illness. Tell what happened and how. Name objects and substances involved.

_____ Give details on all factors that led to accident. Use separate sheet if needed)

Langan

ACCIDENT REPORT FORM

- 14. Time of accident: _____
- 15. Date of injury or initial diagnosis of occupational illness _____

16. WITNESS TO ACCIDENT

	(Name)	(Affiliation)	(Phone No.)
	(Name)	(Affiliation)	(Phone No.)
	(Name)	(Affiliation)	(Phone No.)

Occupational Injury or Occupational Illness

17. Describe the injury or illness in detail; indicate part of body affected.

18. Name the object or substance that directly injured the employee. (For example, object that struck employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.)

- 19. Did the accident result in employee fatality? _____ (Yes or No)
- 20. Number of lost workdays ____/restricted workdays ____ resulting from injury or illness?

Other

21. Did you see a physician for treatment? _____ (Yes or No) _____ (Date)

22. Name and address of physician _____

(No. and Street) (City or Town) (State and Zip)

23. If hospitalized, name and address of hospital _____

(No. and Street) (City or Town) (State and Zip)

Date of report _____ Prepared by _____

Official position _____

Site-Specific Health and Safety Training

(For all Langan and subcontract employees on site)

I hereby confirm that site-specific health and safety training has been conducted by the site health and safety officer that included:

- Names of personnel responsible for site safety and health
- Safety, health, and other hazards at the site
- Proper use of personal protective equipment
- Work practices by which the employee can minimize risk from hazards
- Safe use of engineering controls and equipment on the site
- Acute effects of compounds at the site
- Decontamination procedures

For the following project:

(Project Title)	(Project Number)	
Name (print)	Signature	Date
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Place in project Health and Safety File as soon as possible

ATTACHMENT C

Material Safety Data Sheets

- Arsenic
- Barium
- Cadmium
- Chlorobenzene
- Chromium
- Lead
- Copper
- Manganese
- Magnesium
- Mercury
- Naphthalene
- Nickel
- Sodium
- Selenium
- Tetrachloroethene
- Zinc
- Polynuclear Aromatic Hydrocarbons
- PCBs
- Unleaded Gasoline
- Diesel Fuel
- Motor Oil, 10W-40
- Compressed Oxygen in Air
- Isobutylene Gas in Air, 100 ppm



Material Safety Data Sheet

1,2,4-Trimethylbenzene

MSDS# 73581

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,2,4-Trimethylbenzene
Catalog Numbers: AC140090000, AC140090010, AC140090025, AC140090100, AC140095000
Synonyms: Pseudocumene.

Company Identification: Acros Organics BVBA
Janssen Pharmaceuticaaan 3a
2440 Geel, Belgium

Company Identification: (USA) Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

For information in the US, call: 800-ACROS-01

For information in Europe, call: +32 14 57 52 11

Emergency Number, Europe: +32 14 57 52 99

Emergency Number US: 201-796-7100

CHEMTREC Phone Number, US: 800-424-9300

CHEMTREC Phone Number, Europe: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#: 95-63-6
Chemical Name: 1,2,4-Trimethylbenzene
%: 98
EINECS#: 202-436-9

Hazard Symbols:

XN N



Risk Phrases:

10 20 36/37/38 51/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! Flammable liquid and vapor. Harmful if inhaled. Causes eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Target Organs: Blood, central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes eye irritation. Causes redness and pain.

Skin: Causes skin irritation. Causes redness and pain. May be harmful if absorbed through the skin.

Ingestion: May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May be harmful if swallowed. May cause central nervous system depression.

Inhalation: Harmful if inhaled. Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression.

Prolonged or repeated skin contact may cause dermatitis. May cause anemia and other blood cell abnormalities.

Chronic: Prolonged exposure may produce a narcotic effect. Prolonged or repeated exposure may cause nausea,

dizziness, and headache.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion: Do not induce vomiting. Possible aspiration hazard. Get medical aid immediately. Call a poison control center. Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Possible aspiration hazard. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Inhalation: Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Notes to Physician:

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.

Extinguishing Media: Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.

Autoignition Temperature: 500 deg C (932.00 deg F)

Flash Point: 48 deg C (118.40 deg F)

Explosion Limits: Lower: 0.9 vol %

Explosion Limits: Upper: 6.4 vol %

NFPA Rating: health: 2; flammability: 2; instability: 0;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood. Keep away from heat, sparks and flame.

Storage: Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2,4-Trimethylbenzene	25 ppm TWA (listed under Trimethyl benzene)	25 ppm TWA; 125 mg/m3 TWA	none listed

OSHA Vacated PELs: 1,2,4-Trimethylbenzene: 25 ppm TWA; 125 mg/m3 TWA (listed under Trimethyl benzene)

Engineering Controls:

Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Personal Protective Equipment

- Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
- Skin: Wear appropriate protective gloves to prevent skin exposure.
- Clothing: Wear appropriate protective clothing to prevent skin exposure.
- Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid

Color: colorless

Odor: aromatic odor

pH: Not available

Vapor Pressure: 7 mm Hg @ 44.4 deg C

Vapor Density: 4.15 (air=1)

Evaporation Rate: Not available

Viscosity: Not available

Boiling Point: 168 deg C @ 760 mmHg (334.40°F)

Freezing/Melting Point: -44 deg C (-47.20°F)

Decomposition Temperature: Not available

Solubility in water: Insoluble

Specific Gravity/Density: 0.880 g/cm³

Molecular Formula: C₉H₁₂

Molecular Weight: 120.19

Section 10 - Stability and Reactivity

- Chemical Stability: Stable under normal temperatures and pressures.
- Conditions to Avoid: Incompatible materials, ignition sources, excess heat.
- Incompatibilities with Other Materials: Strong oxidizing agents.
- Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
- Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 95-63-6: DC3325000

RTECS:

CAS# 95-63-6: Inhalation, rat: LC50 = 18000 mg/m³/4H;

LD50/LC50: Oral, mouse: LD50 = 6900 mg/kg;

Oral, rat: LD50 = 5 gm/kg;

Carcinogenicity: 1,2,4-Trimethylbenzene - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: LC50 = 77.2 mg/L; 96 Hr; Flow-through at 25 C (pH 7.24)

Other: Do not empty into drains.

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: FLAMMABLE LIQUIDS, N.O.S. (1,2,4-Trimethylbenzene)

Hazard Class: 3

UN Number: UN1993

Packing Group: III

Canada TDG

Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN N

Risk Phrases:

R 10 Flammable.

R 20 Harmful by inhalation.

R 36/37/38 Irritating to eyes, respiratory system and skin.

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 95-63-6: 3

Canada

CAS# 95-63-6 is listed on Canada's DSL List

Canadian WHMIS Classifications: B3, D1B, D2B

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 95-63-6 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 95-63-6 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 5/19/1999

Revision #6 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.



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Search the NIOSH Pocket Guide

Enter search terms separated by spaces.

<h1>1,3,5-Trimethylbenzene</h1>					
Synonyms & Trade Names Mesitylene, Symmetrical trimethylbenzene, sym-Trimethylbenzene					
CAS No. 108-67-8	RTECS No. OX6825000 (/niosh-rtecs/OX682428.html)		DOT ID & Guide 2325 129 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide129/) (http://www.cdc.gov/Other/disclaimer.html)		
Formula C ₆ H ₃ (CH ₃) ₃	Conversion 1 ppm = 4.92 mg/m ³		IDLH N.D. See: IDLH INDEX (/niosh/idlh/intridl4.html)		
Exposure Limits <small>NIOSH</small> REL : TWA 25 ppm (125 mg/m ³) OSHA PEL † (nengapdxg.html) : none			Measurement Methods OSHA PV2091 (http://www.osha.gov/dts/sltc/methods/partial/pv2091/pv2091.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)		
Physical Description Clear, colorless liquid with a distinctive, aromatic odor.					
MW: 120.2	BP: 329° F	FRZ: -49°F	Sol: 0.002%	VP: 2 mmHg	IP: 8.39 eV
Sp.Gr: 0.86	Fl.P: 122° F	UEL: ?	LEL: ?		
Class II Flammable Liquid					
Incompatibilities & Reactivities Oxidizers, nitric acid					
Exposure Routes inhalation, ingestion, skin and/or eye contact					
Symptoms irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)					
Target Organs Eyes, skin, respiratory system, central nervous system, blood					
Personal Protection/Sanitation (See protection codes (protect.html)) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or			First Aid (See procedures (firstaid.html)) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately		

contaminated
Change: No recommendation

Respirator Recommendations

Not available.

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [1155 \(/niosh/ipcsneng/neng1155.html\)](#)

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Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA 30329-4027,
USA

800-CDC-INFO  (800-232-4636  TTY: (888) 232-6348  - [Contact CDC-INFO](#)





[Division of Facilities Services](#)

DOD Hazardous Material Information (ANSI Format) For Cornell University Convenience Only

ALCONOX

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification ALCONOX

Product Identification: ALCONOX

Date of MSDS: 08/14/1992 **Technical Review Date:** 09/28/1992

FSC: 6505 **NIIN:** 00-839-8894

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: ALCONOX INC
Manufacturer's Address1: 215 PARK AVE S
Manufacturer's Address2: NEW YORK, NY 10003
Manufacturer's Country: US
General Information Telephone: 212-473-1300
Emergency Telephone: 212-473-1300
Emergency Telephone: 212-473-1300
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 17534
Special Project Code: N

Item Description

Item Name: DETERGENT,SURGICAL INSTRUMENT
Item Manager: NK
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: NK **Quantitative Expression:** NK
Unit of Issue Quantity: NK
Type of Container:

Contractor Information

Contractor's Name: ALCONOX INC
Contractor's Address1: 9 EAST 40TH STREET, SUITE 200
Contractor's Address2: NEW YORK, NY 10016
Contractor's Telephone: 212-532-4040
Contractor's CAGE: 17534

Section 2 - Compositon/Information on Ingredients ALCONOX

Ingredient Name: ALCONOX
Ingredient CAS Number: **Ingredient CAS Code:** X
RTECS Number: **RTECS Code:** X
=WT: **=WT Code:**
=Volume: **=Volume Code:**
>WT: **>WT Code:**
>Volume: **>Volume Code:**
<WT: **<WT Code:**
<Volume: **<Volume Code:**
% Low WT: **% Low WT Code:**
% High WT: **% High WT Code:**
% Low Volume: **% Low Volume Code:**
% High Volume: **% High Volume Code:**
% Text: N/K
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**

ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M

ACGIH STEL: N/P **ACGIH STEL Code:**

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview ALCONOX

Health Hazards Acute & Chronic: PROLONGED EXPOSURE TO DUST MAY IRRITATE MUCOUS MEMBRANES.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: NO

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures ALCONOX

First Aid:
EYES: FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MIN. SKIN: FLUSH WITH PLENTY OF WATER. INGEST: DRINK LARGE QTY OF WATER TO DILUTE MATERIAL. GET MED ATTN FOR DISCOMFORT. INHAL: REMOVE TO FRESH AIR. SU PPORT BRTHG (GIVE O*2/ARTF RESP) (FP N).

Section 5 - Fire Fighting Measures ALCONOX

Fire Fighting Procedures:
WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:
NONE.

Extinguishing Media:
WATER, CARBON DIOXIDE, DRY CHEMICAL, FOAM SAND/EARTH.

Flash Point: **Flash Point Text:** NONE

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/A

Upper Limit(s): N/A

Section 6 - Accidental Release Measures
ALCONOX

Spill Release Procedures:

MATERIAL FOAMS PROFUSELY, SHOVEL & RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.

Section 7 - Handling and Storage
ALCONOX

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ALCONOX

Respiratory Protection:

NIOSH/MSHA APPROVED DUST MASK.

Ventilation:

LOCAL EXHAUST: NORMAL.

Protective Gloves:

IMPERVIOUS GLOVES (FP N).

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: NOT REQUIRED.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
ALCONOX

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: N/A

Melting/Freezing Point: Melting/Freezing Text: N/K

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/A Vapor Density: N/A

Percent Volatile Organic Content:

Specific Gravity: N/A

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: NOT APPLICABLE

Solubility in Water: APPRECIABLE

Appearance and Odor: WHITE POWDER INTERSPERSED W/CREAM COLORED FLAKES-
ODORLESS

Percent Volatiles by Volume: N/A

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
ALCONOX

Stability Indicator: YES

Materials to Avoid:

AVOID STRONG ACIDS.

Stability Condition to Avoid:

NONE.

Hazardous Decomposition Products:

MAY RELEASE CARBON DIOXIDE GAS ON BURNING.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT

Section 11 - Toxicological Information
ALCONOX

Toxicological Information:

N/P

Section 12 - Ecological Information
ALCONOX

Ecological Information:

N/P

Section 13 - Disposal Considerations
ALCONOX

Waste Disposal Methods:

SMALL QTY MAY BE DISPOSED OF IN SEWER. LARGE QTY SHOULD BE DISPOSED OF ACCORDING TO LOCAL, FEDERAL & STATE REQUIREMENTS FOR NON-HAZARDOUS DETERGENT.

Section 14 - MSDS Transport Information
ALCONOX

Transport Information:

N/P

Section 15 - Regulatory Information
ALCONOX

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
ALCONOX

Other Information:

N/P

HMIS Transportation Information**Product Identification:** ALCONOX**Transportation ID Number:** 88154**Responsible Party CAGE:** 17534**Date MSDS Prepared:** 08/14/1992**Date MSDS Reviewed:** 02/22/1993**MFN:** 02/22/1993**Submitter:** N TN**Status Code:** C**Container Information****Unit of Issue:** NK**Container Quantity:** NK**Type of Container:****Net Unit Weight:****Article without MSDS:** N**Technical Entry NOS Shipping Number:****Radioactivity:****Form:****Net Explosive Weight:****Coast Guard Ammunition Code:****Magnetism:** N/P**AF MMAC Code:****DOD Exemption Number:****Limited Quantity Indicator:****Multiple Kit Number:** 0**Kit Indicator:** N**Kit Part Indicator:** N**Review Indicator:** Y**Additional Data:**

NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information**DOT Proper Shipping Name:** NOT REGULATED BY THIS MODE OF TRANSPORTATION**DOT PSN Code:** ZZZ**Symbols:** N/R**DOT PSN Modifier:****Hazard Class:** N/R**UN ID Number:** N/R**DOT Packaging Group:** N/R**Label:** N/R**Special Provision(s):** N/R**Packaging Exception:** N/R**Non Bulk Packaging:** N/R**Bulk Packaging:** N/R**Maximum Quantity in Passenger Area:** N/R**Maximum Quantity in Cargo Area:** N/R**Stow in Vessel Requirements:** N/R**Requirements Water/Sp/Other:** N/R**IMO Detail Information**

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: ALCONOX
CAGE: 17534
Assigned Individual: N
Company Name: ALCONOX INC
Company PO Box:
Company Street Address1: 9 EAST 40TH STREET, SUITE 200
Company Street Address2: NEW YORK, NY 10016 US
Health Emergency Telephone: 212-473-1300
Label Required Indicator: Y
Date Label Reviewed: 09/18/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/18/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES

Respiratory Protection Indicator: YES

Signal Word: CAUTION

Health Hazard: Slight

Contact Hazard: Slight

Fire Hazard: None

Reactivity Hazard: None

8/8/2002 12:40:10 AM



**Material Safety
Data Sheets**

[Division of Facilities Services](#)

DOD Hazardous Material Information (ANSI Format) For Cornell University Convenience Only

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Product Identification: ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Date of MSDS: 08/01/1997 **Technical Review Date:** 09/01/1999

FSC: 6810 **NIIN:** LIIN: 00N092040

Submitter: N NF

Status Code: A

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: UNITED MINERAL & CHEMICAL CORP
Manufacturer's Address1: 1100 VALLEYBROOK AVE
Manufacturer's Address2: LYNDHURST, NJ 07071
Manufacturer's Country: US
General Information Telephone: 201-507-3300
Emergency Telephone: (800)424-9300
Emergency Telephone: (800)424-9300
Chemtec Telephone: (800)424-9300
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 87730

Contractor Information

Contractor's Name: UNITED MINERAL & CHEMICAL CORP
Contractor's Address1: 1100 VALLEYBROOK AVE
Contractor's Address2: LYNDHURST, NJ 07071
Contractor's Telephone: 201-507-3300
Contractor's CAGE: 87730

Section 2 - Compositon/Information on Ingredients ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Ingredient Name: ARSENIC; (ARSENIC METAL)
Ingredient CAS Number: 7440-38-2 **Ingredient CAS Code:** T
RTECS Number: CG0525000 **RTECS Code:** T
=WT: 100. **=WT Code:** M
=Volume: **=Volume Code:**
>WT: **>WT Code:**
>Volume: **>Volume Code:**
<WT: **<WT Code:**
<Volume: **<Volume Code:**
% Low WT: **% Low WT Code:**
% High WT: **% High WT Code:**
% Low Volume: **% Low Volume Code:**
% High Volume: **% High Volume Code:**
% Text:
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: N/P **OSHA PEL Code:**
OSHA STEL: N/P **OSHA STEL Code:**
ACGIH TLV: 0.01 MG/M3 **ACGIH TLV Code:** T
ACGIH STEL: NOT ESTABLISHED **ACGIH STEL Code:** T
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Health Hazards Acute & Chronic: ARSENIC METAL IS NOT AS READILY AVAIL IN THE BODY AS ARSENIC IN THE FORM OF DUST OR VAP OR WHEN PROCESSED INTO ARSENIC CMPDS (ARSENICALS). INORGANIC ARSENICALS ARE MORE TOXIC THAN ORGANIC ARSENICALS. ACUTE EFTS: ARSENIC IS POISON BY SUBCUTANEOUS, INTRAMUSCULAR & INTRAPERITONEAL ROUTES. ACUTE ARSENIC POISONING FROM INGEST RSLTS IN MARKED IRRIT OF STOMACH & INTESTINES W/NAUS, VOMIT & DIARR. IN SEV C ASES STOOLS & VOMIT ARE BLOODY & PATIENT MAY GO INTO COLLAPSE & SHOCK W/WEAK, RAPID PULSE, COLD SWEATS, COMA & DEATH. INHAL MAY CAUSE ULCERATION OF NASAL SEPTUM, RESP IRRIT. SKIN/EYE CNTCT MAY CAUSE DERM, SKIN & EYE (EFTS OF OVEREXP)

Signs & Symptoms of Overexposure:

HLTH HAZS: IRRIT. CHRONIC EFTS: ARSENIC IS CONFIRMED HUMAN CARCIN PRODUCING LIVER TUMORS & AN EXPERIMENTAL TERATOGEN (MAY CAUSE DMG TO DEVELOPING FETUS). CHRONIC ARSENIC POISONING MAY INCL ANY/ALL OF FOLLOWING: DIGEST SYS DISTURBS, LOSS OFAPPETITE, CRAMPS, NAUS, CONSTIP, DIARR; LIVER DMG WHICH MAY RSLT IN JAUN; DISTURBS OF BLOOD, KIDNEYS & NERVOUS SYS; SKIN ABNORMS INCL ITCHING, PIGMENTATION & POS S CANCEROUS CHGS. TARGET ORGANS FOR INORGANIC CMPDS AS AS): LIVER, KIDNEYS, SKIN, LUNGS, LYMPHATIC SYS. TLV: 0.01 MG/M3 TWA ARSENIC, ELEMENTAL & INORGANIC CMPDS (EXCEPT ARSINE), AS AS. OSHA PEL: (SUPD AT)

Medical Conditions Aggravated by Exposure:

KNOWN EFFECTS ON OTHER ILLNESSES: GASTROINTESTINAL. NERVOUS SYSTEM. SKIN. LIVER & KIDNEY PROBLEMS. AFTER EXPOSURE HAVE URINE TEST.

LD50 LC50 Mixture: LD50: (ORAL, RAT) 763 MG/M3

Route of Entry Indicators:

Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators

NTP: YES
IARC: YES
OSHA: YES

Carcinogenicity Explanation: ARSENIC: IARC MONOGRAPHS, SUPPLEMENT, VOL 7, PG 100, 1987: GROUP 1. NTP 8TH ANNUAL REPORT ON CARCINOGENS, 1998: KNOWN TO BE CARCINOGEN. OSHA REGULATED: CFR 29 1910.1018.

Section 4 - First Aid Measures ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

First Aid:

SKIN: FLUSH WITH SOAP AND WATER. AVOID RUBBING INTO SKIN. CONTACT MD IMMEDIATELY. EYES: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. CONTACT

PHYSICIAN IMMEDIATELY. INHALATION: REMOVE TO FRESH AIR. PROVIDE OXYGEN IF NECESSARY. CONTACT PHYSICIAN IMMEDIATELY. INGESTION: TREATMENT WITH BAS (DIMERCAPTOL) IS OF QUESTIONABLE EFFECTIVENESS IN TRIVALENT ARSENIC COMPOUNDS. INDUCE VOMITING AND DO GASTRIC LAVAGE. GET PERSONNEL TO HOSPITAL IMMEDIATELY. A PHYSICIAN CAN INITIATE AN EXCHANGE TRANSFUSION AND DIALYSIS. ALSO ABSORPTION AND REMOVAL WITH ANIMAL BONE COAL OR FE (OH)*2 SHOULD BE DONE.

Section 5 - Fire Fighting Measures

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Fire Fighting Procedures:

USE NIOSH APPRVD SCBA & FULL PROT EQUIP (FP N). RESTRICT PERS NOT WEARING PROT EQUIP FROM AREA. TRY TO SNUFF FIRE W/SAND, DRY MEDIA, FOAM OR CO*2. IF NO OTHER OPTIONS AVAILABLE, USE WATER & ALWAYS WEAR NIOSH APPRVD SCBA OR NIOSH TOXIC VAPOR RESP. POISONOUS GASES ARE PRODUCED IN FIRE, INCLUDING ARSENIC OXIDES.

Unusual Fire or Explosion Hazard:

ARSENIC, WHEN HEATED OR IN CONTACT W/ACID OR ACID FUMES, CAN PRODUCE HIGHLY TOXIC FUMES. ARSENIC REACTS VIGOROUSLY W/OXIDIZING MATLS. ARSENIC IS FLAMMABLE IN FORM OF DUST WHEN EXPOSED TO HEAT OR FLAME OR BY CHEMICAL RXN W/POWERFUL OXIDIZERS. SLIGHT EXPLOSION HAZ EXISTS IN FORM OF DUST WHEN EXPOSED TO (ECOLOGICAL INFO)

Extinguishing Media:

FOAM, CARBON DIOXIDE, DRY CHEMICAL.

Flash Point: Flash Point Text: NONE

Autoignition Temperature:

Autoignition Temperature Text: N/K

Lower Limit(s): N/A

Upper Limit(s): N/A

Section 6 - Accidental Release Measures

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Spill Release Procedures:

RESTRICT PERSONS NOT WEARING PROTECTIVE EQUIPMENT FROM AREA UNTIL CLEANUP IS COMPLETE. WEARING NIOSH APPROVED RESPIRATOR, GLOVES, GOGGLES, LAB COAT, GATHER UP CHUNKS, RODS OR GRANULES WITH VACUUM OR UTENSILS RESERVED FOR POISONOUS SOLIDS. AVOID RAISING DUST. VENTILATE THE AREA AFTER CLEANUP IS COMPLETE.

Section 7 - Handling and Storage

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Respiratory Protection:

NIOSH APPROVED, AIR PURIFYING, TOXIC VAPOR RESPIRATOR TO PARTICULATE AND FUME AIR LEVEL. FOR INORGANIC ARSENIC APPLICATIONS, SEE 29 CFR 1910.1018 FOR PROPER RESPIRATOR SELECTION.

Ventilation:

LOC EXHST/MECH (GEN) SCRUBBER OR TRAP IF POSS TO MAINTAIN EXPOS TO LESS THAN PERMISSIBLE LIMITS FOR ELEMENTAL ARSENIC & ANY CMPDS BEING GENERATED.

Protective Gloves:

NEOPRENE OR PLASTIC.

Eye Protection: ANSI APPROVED CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: ANSI APPROVED EYE WASH AND DELUGE SHOWER (FP N). LAB COAT.

Work Hygienic Practices: N/P

Supplemental Health & Safety Information: EFTS OF OVEREXP: 0.01 MG/M3 AS AS & INORGANIC CMPDS; 0.5 AS AS ORGANIC CMPDS. ACGIH TLV: 0.01 MG/M3 TWA ARSENIC, ELEMENTAL & INORGANIC CMPDS (EXCEPT ARSINE), AS AS. ALSO SEE TOXICOLOGICAL INFO. WASTE DISP METH: HAZ DEPENDING ON LEVEL OF TOX CHARACT OF ARSENIC. SEE 40 CFR 261.24 FOR DETERMINATION. (OTHER INFO)

Section 9 - Physical & Chemical Properties
ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: =612.C, 1133.6F **Boiling Point Text:** SUBLIMES

Melting/Freezing Point: =814.C, #####F **Melting/Freezing Text:** @ 36 ATM. FP:N/A

Decomposition Point: **Decomposition Text:** N/P

Vapor Pressure: 1 MMHG @ 372C **Vapor Density:** N/A

Percent Volatile Organic Content:

Specific Gravity: 5.727

Volatile Organic Content Pounds per Gallon:

pH: NONE-0% IN H*2O

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/A

Solubility in Water: INSOLUBLE

Appearance and Odor: SILVER GRAY CRYSTALLINE CHUNKS, RODS OR GRANULES; NO ODOR AS (ECOLOGICAL INFO)

Percent Volatiles by Volume: N/A (BY WT)

Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Stability Indicator: YES

Materials to Avoid:

INCOMPATIBLE W/BROMINE AZIDE, DIRUBIDIUM ACETYLIDE, HALOGENS, PALLADIUM ZINC, PLATINUM, NCL*3, AGNO*3, CRO*3, NA*2O*2, HEXAFLUOROISOPROPYLIDENEAMINO LITHIUM. CAN REACT W/ACIDS OR ACID FUMES & POWERFUL OXIDIZERS SUCH AS BROM

Stability Condition to Avoid:

AVOID OPEN CONTAINERS AND CONTACT WITH INCOMPATIBLE MATERIALS.

Hazardous Decomposition Products:

ARSENIC FUMES, ARSINE, OTHER ARSENIC COMPOUNDS.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

N/P

Section 11 - Toxicological Information

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Toxicological Information:

LD50: TDLO 605 ?G/KG. ORAL-MAN TDLO 7857 MG/KG/55Y SKIN. DERMAL IRRITATION-RABBIT: UNKNOWN; SUBCUTANEOUS IMPLANT RABBIT LTLO 75 MG/KG. EYE IRRITATION-RABBIT: UNKNOWN.

Section 12 - Ecological Information

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Ecological Information:

N/P. EXPLO HAZ: FLAME. IN EVENT OF A FIRE OR SPILL CONTACT THE STATE DEPARTMENT OF THE ENVIRONMENT & YOUR REGIONAL OFFICE OF THE FEDERAL EPA. PHYSICAL DATA - APPEAR/ODOR: METAL AS COMPOUND, ASH*3, HAS GARLIC ODOR. ODOR THRESHOLD: N/A. MATLS TO AVOID: CHLORATES, IODATES, PEROXIDES, LITHIUM, NACL*3, KMNO*3, RB*2C*2, AGNO*4, NOCL, IF*5, CRO*3, CLF*3, CLO, BRF*3, BRF*5, BRN*3, RBC*3BCH, CSC*3BCH.

Section 13 - Disposal Considerations

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Waste Disposal Methods:

SOLID WASTES SHOULD BE VITRIFIED, PLACED IN LABELED CNTNR & BURIED IN EPA SUPERVISED FACILITY. ETCHING SOLNS & CUTTING WASTES SHOULD BE PRECIPITATED, CEMENTED/VITRIFIED & PLACED IN METAL/PLASTIC LABEL ED CNTNRS & BURIED IN EPA SUPERVISED FACILITY. PASS GAS THRU POTASSIUM PERMANGANATE, PRECIPITATE & TREAT AS ABOVE. WASTE MAY BE CONSIDERED (SUPDAT)

Section 14 - MSDS Transport Information

ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Transport Information:

DOT REGULATED: YES. RQ: (NA - PIECES ARE LARGER THAN 100 MICROMETERS IN DIAMETER). IF REGULATED, PROPER SHIPPING NAME: ARSENIC. HAZARD CLASS: (6.1). IDENTIFICATION NO: (UN1558). PACKING GROUP: (III). LABEL REQUIRED: (POISON). INLAND B/L: ARSENIC, 6.1, UN1558, PACKING GROUP II, POISON. EMERGENCY RESPONSE GUIDE NO: (152).

Section 15 - Regulatory Information
ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

SARA Title III Information:

SARA TITLE III, SECT 313: LISTED.

Federal Regulatory Information:

TSCA: WE CERTIFY THAT ALL COMPONENTS OF THIS PRODUCT ARE REGISTERED UNDER THE REGULATIONS OF THE TOXIC SUBSTANCES CONTROL ACT. HMIS: HEALTH (4); FLAMMABILITY (0); REACTIVITY (1).

State Regulatory Information:

Section 16 - Other Information
ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE

Other Information:

WASTE DISP METH: HAZARDOUS DEPENDING ON LEVEL OF TOXICITY CHARACTERISTIC OF ARSENIC. SEE 40 CFR 261.24 FOR DETERMINATION. RCRA HAZARDOUS WASTE: YES RCRA @: D004; IF TESTED POSITIVE AS CHARACTER OF TOXICITY FOR ARSENIC. CERCLA: YES. RQ (1 LB RQ IS APPLICABLE ONLY IF DIAMETER OF PIECES OF SOLID METAL RELEASED IS LESS THAN 100 MICROMETERS OR 0.004 INCH. THIS PROD FORM IS LARGER THAN 100 MICROMETERS & HAS NO RQ IN ITS CURRENT FORM. IF AS HAZ WASTE CHARACTER OF ARSENIC, THEN RQ=1LB. FOLLOW ALL LOCAL, STATE AND FEDERAL INFO & REGULATIONS.

HAZCOM Label Information

Product Identification: ARSENIC METAL-MBE CHARGES, ARSENIC CHUNK & GRANULE
CAGE: 87730

Assigned Individual: N

Company Name: UNITED MINERAL & CHEMICAL CORP

Company PO Box:

Company Street Address1: 1100 VALLEYBROOK AVE

Company Street Address2: LYNDHURST, NJ 07071 US

Health Emergency Telephone: (800)424-9300

Label Required Indicator: Y

Date Label Reviewed: 09/01/1999

Status Code: A

Manufacturer's Label Number:

Date of Label:

Year Procured: N/K

Organization Code: F

Chronic Hazard Indicator: Y

Eye Protection Indicator: YES

Skin Protection Indicator: YES

Respiratory Protection Indicator: YES

Signal Word: DANGER

Health Hazard: Severe

Contact Hazard: Severe

Fire Hazard: None

Reactivity Hazard: Slight

8/9/2002 10:40:46 AM

SUPELCO,INC. -- BENZO(A)ANTHRACENE 0.1G,48563 -- 6810-00N010656

===== Product Identification =====

Product ID:BENZO(A)ANTHRACENE 0.1G,48563

MSDS Date:05/16/1985

FSC:6810

NIIN:00N010656

MSDS Number: BHYRL

=== Responsible Party ===

Company Name:SUPELCO,INC.

Address:SUPELCO PARK

City:BELLEFONTE

State:PA

ZIP:16823-0048

Info Phone Num:814-359-3441

Emergency Phone Num:814-359-3441

CAGE:HO582

=== Contractor Identification ===

Company Name:SIGMA-ALDRICH INC.

Address:3050 SPRUCE STREET

Box:14508

City:ST. LOUIS

State:MO

ZIP:63103

Country:US

Phone:314-771-5765/414-273-3850X5996

CAGE:54968

Company Name:SUPELCO,INC.

Address:SUPELCO PARK

Box:City:BELLEFONTE

State:PA

ZIP:16823-0048

Phone:814-359-3441

CAGE:HO582

===== Composition/Information on Ingredients =====

Ingred Name:BENZ A ANTHRACENE (SARA III)

CAS:56-55-3

RTECS #:CV9275000

Other REC Limits:N/K

ACGIH TLV:A2 ; 9394

EPA Rpt Qty:10 LBS

DOT Rpt Qty:10 LBS

===== Hazards Identification =====

Routes of Entry: Inhalation:NO Skin:NO Ingestion:NO

Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO

Health Hazards Acute and Chronic:SEE SIGNS AND SYMPTOMS OF
OVEREXPOSURE.Explanation of Carcinogenicity:SUSPECTED HUM CARCIN/KNOWN ANIM CARCIN
(NTP 1985).INADEQ EVID FOR CARC IN HUM,SUFF EVID FOR CARC IN
ANIMALS (IARC 1987).

Effects of Overexposure:EYES/SKIN/INGESTION/INHALATION:N/K .

Medical Cond Aggravated by Exposure:N/K

===== First Aid Measures =====

First Aid:EYES:FLUSH WITH WATER FOR AT LEAST 15 MINUTES.SKIN:FLUSH WITH
LARGE VOLUMES OF WATER.REMOVE CONTAMINATED
CLOTHING.INGESTION:CONTACT PHYSICIAN.INHALATION:IMMEDIATELY MOVE
TO FRESH AIR.GIVE OXYGEN IF BREATHING IS LABORED.IF BREATHING
STOPS,GIVE ARTIFICIAL RESPIRATION.CONTACT PHYSICIAN.

===== Fire Fighting Measures =====

Flash Point:N/K
Lower Limits:N/K
Upper Limits:N/K
Extinguishing Media:CO*2,FOAM,DRY CHEMICAL.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA AND FULL
PROTECTIVE EQUIPMENT .

===== Accidental Release Measures =====

Spill Release Procedures:SWEEP UP MATERIAL.VENTILATE AREA.AVOID
GENERATING DUST.
Neutralizing Agent:N/K

===== Handling and Storage =====

Handling and Storage Precautions:STORE IN SEALED CONTAINER IN COOL,DRY
LOCATION.KEEP AWAY FROM OXIDIZERS.AVOID GENERATING DUST.
Other Precautions:REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR
EXPOSURE OF CONCERN .
Ventilation:LOCAL AND GENERAL VENTILATION NECESSARY TO KEEP AIR
CONCENTRATION BELOW LEVEL OF CONCERN .
Protective Gloves:RUBBER
Eye Protection:CHEMICAL WORKERS GOGGLES .
Work Hygienic Practices:N/K
Supplemental Safety and Health
ROUTES OF ENTRY:INHALATION/SKIN/INGESTION .

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:438C,820F
Melt/Freeze Pt:M.P/F.P Text:157C,315F
Decomp Temp:Decomp Text:N/K
Appearance and Odor:PALE YELLOW CRYSTAL.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS.

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSAL MUST BE IN ACCORDANCE WITH
FEDERAL,STATE AND LOCAL REGULATIONS .

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**Material Safety
Data Sheets**

[Division of Facilities Services](#)

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

BENZO (A) PYRENE, MD-1956

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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**Section 1 - Product and Company Identification
BENZO (A) PYRENE, MD-1956**

Product Identification: BENZO (A) PYRENE, MD-1956

Date of MSDS: 03/25/1986 **Technical Review Date:** 09/30/1992

FSC: 6810 **NIIN:** LIIN: 00N034844

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients BENZO (A) PYRENE, MD-1956

Ingredient Name: BENZO (A) PYRENE
Ingredient CAS Number: 50-32-8 **Ingredient CAS Code:** M
RTECS Number: DJ3675000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.2 MG/M3 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: A2, MG/M3;9394 **ACGIH TLV Code:** M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview BENZO (A) PYRENE, MD-1956

Health Hazards Acute & Chronic: CANCER SUSPECT (GASTRIC), MUTAGENIC, NEOPLASTIC.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES

Skin: NO

Ingestion: YES

Carcinogenicity Indicators

NTP: YES

IARC: YES

OSHA: NO

Carcinogenicity Explanation: BENZO (A) PYRENE: GROUP 2A (IARC), ANTICIPATED TO BE A CARCINOGEN (NTP).

Section 4 - First Aid Measures BENZO (A) PYRENE, MD-1956

First Aid:

SUMMON A PHYSICIAN. SKIN: WASH WITH WATER. INHALATION: REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION OR OXYGEN IF NECESSARY. INGESTION: GIVE WATER AND INDUCE VOMITING. MEDICAL ASSISTANCE FOR GASTRIC LAV AGE. EYE: FLUSH WITH WATER FOR AT LEAST 15 MINUTES (FP N).

Section 5 - Fire Fighting Measures BENZO (A) PYRENE, MD-1956

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

NONE SPECIFIED BY MANUFACTURER.

Extinguishing Media:

CO*2, DRY CHEMICAL, ALCOHOL FOAM.

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
BENZO (A) PYRENE, MD-1956

Spill Release Procedures:

PROVIDE GOOD VENTILATION. CAREFULLY SCOOP UP AND TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
BENZO (A) PYRENE, MD-1956

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
BENZO (A) PYRENE, MD-1956

Respiratory Protection:

WEAR NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS.

Ventilation:

LOCAL EXHAUST: STRONG FUMEHOOD.

Protective Gloves:

RUBBER GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWER AND EYEWASH STATION NEAR WORKPLACE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
BENZO (A) PYRENE, MD-1956

HCC: N1

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 594F,312C

Melting/Freezing Point: Melting/Freezing Text: 354F,179C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/K Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: N/K

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: <0.1

Appearance and Odor: YELLOW SOLID.
Percent Volatiles by Volume: LOW
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
BENZO (A) PYRENE, MD-1956

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
CARBON MONOXIDE, CARBON DIOXIDE ON COMBUSTION.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT.

Section 11 - Toxicological Information
BENZO (A) PYRENE, MD-1956

Toxicological Information:
N/P

Section 12 - Ecological Information
BENZO (A) PYRENE, MD-1956

Ecological Information:
N/P

Section 13 - Disposal Considerations
BENZO (A) PYRENE, MD-1956

Waste Disposal Methods:
VIA LICENSED DISPOSAL COMPANY. DISPOSE IN ACCORDANCE WITH FEDERAL, STATE
AND LOCAL REGULATIONS (FP N).

Section 14 - MSDS Transport Information
BENZO (A) PYRENE, MD-1956

Transport Information:
N/P

Section 15 - Regulatory Information
BENZO (A) PYRENE, MD-1956

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
BENZO (A) PYRENE, MD-1956

Other Information:

N/P

HMIS Transportation Information**Product Identification:** BENZO (A) PYRENE, MD-1956**Transportation ID Number:** 39315**Responsible Party CAGE:** 09578**Date MSDS Prepared:** 03/25/1986**Date MSDS Reviewed:** 02/17/1993**MFN:** 02/17/1993**Submitter:** N TN**Status Code:** C**Container Information****Unit of Issue:** NK**Container Quantity:** NK**Type of Container:****Net Unit Weight:****Article without MSDS:** N**Technical Entry NOS Shipping Number:****Radioactivity:****Form:****Net Explosive Weight:****Coast Guard Ammunition Code:****Magnetism:** N/P**AF MMAC Code:****DOD Exemption Number:****Limited Quantity Indicator:****Multiple Kit Number:** 0**Kit Indicator:** N**Kit Part Indicator:** N**Review Indicator:** Y**Additional Data:**

NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information**DOT Proper Shipping Name:** NOT REGULATED BY THIS MODE OF TRANSPORTATION**DOT PSN Code:** ZZZ**Symbols:** N/R**DOT PSN Modifier:****Hazard Class:** N/R**UN ID Number:** N/R**DOT Packaging Group:** N/R**Label:** N/R**Special Provision(s):** N/R**Packaging Exception:** N/R**Non Bulk Packaging:** N/R

Bulk Packaging: N/R
Maximum Quantity in Passenger Area: N/R
Maximum Quantity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: BENZO (A) PYRENE, MD-1956
CAGE: 09578
Assigned Individual: N
Company Name: MERCK FROSST CANADA INC
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US
Health Emergency Telephone: 800-325-9034;514-697-2823
Label Required Indicator: Y

Date Label Reviewed: 09/30/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/30/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: WARNING
Health Hazard: Slight
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None

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New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **BARIUM**

CAS Number: 7440-39-3

DOT Number: UN 1400

RTK Substance number: 0180

Date: January 1986 Revision: September 2000

HAZARD SUMMARY

- * **Barium** can affect you when breathed in.
- * Contact can irritate and burn the skin and eyes.
- * Breathing **Barium** can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.
- * Very high exposure can cause **Barium** poisoning with symptoms of nausea, vomiting, diarrhea, irregular heartbeat, muscle weakness, tremors, paralysis and even death.
- * **Barium** may damage the kidneys.
- * **Barium** is a **FLAMMABLE** and **REACTIVE** chemical and a **FIRE** and **EXPLOSION HAZARD**.

IDENTIFICATION

Barium is a silver-white or yellowish metal powder. It is used in spark plugs and engine rod bearings, and to remove gas from vacuum tubes and television picture tubes.

REASON FOR CITATION

- * **Barium** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, HHAG and EPA.
- * This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE** and **REACTIVE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

- OSHA: The legal airborne permissible exposure limit (PEL) is **0.5 mg/m³** averaged over an 8-hour workshift.
- NIOSH: The recommended airborne exposure limit is **0.5 mg/m³** averaged over a 10-hour workshift.
- ACGIH: The recommended airborne exposure limit is **0.5 mg/m³** averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to **Barium** and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Barium** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Barium**:

- * Contact can irritate and burn the skin and eyes.
- * Breathing **Barium** can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.
- * Very high exposure can cause **Barium** poisoning with symptoms of nausea, vomiting, diarrhea, irregular heartbeat, muscle weakness, tremors, paralysis and even death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Barium** and can last for months or years:

Cancer Hazard

- * There is no evidence that **Barium** causes cancer in animals. This is based on test results presently available to the New Jersey Department of Health and Senior Services from published studies.

Reproductive Hazard

- * There is no evidence that **Barium** affects reproduction. This is based on test results presently available to the New Jersey Department of Health and Senior Services from published studies.

Other Long-Term Effects

- * **Barium** can irritate the lungs. Repeated exposure may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.
- * **Barium** may damage the kidneys.
- * Repeated exposure can cause an abnormal chest x-ray. This usually takes years to develop.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- * Lung function tests.
- * Kidney function tests.
- * EKG.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

- * Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically transfer **Barium** from drums or other storage containers to process containers.
- * Before entering a confined space where **Barium** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by **Barium** should change into clean clothing promptly.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Barium**.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.

- * On skin contact with **Barium**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Barium**, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where **Barium** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
- * Use a vacuum to reduce dust during clean-up. DO NOT DRY SWEEP.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with **Barium**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear impact resistant eye protection with side shields or goggles.
- * Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%.

Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.

- * If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Barium**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- * Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- * Exposure to **50 mg/m³** is immediately dangerous to life and health. If the possibility of exposure above **50 mg/m³** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

- * Prior to working with **Barium** you should be trained on its proper handling and storage.
- * **Barium** reacts violently with WATER, releasing flammable and/or explosive *Hydrogen gas*.
- * **Barium** must be stored to avoid contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); HALOGENATED HYDROCARBONS; and OXYGEN since violent reactions occur.
- * **Barium** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMAN-GANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and CHLORINATED SOLVENTS (such as CARBON TETRACHLORIDE and TRICHLOROETHYLENE).
- * Store **Barium** under *Inert Gas, Petroleum, or an Oxygen-free liquid* to exclude air.
- * Store in tightly closed containers in a cool, well-ventilated area away from MOISTURE and COMBUSTIBLES.
- * Sources of ignition, such as smoking and open flames, are prohibited where **Barium** is used, handled, or stored.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of **Barium**.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.



[Division of Facilities Services](#)

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

F74 BENZO/B/FLUORANTHENE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

**Section 1 - Product and Company Identification
F74 BENZO/B/FLUORANTHENE**

Product Identification: F74 BENZO/B/FLUORANTHENE

Date of MSDS: 09/11/1990 **Technical Review Date:** 12/14/1994

FSC: 6550 **NIIN:** LIIN: 00F037517

Submitter: F BT

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: CHEM SERVICE INC
Post Office Box: 3108
Manufacturer's Address1: 660 TOWER LN
Manufacturer's Address2: WEST CHESTER, PA 19381-3108
Manufacturer's Country: US
General Information Telephone: 215-692-3026/800-452-9994
Emergency Telephone: 215-692-3026/800-452-9994
Emergency Telephone: 215-692-3026/800-452-9994
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 84898
Special Project Code: N

Preparer Information

Preparer's Name: CHEM SERVICE INC
Post Office Box: 3108
Preparer's Address1: N/K
Preparer's Address2: WEST CHESTER, PA 19381
Preparer's CAGE: 84898
Assigned Individual: N

Contractor Information

Contractor's Name: CHEM SERVICE INC
Post Office Box: 3108
Contractor's Address1: N/K
Contractor's Address2: WEST CHESTER, PA 19381
Contractor's Telephone: 215-692-3026
Contractor's CAGE: 84898

Contractor Information

Contractor's Name: CHEM SERVICE, INC
Post Office Box: 599
Contractor's Address1: 660 TOWER LN
Contractor's Address2: WEST CHESTER, PA 19301-9650
Contractor's Telephone: 610-692-3026
Contractor's CAGE: 8Y898

Section 2 - Compositon/Information on Ingredients
F74 BENZO/B/FLUORANTHENE

Ingredient Name: BENZO (B) FLUORANTHENE (SUSPECTED CARCINOGEN BY NTP, IARC GROUP 2B) *94-4*
Ingredient CAS Number: 205-99-2 **Ingredient CAS Code:** M
RTECS Number: DF6350000 **RTECS Code:** M

=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:
Other REC Limits: A2 CARCINOGEN
OSHA PEL: N/K OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: N/K ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
F74 BENZO/B/FLUORANTHENE

Health Hazards Acute & Chronic: N/K

Signs & Symptoms of Overexposure:
N/K

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: ORAL LD50 (RAT/MOUSE): 72 MG/KG

Route of Entry Indicators:
Inhalation: NO
Skin: NO
Ingestion: NO

Carcenogenicity Indicators
NTP: YES
IARC: YES
OSHA: NO

Carcinogenicity Explanation: SEE INGREDIENTS

Section 4 - First Aid Measures
F74 BENZO/B/FLUORANTHENE

First Aid:

EYES: FLUSH W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER TO CLEANSE. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. KEEP WARM & QUIET. IN GESTION: DON'T GIVE LIQUIDS/INDUCE VOMITING IF UNCONSCIOUS/CONVULSING. IF VOMITING OCCURS, WATCH CLOSELY TO AVOID AIRWAY OBSTRUCTION. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures F74 BENZO/B/FLUORANTHENE

Fire Fighting Procedures:

N/K

Unusual Fire or Explosion Hazard:

N/K

Extinguishing Media:

CO2, DRY CHEMICAL POWDER/SPRAY.

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures F74 BENZO/B/FLUORANTHENE

Spill Release Procedures:

EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

Section 7 - Handling and Storage F74 BENZO/B/FLUORANTHENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection F74 BENZO/B/FLUORANTHENE

Respiratory Protection:

WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.

Ventilation:

CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.

Protective Gloves:

N/K

Eye Protection: EYE SHIELDS

Other Protective Equipment: N/K

Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Supplemental Health & Safety Information: N/K

Section 9 - Physical & Chemical Properties
F74 BENZO/B/FLUORANTHENE

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: N/K

Melting/Freezing Point: Melting/Freezing Text: 334.4F

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/K Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: N/K

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: N/K

Appearance and Odor: CRYSTALLINE SOLID

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
F74 BENZO/B/FLUORANTHENE

Stability Indicator: YES

Materials to Avoid:

N/K

Stability Condition to Avoid:

N/K

Hazardous Decomposition Products:

N/K

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

N/K

Section 11 - Toxicological Information
F74 BENZO/B/FLUORANTHENE

Toxicological Information:

N/P

Section 12 - Ecological Information
F74 BENZO/B/FLUORANTHENE

Ecological Information:

N/P

Section 13 - Disposal Considerations

F74 BENZO/B/FLUORANTHENE

Waste Disposal Methods:

BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER
IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information**F74 BENZO/B/FLUORANTHENE**

Transport Information:

N/P

Section 15 - Regulatory Information**F74 BENZO/B/FLUORANTHENE**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information**F74 BENZO/B/FLUORANTHENE**

Other Information:

N/P

HAZCOM Label Information

Product Identification: F74 BENZO/B/FLUORANTHENE

CAGE: 84898

Assigned Individual: N

Company Name: CHEM SERVICE INC

Company PO Box: 3108

Company Street Address1: N/K

Company Street Address2: WEST CHESTER, PA 19381 US

Health Emergency Telephone: 215-692-3026/800-452-9994

Label Required Indicator: Y

Date Label Reviewed: 12/16/1998

Status Code: C

Manufacturer's Label Number:

Date of Label: 12/16/1998

Year Procured: N/K

Organization Code: G

Chronic Hazard Indicator: N/P

Eye Protection Indicator: N/P

Skin Protection Indicator: N/P

Respiratory Protection Indicator: N/P

Signal Word: N/P

Health Hazard:

Contact Hazard:

Fire Hazard:

Reactivity Hazard:

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**Material Safety
Data Sheets**

[Division of Facilities Services](#)

**DOD Hazardous Material Information (ANSI Format)
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BENZENE

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**Section 1 - Product and Company Identification
BENZENE**

Product Identification: BENZENE

Date of MSDS: 01/01/1985 **Technical Review Date:** 02/29/1984

FSC: 6810 **NIIN:** 00-973-8588

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: BURDICK & JACKSON LAB (SEE SUP DATA)
Manufacturer's Address1: 1953 S HARVEY STREET
Manufacturer's Address2: MUSKEGON, MI 49442-6101
Manufacturer's Country: US
General Information Telephone: 616-726-3171
Emergency Telephone: 616-726-3171
Emergency Telephone: 616-726-3171
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: BURDI
Special Project Code: N

Item Description

Item Name: BENZENE,ACS
Item Manager:
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue:
Unit of Issue Quantity:
Type of Container: BOTTLE,GLASS

Contractor Information

Contractor's Name: BURDICK & JACKSON, INC.
Contractor's Address1: 1953 S. HARVEY STREET
Contractor's Address2: MUSKEGON, MI 49442
Contractor's Telephone: 616-726-3171
Contractor's CAGE: BURDI

Contractor Information

Contractor's Name: BURDICK AND JACKSON DIV OF BAXTER HEALTHCARE CORP.
Contractor's Address1: 1953 S HARVEY STREET
Contractor's Address2: MUSKEGON, MI 49442-6101
Contractor's Telephone: 616-726-3171, CHEMTREC 800-424-9300
Contractor's CAGE: 2H215

Section 2 - Compositon/Information on Ingredients

BENZENE

Ingredient Name: BENZENE (SARA III)
Ingredient CAS Number: 71-43-2 **Ingredient CAS Code:** M
RTECS Number: CY1400000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:

>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >90
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: 1PPM/5STEL;1910.1028 OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 10 PPM; A2; 9192 ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 10 LBS
DOT Reporting Quantity: 10 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview BENZENE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:

EYE: IRRIT. VAPOR: DIZZY,NAUSEA,INCOORDINATION,STUPOR,UNCONSCIOUSNESS & CHANGE IN BLOOD COMPOSITION.

Medical Conditions Aggravated by Exposure:

N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:

Inhalation: N/P

Skin: N/P

Ingestion: N/P

Carcenogenicity Indicators

NTP: N/P

IARC: N/P

OSHA: N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures BENZENE

First Aid:

EYE: FLUSH WITH WATER 15 MIN,GET MED ATTN. INHALATION: REMOVE FROM EXPOSURE,GIVE ARTIFICIAL RESPIRATION IF NEEDED,GET MEDICAL ASSISTANCE.

Section 5 - Fire Fighting Measures

BENZENE

Fire Fighting Procedures:

SELF-CONT BREATH APP, WATER FOG TO COOL EXPOSED CONTAINERS.

Unusual Fire or Explosion Hazard:

BURNS VIGOROUSLY AND EMITS ACID FUMES.

Extinguishing Media:

FOAM, CO₂, DRY CHEMICAL

Flash Point: Flash Point Text: 12F/-11C

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): 1.3

Upper Limit(s): 7.9

Section 6 - Accidental Release Measures

BENZENE

Spill Release Procedures:

PROTECT FROM IGNITION. WEAR SELF CONTAINED BREATHING APPARATUS.

Section 7 - Handling and Storage

BENZENE

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection

BENZENE

Respiratory Protection:

NIOSH/MSHA APPROVED RESP DEVICE IN ACCORD WITH EXPOSURE OF CONCERN.

Ventilation:

LOCAL/HIGH RATE MECHANICAL

Protective Gloves:

CHEMICAL TYPE

Eye Protection: GOGGLES/FACE MASK

Other Protective Equipment: AS REQUIRED TO PREVENT SKIN CONTACT.

Work Hygienic Practices: N/P

Supplemental Health & Safety Information: MFR CONT: PHILLIPS PETROL CO MFR'S THE RAW MATERIAL, BURDICK & JACKSON LAB. REFINES IT TO DESIRED PCT, SPEC & GRADE. CONTAINER SIZE: 500 ML BOTTLE

Section 9 - Physical & Chemical Properties

BENZENE

HCC: F5

NRC/State License Number: N/A
Net Property Weight for Ammo: N/A
Boiling Point: Boiling Point Text: 176F/80C
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: 100 Vapor Density: 2.77
Percent Volatile Organic Content:
Specific Gravity: 0.884
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: <1 (ETHYL ETHER)
Solubility in Water: NEGLIGIBLE
Appearance and Odor: COLORLESS LIQUID. AROMATIC HYDROCARBON ODOR
Percent Volatiles by Volume: 100
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
BENZENE

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDANTS
Stability Condition to Avoid:
N/P
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/P

Section 11 - Toxicological Information
BENZENE

Toxicological Information:
N/P

Section 12 - Ecological Information
BENZENE

Ecological Information:
N/P

Section 13 - Disposal Considerations
BENZENE

Waste Disposal Methods:
BURN UNDER CONTROLLED CONDITIONS. COMPLY WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information

BENZENE

Transport Information:N/P

Section 15 - Regulatory Information**BENZENE**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:N/P

Section 16 - Other Information**BENZENE**

Other Information:

N/P

HMIS Transportation Information**Product Identification:** BENZENE**Transportation ID Number:** 95976**Responsible Party CAGE:** BURDI**Date MSDS Prepared:** 01/01/1985**Date MSDS Reviewed:** 09/05/1986**MFN:** 09/05/1986**Submitter:** N TN**Status Code:** C**Container Information****Unit of Issue:****Container Quantity:****Type of Container:** BOTTLE, GLASS**Net Unit Weight:****Article without MSDS:** N**Technical Entry NOS Shipping Number:****Radioactivity:****Form:****Net Explosive Weight:****Coast Guard Ammunition Code:****Magnetism:** N/P**AF MMAC Code:****DOD Exemption Number:****Limited Quantity Indicator:****Multiple Kit Number:** 0**Kit Indicator:** N**Kit Part Indicator:** N**Review Indicator:** Y**Additional Data:**

Department of Transportation Information**DOT Proper Shipping Name:** BENZENE**DOT PSN Code:** BRS**Symbols:****DOT PSN Modifier:****Hazard Class:** 3**UN ID Number:** UN1114**DOT Packaging Group:** II**Label:** FLAMMABLE LIQUID**Special Provision(s):** B101,T8**Packaging Exception:** 150**Non Bulk Packaging:** 202**Bulk Packaging:** 242**Maximum Quantity in Passenger Area:** 5 L**Maximum Quantity in Cargo Area:** 60 L**Stow in Vessel Requirements:** B**Requirements Water/Sp/Other:** 40**IMO Detail Information****IMO Proper Shipping Name:** BENZENE**IMO PSN Code:** BXB**IMO PSN Modifier:****IMDG Page Number:** 3185**UN Number:** 1114**UN Hazard Class:** 3.2**IMO Packaging Group:** II**Subsidiary Risk Label:** -**EMS Number:** 3-03**Medical First Aid Guide Number:** 312**IATA Detail Information****IATA Proper Shipping Name:** BENZENE**IATA PSN Code:** DBA**IATA PSN Modifier:****IATA UN Id Number:** 1114**IATA UN Class:** 3**Subsidiary Risk Class:****UN Packaging Group:** II**IATA Label:** FLAMMABLE LIQUID**Packaging Note for Passengers:** 305**Maximum Quantity for Passengers:** 5L**Packaging Note for Cargo:** 307**Maximum Quantity for Cargo:** 60L**Exceptions:****AFI Detail Information****AFI Proper Shipping Name:** BENZENE**AFI Symbols:****AFI PSN Code:** DBA**AFI PSN Modifier:****AFI UN Id Number:** UN1114**AFI Hazard Class:** 3

AFI Packing Group: II
AFI Label:
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: BENZENE
CAGE: BURDI
Assigned Individual: N
Company Name: BURDICK & JACKSON, INC.
Company PO Box:
Company Street Address1: 1953 S. HARVEY STREET
Company Street Address2: MUSKEGON, MI 49442 US
Health Emergency Telephone: 616-726-3171
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Material Safety Data Sheet

Benzo[k]fluoranthene, 99+% (tlc)

ACC# 54641

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzo[k]fluoranthene, 99+% (tlc)**Catalog Numbers:** AC279730000, AC279732500**Synonyms:** 8,9-Benzofluoranthene.**Company Identification:**

Acros Organics N.V.

One Reagent Lane

Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01**For emergencies in the US, call CHEMTREC:** 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
207-08-9	Benzo[k]fluoranthene, 99+% (TLC)	99%	205-916-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow solid.

Danger! Toxic. May be fatal if swallowed. Cancer hazard. May be fatal if absorbed through the skin. May be fatal if inhaled. Carcinogen. Causes eye and skin irritation. Causes digestive and respiratory tract irritation. May cause lung damage.

Target Organs: Lungs, respiratory system.**Potential Health Effects****Eye:** Causes eye irritation.**Skin:** Causes skin irritation. May be fatal if absorbed through the skin.**Ingestion:** May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea.**Inhalation:** May be fatal if inhaled. Causes respiratory tract irritation.**Chronic:** May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.**Ingestion:** Call a poison control center. If swallowed, do not induce vomiting unless directed to do

so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.

Flash Point: Not available.

Autoignition Temperature: Not available.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: Not published.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash hands before eating. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Do not get on skin or in eyes. Do not ingest or inhale.

Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzo[k]fluoranthene, 99+% (TLC)	none listed	none listed	none listed

OSHA Vacated PELs: Benzo[k]fluoranthene, 99+% (TLC): No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance: yellow

Odor: Not available.

pH: Not available.

Vapor Pressure: Not available.

Vapor Density: Not available.

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 480 deg C @ 760.00mm Hg

Freezing/Melting Point: 216 - 218 deg C

Decomposition Temperature: Not available.

Solubility: Not available.

Specific Gravity/Density: Not available.

Molecular Formula: C₂₀H₁₂

Molecular Weight: 252.32

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Incompatible materials, dust generation.

Incompatibilities with Other Materials: Strong oxidants.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 207-08-9: DF6350000

LD50/LC50:

Not available.

Carcinogenicity:

CAS# 207-08-9:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: *Salmonella typhimurium* : 10æg/plate
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. From calc logKow of 6.84, the est bioconc factor for fish is 144. However no accum is likely due to the pres of microsomal mixed funct oxidases which enables it to be metabolised (Lyman,W.J. Handb of chem.prop est meth. Env behaviour of org chem 1982; Santodonato, J. Health and ecol assessment of polynucl arom hydrocarb. 1981) Short-necked clam cultured in artif seawater at 21-25øC for 10 days revealed a decr in benzo[k].. of ca 20% on day 8. When clams were placed in a basket and kept in harbour water, only a small incr in polycycl arom hydrocarb were found.

Environmental: When soil treated with 7 applications of oil sludge containing polynucleated arom. hydrocarb. over a two yr period, was monitored for an additional 18 months, the benzo[k] fluoranthene residue in the soil decreased by 57%. In a static biodegrad. test employing a domestic wastewater inoculum, 50-70% of benzo[k]fluoranthene residue in the soil decreased by 57%. In a static biodegrad. test employing a dometic wastewater inoculum, 50-70% of benzo[k] fluoranthene was degraded in four successive weekkly subcultures (Tabak H.H. 94th An.Mtg.Assoc.Off.Anal.Chem.1981)

Physical: No information available.

Other: Abiotic removal : Demonstrates considerable atmospheric stability. Pollution resulting from emissions can be found far from source. (Bjorseth A. Handbook of polycyclic aromatic hydrocarbons 1983, MARcel Dekker Inc., New York)

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 207-08-9 is not listed on the TSCA inventory. It is for research and development use only.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 207-08-9: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313

This material contains Benzo[k]fluoranthene, 99+% (TL (CAS# 207-08-9, 99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40

Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

CAS# 207-08-9 is listed as a Priority Pollutant under the Clean Water Act.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 207-08-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[k]fluoranthene, 99+% (TL, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 45 May cause cancer.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)

CAS# 207-08-9: No information available.

Canada - DSL/NDSL

None of the chemicals in this product are listed on the DSL or NDSL list.

Canada - WHMIS

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 207-08-9 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information
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MSDS Creation Date: 9/02/1997

Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.



New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **CADMIUM**

CAS Number: 7440-43-9
DOT Number: UN 2570

RTK Substance number: 0305
Date: April 1994 Revision: December 1999

HAZARD SUMMARY

- * **Cadmium** can affect you when breathed in.
- * **Cadmium** is a CARCINOGEN and a TERATOGEN -- HANDLE WITH EXTREME CAUTION.
- * **Cadmium** can cause a flu-like illness with chills, headache, aching and/or fever.
- * High exposure to **Cadmium** may cause nausea, salivation, vomiting, abdominal cramps and diarrhea.
- * Breathing **Cadmium** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- * Repeated low exposures can cause kidney and liver damage, anemia, and loss of smell.

IDENTIFICATION

Cadmium is a blue-white solid or gray-black powder. It is used in silver solder, making batteries and metal plating, for plastics and pigments, and as a catalyst.

REASON FOR CITATION

- * **Cadmium** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, NTP, DEP, IARC, HHAG and EPA.
- * This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN** and a **TERATOGEN**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.

- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **0.005 mg/m³** for **Cadmium dust or fume** averaged over an 8-hour workshift.

OSHA has recognized that some processes in certain industries may be unable to achieve the **0.005 mg/m³** limit through engineering and work practices. These industries must follow SECALs (separate engineering control air limits) of either **0.015** or **0.05 mg/m³**.

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The recommended airborne exposure limit is **0.01 mg/m³** for *elemental Cadmium* and **0.002 mg/m³** for *Cadmium compounds (respirable fraction)*, averaged over an 8-hour workshift.

- * **Cadmium** is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

- * Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * A regulated, marked area should be established where **Cadmium** is handled, used, or stored as required by the OSHA Standard: 29 CFR 1910.1027.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to **Cadmium** and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Cadmium** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Metal, metal compounds and alloys are often used in “hot” operations in the workplace. These may include, but are not limited to, welding, brazing, soldering, plating, cutting, and metallizing. At the high temperatures reached in these operations, metals often form metal fumes which have different health effects and exposure standards than the original metal or metal compound and require specialized controls. Your workplace can be evaluated for the presence of particular fumes which may be generated. Consult the appropriate New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheets.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Cadmium**:

- * **Cadmium** can cause a flu-like illness with chills, headache, aching and/or fever.
- * High exposure to **Cadmium** may cause nausea, salivation, vomiting, abdominal cramps and diarrhea.
- * Breathing **Cadmium** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Cadmium** and can last for months or years:

Cancer Hazard

- * **Cadmium** is a PROBABLE CARCINOGEN in humans. There is some evidence that it causes prostate and kidney cancer in humans and it has been shown to cause lung and testes cancer in animals.
- * Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- * **Cadmium** is a PROBABLE TERATOGEN in humans.
- * **Cadmium** may damage the testes (male reproductive glands) and may affect the female reproductive cycle.

Other Long-Term Effects

- * **Cadmium** can irritate the lungs. Repeated exposure may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.

- * Repeated low exposures can cause permanent kidney damage which can lead to kidney stones.
- * Long term exposure can cause anemia, loss of sense of smell, fatigue and/or yellow staining of teeth.
- * **Cadmium** can damage the liver.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following are recommended before beginning work and at regular times after that:

- * Blood test for **Cadmium** (levels should be less than **5 micrograms per liter** of whole blood).
- * Urine test for **Cadmium** (levels should be less than **3 micrograms per liter** of urine).
- * Urine test for Beta-2-microglobulin to detect kidney damage.
- * Urinalysis (UA).
- * Lung function tests.
- * Liver function tests.
- * Complete blood count.
- * Consider chest x-ray after acute overexposure.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

- * Cigarette smoke contains some **Cadmium**. Because it is hard for the body to eliminate **Cadmium**, it tends to build up in the body. Any workplace exposure adds to these levels.
- * Smoking cigarettes near **Cadmium** increases release of toxic fumes. Also, because both smoking and **Cadmium** can cause emphysema, lung effects may be greater in smokers.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * If **Cadmium** is used in a “hot” process such as smelting, steel fabricating or melting **Cadmium ingots**, **Cadmium fume** may be released. This is more acutely toxic than **Cadmium dust** and proper controls and protective equipment are necessary.
- * Where possible, automatically transfer **Cadmium** from drums or other storage containers to process containers.
- * Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA Standards: 1910.1027, 1915.1027, 1926.63, and 1928.1027.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by **Cadmium** should change into clean clothing promptly.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Cadmium**.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with **Cadmium**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Cadmium**, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where **Cadmium** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
- * Use a vacuum or a wet method to reduce dust during clean-up. **DO NOT DRY SWEEP.**

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with **Cadmium**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear impact resistant eye protection with side shields or goggles.
- * Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposure over **0.002 mg/m³**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- * Exposure to **9 mg/m³** is immediately dangerous to life and health. If the possibility of exposure above **9 mg/m³** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

- * Prior to working with **Cadmium** you should be trained on its proper handling and storage.
- * A regulated, marked area should be established where **Cadmium** is handled, used, or stored as required by the OSHA Standard: 1910.1027.
- * **Cadmium powder** and *metal* must be stored to avoid contact with POTASSIUM, HYDRAZOIC ACID, and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) since violent reactions occur.
- * **Cadmium** may react with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to release flammable *Hydrogen gas*.
- * **Cadmium powder** is not compatible with SULFUR, SELENIUM, TELLURIUM, AMMONIUM NITRATE, and ZINC.
- * Store in tightly closed containers in a cool, well-ventilated area away from AIR.

- * Sources of ignition, such as smoking and open flames, are prohibited where **Cadmium powder** is used, handled, or stored.
- * Store **Cadmium powder** under *Nitrogen*.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

Q: Don't all chemicals cause cancer?

A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?

A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?

A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?

A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.



**Material Safety
Data Sheets**

[Division of Facilities Services](#)

DOD Hazardous Material Information (ANSI Format) For Cornell University Convenience Only

CHRYSENE, MD-402

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification CHRYSENE, MD-402

Product Identification: CHRYSENE, MD-402

Date of MSDS: 03/25/1986 **Technical Review Date:** 10/05/1992

FSC: 6810 **NIIN:** LIIN: 00N034847

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINT CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients CHRYSENE, MD-402

Ingredient Name: CHRYSENE (PEL LIMIT FROM COAL TAR PITCH VOLITILES) (SARA III)
Ingredient CAS Number: 218-01-9 **Ingredient CAS Code:** M
RTECS Number: GC0700000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.2 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: A2 9394 ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 100 LBS
DOT Reporting Quantity: 100 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview CHRYSENE, MD-402

Health Hazards Acute & Chronic: CANCER SUSPECT AGENT; IRRITATION, PULMONARY EDEMA, SENSITIZER, DERMATITIS, DIZZINESS, NAUSEA, CONVULSIONS, KIDNEY AND LIVER DAMAGE.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES

Skin: NO

Ingestion: YES

Carcenogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures CHRYSENE, MD-402

First Aid:

SKIN: WASH WITH WATER. INHAL: REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION OR OXYGEN IF NECESSARY. INGEST: GIVE WATER AND INDUCE VOMITING. MEDICAL ASSISTANCE FOR GASTRIC LAVAGE. EYES: IMMEDIATELY FLUSH WITH POTABLE WATER FOR A MINIMUM OF 15 MIN. SEEK ASSISTANCE FROM MD (FP N).

Section 5 - Fire Fighting Measures CHRYSENE, MD-402

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

CANCER SUSPECT.

Extinguishing Media:

CO*2, DRY CHEMICAL, ALCOHOL FOAM.

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
CHRYSENE, MD-402

Spill Release Procedures:

PROVIDE ADEQUATE VENTILATION. CAREFULLY SCOOP UP AND TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
CHRYSENE, MD-402

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
CHRYSENE, MD-402

Respiratory Protection:

NIOSH/MSHA APPROVED SCBA.

Ventilation:

LOCAL EXHAUST: STRONG FUMEHOOD. SPECIAL: CANCER SUSPECT; AVOID ALL CONTACT.

Protective Gloves:

RUBBER GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWERS AND EYEWASH STATION NEAR WORKPLACE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: % VOLATILE: SUBLIMES.

Section 9 - Physical & Chemical Properties
CHRYSENE, MD-402

HCC: N1

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 838F,448C

Melting/Freezing Point: Melting/Freezing Text: 489F,254C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/K Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: 1.27

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: <0.1 %

Appearance and Odor: WHITE-PALE YELLOW SOLID

Percent Volatiles by Volume: SUPDAT

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
CHRYSENE, MD-402

Stability Indicator: YES

Materials to Avoid:

STRONG OXIDIZING AGENTS.

Stability Condition to Avoid:

NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:

CO/CO*2 ON COMBUSTION

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT

Section 11 - Toxicological Information
CHRYSENE, MD-402

Toxicological Information:

N/P

Section 12 - Ecological Information
CHRYSENE, MD-402

Ecological Information:

N/P

Section 13 - Disposal Considerations
CHRYSENE, MD-402

Waste Disposal Methods:

VIA LICENSED DISPOSAL COMPANY. DISPOSE OF ACCORDING TO FEDERAL, STATE AND LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
CHRYSENE, MD-402

Transport Information:

N/P

Section 15 - Regulatory Information
CHRYSENE, MD-402

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
CHRYSENE, MD-402

Other Information:

N/P

HMIS Transportation Information**Product Identification:** CHRYSENE, MD-402**Transportation ID Number:** 39318**Responsible Party CAGE:** 09578**Date MSDS Prepared:** 03/25/1986**Date MSDS Reviewed:** 04/15/1993**MFN:** 04/15/1993**Submitter:** N TN**Status Code:** C**Container Information****Unit of Issue:** NK**Container Quantity:** NK**Type of Container:****Net Unit Weight:****Article without MSDS:** N**Technical Entry NOS Shipping Number:****Radioactivity:****Form:****Net Explosive Weight:****Coast Guard Ammunition Code:****Magnetism:** N/P**AF MMAC Code:****DOD Exemption Number:****Limited Quantity Indicator:****Multiple Kit Number:** 0**Kit Indicator:** N**Kit Part Indicator:** N**Review Indicator:** Y**Additional Data:**

NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information**DOT Proper Shipping Name:** NOT REGULATED BY THIS MODE OF TRANSPORTATION**DOT PSN Code:** ZZZ**Symbols:** N/R**DOT PSN Modifier:****Hazard Class:** N/R**UN ID Number:** N/R**DOT Packaging Group:** N/R**Label:** N/R**Special Provision(s):** N/R**Packaging Exception:** N/R

Non Bulk Packaging: N/R
Bulk Packaging: N/R
Maximum Quantity in Passenger Area: N/R
Maximum Quantity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: CHRYSENE, MD-402
CAGE: 09578
Assigned Individual: N
Company Name: MERCK FROSST CANADA INC
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US
Health Emergency Telephone: 800-325-9034;514-697-2823

Label Required Indicator: Y
Date Label Reviewed: 10/05/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 10/05/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: WARNING
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None

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**Material Safety
Data Sheets**

[Division of Facilities Services](#)

DOD Hazardous Material Information (ANSI Format) For Cornell University Convenience Only

1000 PPM COBALT

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
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Section 1 - Product and Company Identification 1000 PPM COBALT

Product Identification: 1000 PPM COBALT

Date of MSDS: 03/05/1992 **Technical Review Date:** 11/22/1994

FSC: 6550 **NIIN:** LIIN: 00F037421

Submitter: F BT

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Post Office Box: N/K
Manufacturer's Address1: 5540 MARSHALL ST
Manufacturer's Address2: ARVADA, CO 80002-3108
Manufacturer's Country: US
General Information Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
MSDS Preparer's Name: DANIEL A GOLDSTEIN
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 1R664
Special Project Code: N

Preparer Information

Preparer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Preparer's Address1: 5540 MARSHALL STREET
Preparer's Address2: ARVADA, CO 80002
Preparer's CAGE: 1R664
Assigned Individual: N

Contractor Information

Contractor's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Contractor's Address1: 5540 MARSHALL STREET
Contractor's Address2: ARVADA, CO 80002
Contractor's Telephone: 303-431-8454
Contractor's CAGE: 1R664

Section 2 - Compositon/Information on Ingredients 1000 PPM COBALT

Ingredient Name: COBALT (ANIMAL CARCINOGEN BY IARC - GROUP 2B) *94-3*
Ingredient CAS Number: 7440-48-4 **Ingredient CAS Code:** M
RTECS Number: GF8750000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <1
% Enviromental Weight:

Other REC Limits: 0.05 PPM
OSHA PEL: 0.05 MG/CUM **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: 0.05 MG/CUM **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: NITRIC ACID, HYDROGEN NITRATE
Ingredient CAS Number: 7697-37-2 **Ingredient CAS Code:** M
RTECS Number: QU5775000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <5
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 2 PPM **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: 5.2 MG/CUM **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview 1000 PPM COBALT

Health Hazards Acute & Chronic: POISON & CORROSIVE TO SKIN, EYES, MUCOUS MEMBRANES/LUNGS. MAY BURN ANY TISSUE & CAUSE BLINDNESS. MAY CAUSE GI TRACT PERFORATION, PULMONARY EDEMA. COBALT: HEART FAILURE, SEVERE GASTROENTERITIS.

Signs & Symptoms of Overexposure:
IRRITATION, BURNING, COUGH, METHEMOGLOBINEMIA, PAIN, ABDOMINAL PAIN, FLUSHING, DEAFNESS, RASH, GOITRE, REDNESS, SHORTNESS OF BREATH, VOMITING, CYANOSIS, THYROID ENLARGEMENT, ANKLE SWELLING.

Medical Conditions Aggravated by Exposure:
ASTHMA, THYROID/HEART DISEASE.

LD50 LC50 Mixture: N/P

Route of Entry Indicators:

Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators

NTP: NO
IARC: YES
OSHA: NO

Carcinogenicity Explanation: SEE INGREDIENTS

Section 4 - First Aid Measures
1000 PPM COBALT

First Aid:

EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: GIVE MOIST OXYGEN. INGESTION: GIVE WATER/MILK. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
1000 PPM COBALT

Fire Fighting Procedures:

NONE

Unusual Fire or Explosion Hazard:

NONE

Extinguishing Media:

NONE

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
1000 PPM COBALT

Spill Release Procedures:

NEUTRALIZE & FLUSH W/WATER/NEUTRALIZE & ABOSRB. VENTILATE AREA.

Section 7 - Handling and Storage
1000 PPM COBALT

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection
1000 PPM COBALT

Respiratory Protection:

WEAR ACID GAS TYPE DUST/MIST RESPIRATOR IF MIST PRODUCTION OCCURS.

Ventilation:

MECHANICAL/LOCAL EXHAUST: USE IN HOOD.

Protective Gloves:

ACID PROOF

Eye Protection: SPLASH GOGGLES

Other Protective Equipment: ACID PROOF APRON W/SLEEVES, LAB COAT, CLOSED SHOES, SAFETY SHOWER, EYE WASH.

Work Hygienic Practices: N/K

Supplemental Health & Safety Information: BOILING POINT (0-5% ACID): 212-212.72F.

Section 9 - Physical & Chemical Properties
1000 PPM COBALT

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: (SEE SUPP)

Melting/Freezing Point: Melting/Freezing Text: N/K

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: 28 Vapor Density: >1

Percent Volatile Organic Content:

Specific Gravity: 1

Volatile Organic Content Pounds per Gallon:

pH: <1

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: (WATER =1): 1

Solubility in Water: COMPLETE

Appearance and Odor: RED LIQUID W/NO ODOR

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
1000 PPM COBALT

Stability Indicator: YES

Materials to Avoid:

METALS

Stability Condition to Avoid:

FREEZING

Hazardous Decomposition Products:

HYDROGEN

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NONE

Section 11 - Toxicological Information
1000 PPM COBALT

Toxicological Information:

N/P

Section 12 - Ecological Information
1000 PPM COBALT

Ecological Information:

N/P

Section 13 - Disposal Considerations
1000 PPM COBALT

Waste Disposal Methods:

DISPOSE OF AS NON-HAZARDOUS WASTE IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
1000 PPM COBALT

Transport Information:

N/P

Section 15 - Regulatory Information
1000 PPM COBALT

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
1000 PPM COBALT

Other Information:

N/P

HAZCOM Label Information**Product Identification:** 1000 PPM COBALT**CAGE:** 1R664**Assigned Individual:** N**Company Name:** ENVIRONMENTAL RESOURCE ASSOCIATES**Company PO Box:****Company Street Address1:** 5540 MARSHALL STREET**Company Street Address2:** ARVADA, CO 80002 US**Health Emergency Telephone:** 303-431-8454**Label Required Indicator:** Y**Date Label Reviewed:** 12/16/1998**Status Code:** C**Manufacturer's Label Number:****Date of Label:** 12/16/1998**Year Procured:** N/K

Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

8/8/2002 4:22:58 PM

**INDUSTRIAL GAS DIVISION AIR PRODUCTS AND CHEMICALS, INC. -- OXYGEN,
COMPRESSED -- 6830-01-169-3977**=====
Product Identification
=====

Product ID:OXYGEN, COMPRESSED
MSDS Date:01/01/1995
FSC:6830
NIIN:01-169-3977
Status Code:A
MSDS Number: CKTPJ
=== Responsible Party ===
Company Name:INDUSTRIAL GAS DIVISION AIR PRODUCTS AND CHEMICALS, INC.
Address:7201 HAMILTON BLVD
City:ALLENTOWN
State:PA
ZIP:18195-1501
Country:US
Info Phone Num:215-481-4911
Emergency Phone Num:800-523-9374/610-481-7711
Resp. Party Other MSDS Num.:1012
CAGE:00742
=== Contractor Identification ===
Company Name:AIR PRODUCTS AND CHEMICALS INC
Address:7201 HAMILTON BLVD
Box:City:ALLENTOWN
State:PA
ZIP:18195-1501
Country:US
Phone:800-345-3148/ 800-752-1597
Contract Num:SP0450-00-M-SJ79
CAGE:00742

=====
Composition/Information on Ingredients
=====

Ingred Name:OXYGEN
CAS:7782-44-7
RTECS #:RS2060000
> Wt:99.

=====
Hazards Identification
=====

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:TARGET ORGANS: EYES, CENTRAL NERVOUS
SYSTEM. INHALATION: BREATHING 80% OR MORE OXYGEN AT ATMOSPHERIC
PRESSURE FOR MORE THAN A FEW HOURS MAY CAUSE NASAL STUFFINESS,
COUGH, SORE THROAT, CHEST PAIN & BREATHING DIFFICULTY. BREATHING
OXYGEN AT HIGHER PRESSURE INCREASES THE LIKELIHOOD OF ADVERSE
EFFECTS WITHIN A SHORTER TIME PERIOD. BREATHING PURE OXYGEN UNDER
PRESSURE MAY CAUSE LUNG DAMAGE & ALSO CNS EFFECTS, AND MAY CAUSE
PROLONGATION OF ADAPTATION TO DARKNESS AND REDUCED PERIPHERAL
VISION.
Explanation of Carcinogenicity:OXYGEN IS NOT LISTED AS A CARCINOGEN OR
POTENTIAL CARCINOGEN BY NTP, IARC, OR OSHA SUBPART Z.
Effects of Overexposure:BREATHING 80% OR MORE OXYGEN AT ATMOSPHERIC
PRESSURE: NASAL STUFFINESS, COUGH, SORE THROAT, CHEST PAIN &
BREATHING DIFFICULTY. BREATHING PURE OXYGEN UNDER PRESSURE MAY
CAUSE LUNG DAMAGE & ALSO CNS EFFECTS RESULTING IN DIZZINESS, POOR

COORDINATION, TINGLING SENSATION, VISUAL & HEARING DISTURBANCES, MUSCULAR TWITCHING, UNCONSCIOUSNESS & CONVULSIONS, MAY CAUSE PROLONGATION OF ADAPTATION TO DARKNESS & REDUCED PERIPHERAL VISION.

Medical Cond Aggravated by Exposure: PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

===== First Aid Measures =====

First Aid: INHALATION: MOVE VICTIM TO FRESH AIR OR IF IN ELEVATED PRESSURES REDUCE OXYGEN PRESSURES TO ONE ATMOSPHERE. CALL A PHYSICIAN. THE PHYSICIAN SHOULD BE ADVISED THAT THE VICTIM HAS BEEN EXPOSED TO A HIGH CONCENTRATION OF OXYGEN. NO TREATMENT IS REQUIRED IN THE ABSENCE OF SYMPTOMS OF HIGH PRESSURE EXPOSURE. EYE/SKIN: NOT APPLICABLE. NOTES TO PHYSICIAN: ANIMAL STUDIES SUGGEST THAT THE ADMINISTRATION OF CERTAIN DRUGS, INCLUDING PHENOTHIAZINE DRUGS AND CHLOROQUINE, INCREASE THE SUSCEPTIBILITY TO TOXICITY FROM OXYGEN AT HIGH PRESSURES. ANIMAL STUDIES ALSO INDICATE THAT VITAMIN "E" DEFICIENCY (CONTINUE D TO TOXICOLOGICAL SECTION)

===== Fire Fighting Measures =====

Flash Point: NONFLAMMABLE

Extinguishing Media: OXYGEN IS NONFLAMMABLE BUT WILL SUPPORT COMBUSTION. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

Fire Fighting Procedures: EVACUATE ALL PERSONNEL FROM THE DANGER AREA. IF POSSIBLE, SHUT OFF FLOW OF OXYGEN WHICH IS SUPPORTING THE FIRE. IMMEDIATELY COOL CONTAINERS WITH WATER SPRAY FROM MAXIMUM DISTANCE. WHEN COOL MOVE CYLINDERS FROM FIRE AREA, IF POSSIBLE WITHOUT RISK. SELF CONTAINED BREATHING APPARATUS MAY BE REQUIRED FOR RESCUE WORKERS.

Unusual Fire/Explosion Hazard: OXYGEN VIGOROUSLY ACCELERATES COMBUSTION. SOME MATERIALS WHICH ARE NONCOMBUSTIBLE IN AIR WILL BURN IN THE PRESENCE OF AN OXYGEN ENRICHED ATMOSPHERE (GREATER THEN 23%). FIRE RESISTANT CLOTHING MAY BURN AND OFFER NO PROTECTION IN OXYGEN RICH ATMOSPHERES. OXYGEN MAY FORM EXPLOSIVE COMPOUNDS WHEN EXPOSED TO COMBUSTIBLES.

===== Accidental Release Measures =====

Spill Release Procedures: EVACUATE ALL PERSONNEL FROM AFFECTED AREA. SHUT OFF SOURCE OF OXYGEN IF POSSIBLE. INCREASE VENTILATION TO RELEASE AREA. PERSONNEL WHO HAVE BEEN EXPOSED TO HIGH CONCENTRATIONS OF OXYGEN SHOULD STAY IN A WELL-VENTILATED OR OPEN AREA FOR 30 MINUTES BEFORE GOING INTO A CONFINED SPACE OR NEAR AN IGNITION SOURCE. IF LEAK IS FROM CONTAINER OR ITS VALVE, CALL THE AIR PRODUCTS EMERGENCY TELEPHONE NUMBER.

===== Handling and Storage =====

Handling and Storage Precautions: CYLINDERS SHOULD BE STORED UPRIGHT IN A WELL-VENTILATED, SECURE AREA, PROTECTED FROM THE WEATHER. STORAGE AREA TEMPERATURES SHOULD NOT EXCEED 125F (52C) AND AREA SHOULD BE FREE OF COMBUSTIBLE MATERIAL S. STORAGE SHOULD BE AWAY FROM HEAVILY TRAVELED AREAS AND EMERGENCY EXITS.

Other Precautions: SPECIAL REQUIREMENTS: ALWAYS STORE AND HANDLE COMPRESSED GASES IN ACCORDANCE WITH COMPRESSED GAS ASSOCIATION, INC. (PH. 703-412-0900) PAMPHLET CGA P-1, SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS. LOCAL REGULATIONS MAY REQUIRE

SPECIFIC EQUIPMENT FOR STORAGE OR USE.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:GENERAL USE: NONE REQUIRED. EMERGENCY: USE SCBA DUE TO POSSIBILITY OF FIRE WHEN CONCENTRATIONS EXCEED 23%.

Ventilation:PROVIDE VENTILATION AND/OR LOCAL EXHAUST TO PREVENT ACCUMULATION OF HIGH CONCENTRATIONS OF GAS (GREATER THAN 23%).

Protective Gloves:WORK GLOVES RECOMMENDED WHEN HANDLING CYLINDERS.

Other Protective Equipment:SAFETY SHOES RECOMMENDED WHEN HANDLING CYLINDERS.

Work Hygienic Practices:CLOTHING EXPOSED TO HIGH CONCENTRATIONS MAY RETAIN OXYGEN 30 MINUTES OR LONGER AND BECOME A POTENTIAL FIRE HAZARD. STAY AWAY FROM IGNITION SOURCES.

Supplemental Safety and Health

CAUTION:COMPRESSED GAS CYLINDERS SHALL NOT BE REFILLED EXCEPT BY QUALIFIED PRODUCERS OF COMPRESSED GASES. SHIPMENT OF A COMPRESSED GAS CYLINDER WHICH HAS NOT BEEN FILLED BY THE OWNER OR WITH THE OWNER 'S WRITTEN CONSENT IS A VIOLATION OF FEDERAL LAW. NSN FOR GAS ONLY: 6810-01-169-4836.

===== Physical/Chemical Properties =====

HCC:G4

Boiling Pt:=-182.9C, -297.3F

Melt/Freeze Pt:=-218.8C, -361.9F

Vapor Pres:NOT APPLICABLE AT 70F

Spec Gravity:1.10

Solubility in Water:0.049

Appearance and Odor:COLORLESS GAS; ODORLESS.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

OILS, GREASE, HYDROCARBONS AND FLAMMABLE MATERIALS.

Stability Condition to Avoid:NONE.

Hazardous Decomposition Products:NONE

Conditions to Avoid Polymerization:WILL NOT OCCUR.

===== Toxicological Information =====

Toxicological Information:FROM FIRST AID: VITAMIN E DEFICIAENCY MAY INCREASE SUSCEPTIBILITY TO OXYGEN TOXICITY. AIRWAY OBSTRUCTION DURING HIGH OXYGEN TENSION MAY CAUSE ALVEOLAR COLLAPSE FOLLOWING ABSORPTION OF THE OXYGEN. SIMI LARLY, OCCLUSION OF THE EUSTACHIAN TUBS MAY CAUSE RETRACTION OF THE EARDRUM AND OBSTRUCTION OF THE PARANASAL SINUS MAY PRODUCE "VACUUM-TYPE" HEADACHE. ALL INDIVIDUALS EXPOSED FOR LONG PERIODS TO OXYGE N AT HIGH PRESSURE AND WHO EXHIBIT OVERT OXYGEN TOXICITY SHOULD HAVE OPTHALMOLOGIC EXAMINATIONS.

===== Ecological Information =====

Ecological:ATMOSPHERE CONTAINS 21% OXYGEN. NO ADVERSE ECOLOGICAL EFFECTS ARE EXPECTED. OXYGEN DOES NOT CONTAIN ANY CLASS I CLASS II OZONE DEPLETING CHEMICALS. OXYGEN IS LISTED AS A MARINE POLLUTANT BY DOT (29 CF R 171).

===== Disposal Considerations =====

Waste Disposal Methods:FOR EMERGENCY DISOSAL, SECURE CYLINDER AND SLOWLY DISCHARGE GAS TO THE ATMOSPHERE IN A WELL-VENTILATED AREA OR OUTDOORS. UNUSED PRODUCT/EMPTY CONTAINER:RETURN CONTAINER AND UNUSED PRODUCT TO SUPPLIER. DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES.

===== MSDS Transport Information =====

Transport Information:PSN: OXYGEN, COMPRESSED, 2.2, UN1072. LABEL: NON-FLAMMABLE GAS, OXIDIZER.

===== Other Information =====

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SUPELCO INC -- 48574, DIBENZO (A,H) ANTHRACENE 0.1G -- 6810-00N032523

===== Product Identification =====

Product ID:48574, DIBENZO (A,H) ANTHRACENE 0.1G

MSDS Date:12/19/1985

FSC:6810

NIIN:00N032523

MSDS Number: BNSSL

=== Responsible Party ===

Company Name:SUPELCO INC

Address:SUPELCO PARK

City:BELLEFONTE

State:PA

ZIP:16823-0048

Country:US

Info Phone Num:814-359-3441

Emergency Phone Num:814-359-3441

CAGE:54968

=== Contractor Identification ===

Company Name:SIGMA-ALDRICH INC.

Address:3050 SPRUCE STREET

Box:14508

City:ST. LOUIS

State:MO

ZIP:63103

Country:US

Phone:314-771-5765/414-273-3850X5996

CAGE:54968

===== Composition/Information on Ingredients =====

Ingred Name:DIBENZ A,H ANTHRACENE

CAS:53-70-3

RTECS #:HN2625000

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.

Routes of Entry: Inhalation:YES Skin:NO Ingestion:YES

Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO

Health Hazards Acute and Chronic:REPORTED ANIMAL CARCINOGEN.

Explanation of Carcinogenicity:DIBENZ(A,H) ANTHRACENE: GROUP 2A(IARC),
ANTICIPATED TO BE CARCINOGEN (NTP).

Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

===== First Aid Measures =====

First Aid:EYES: FLUSH WITH WATER FOR AT LEAST 15 MIN. CONTACT A
PHYSICIAN. SKIN: FLUSH WITH LARGE VOLUMES OF WATER. CONTACT A
PHYSICIAN. INHAL: IMMED MOVE TO FRESH AIR. INGEST: CONTACT A
PHYSICIAN.

===== Fire Fighting Measures =====

Lower Limits:1%

Extinguishing Media:WATER, CO2, DRY CHEMICAL.
Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL
PROTECTIVE EQUIPMENT .

===== Accidental Release Measures =====

Spill Release Procedures:SWEEP UP MATERIAL. AVOID GENERATING DUST.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:STORE IN SEALED CONTAINER IN COOL, DRY
LOCATION. AVOID GENERATING DUST.
Other Precautions:REPORTED CANCER HAZARD. AVOID EYE OR SKIN CONTACT.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:WEAR NIOSH/MSHA APPROVED SCBA.
Ventilation:USE ONLY IN WELL VENTILATED AREA.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:CHEMICAL WORKERS GOGGLES .
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

===== Physical/Chemical Properties =====

HCC:T6
Boiling Pt:B.P. Text:509F,265C
Vapor Density:9.60
Spec Gravity:>1(H2O=1)
Appearance and Odor:OFF-WHITE TO YELLOW-GREEN CRYSTALLINE

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS.

===== Disposal Considerations =====

Waste Disposal Methods:COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR
LOCAL REGULATIONS.

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assume responsibility for the suitability of this information to their
particular situation.

PHIBRO ENERGY USA, INC. -- DIESEL FUEL -- 9140-00-000-0184

===== Product Identification =====

Product ID:DIESEL FUEL
MSDS Date:01/31/1994
FSC:9140
NIIN:00-000-0184
MSDS Number: BVGFN
=== Responsible Party ===
Company Name:PHIBRO ENERGY USA, INC.
Address:500 DALLAS AVE, SUITE 3200
City:HOUSTON
State:TX
ZIP:77002
Country:US
Info Phone Num:713-646-5135
Emergency Phone Num:713-923-6641, CHEMTREC 800-424-9300
Preparer's Name:SUE BOTTOM
CAGE:0V310

=== Contractor Identification ===
Company Name:PHIBRO ENERGY USA INC
Address:500 DALLAS AVE SUITE 3200
Box:City:HOUSTON
State:TX
ZIP:77002
Country:US
Phone:713-923-6641, CHEMTREC800-424-9300
CAGE:0V310

===== Composition/Information on Ingredients =====

Ingred Name:PETROLEUM DISTILLATE, ALIPHATIC AND AROMATIC HYDROCARBONS
(VARYING FROM C9 TO C20), CONTAING ALSO INGREDIENT #2 TO 7.

Fraction by Wt: BALANCE
Other REC Limits:NONE SPECIFIED
OSHA PEL:400 PPM NAPHTHA TWA

Ingred Name:N-OCTANE
CAS:111-65-9
RTECS #:RG8400000
Fraction by Wt: <1-2%
Other REC Limits:NONE SPECIFIED
OSHA PEL:300 PPM TWA 1989
ACGIH TLV:300 PPM/375STEL;9394

Ingred Name:N-NONANE
CAS:111-84-2
RTECS #:RA6115000
Fraction by Wt: <1-3%
Other REC Limits:NONE SPECIFIED
OSHA PEL:200 PPM
ACGIH TLV:200 PPM; 9192

Ingred Name:NAPHTHALENE (SARA III)
CAS:91-20-3
RTECS #:QJ0525000
Fraction by Wt: <1-3%
Other REC Limits:NONE RECOMMENDED

OSHA PEL:10 PPM
 ACGIH TLV:10 PPM/15 STEL; 9394
 EPA Rpt Qty:100 LBS
 DOT Rpt Qty:100 LBS

Ingred Name:HEXANE ISOMERS (OTHER THAN N-HEXANE)
 Fraction by Wt: <1-3%
 Other REC Limits:NONE RECOMMENDED
 OSHA PEL:500 PPM
 ACGIH TLV:500 PPM

Ingred Name:N-HEXANE
 CAS:110-54-3
 RTECS #:MN9275000
 Fraction by Wt: <1-2%
 Other REC Limits:NONE RECOMMENDED
 OSHA PEL:50 PPM 1989
 ACGIH TLV:50 PPM; 9394
 EPA Rpt Qty:1 LB
 DOT Rpt Qty:1 LB

Ingred Name:N-HEPTANE
 CAS:142-82-5
 RTECS #:MI7700000
 Fraction by Wt: <1-2%
 Other REC Limits:NONE RECOMMENDED
 OSHA PEL:400 PPM TWA 1989
 ACGIH TLV:400 PPM/500STEL; 9394

Ingred Name:HYDROGEN SULFIDE (SARA III)
 CAS:7783-06-4
 RTECS #:MX1225000
 Other REC Limits:NONE RECOMMENDED
 OSHA PEL:C, 20 PPM
 ACGIH TLV:10 PPM/15 STEL; 9394
 EPA Rpt Qty:100 LBS
 DOT Rpt Qty:100 LBS

=====
 ===== Hazards Identification =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:ACUTE-INHALATION:CNS EFFECTS,
 RESPIRATORY IRRITATION. EYES:SEVERE IRRITATION. INGESTION:HARMFUL
 OR FATAL, IRRITATION OF GI TRACT. ASPIRATION INTO THE LUNGS CAN
 CAUSE SEVERE CHEMICAL PNEUMONITIS, WHICH CAN BE FATAL.
 SKIN:REPEATED EXPOSURE MAY CAUSE IRRITATION. CHRONIC:DERMATITIS.
 TARGET ORGANS:SKIN, LUNG, CNS.
 Explanation of Carcinogenicity:PER NIOSH BULLETIN 50 A POTENTIAL
 OCCUPATIONAL CARCINOGENIC HAZARD EXISTS DUE TO HUMAN EXPOSURE TO
 DIESEL EXHAUST.
 Effects of Overexposure:EYE:IRRITATION, REDNESS, TEARING, BLURRED
 VISION, CONJUNCTIVITIS. SKIN:IRRITATION, DRYNESS, REDNESS, ITCHING.
 INHAL:HEADACHE, DIZZINESS, DROWZINESS, NAUSEA, VOMITNING, TREMORS,
 CONVULSIONS, IRREGULAR H EART BEAT. INGESTION: G/I IRRITATION AND
 SYMPTOMS SIMILAR TO INHALATION.
 Medical Cond Aggravated by Exposure:EYE, SKIN, HEART, CNS, AND
 RESPIRATORY DISORDERS MAY BE AGGARAVATED BY OVEREXPOSURE.

=====
 ===== First Aid Measures =====

First Aid:SKIN:REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER.
GET MEDICAL ATTENTION IF IRRITATION PERSISTS. INHALATION:REMOVE TO
FRESH AIR & RESTORE BREATHING IF NECESSARY. GET MEDICAL ATTENTION.
EYE:IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING
EYELIDS OPEN. GET MEDICAL ATTENTION. INGESTION:GET IMMEDIATE
MEDICAL ATTENTION. DO NOT INDUCE VOMITING. NOTHING BY MOUTH IF
UNCONSCIOUS.

=====
===== Fire Fighting Measures =====

Flash Point:125F,52C
Lower Limits:0.4%
Upper Limits:8.0%
Extinguishing Media:CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.
Fire Fighting Procedures:EVACUATE AREA. USE NIOSH APPROVED SCBA & FULL
PROTECTIVE EQUIPMENT TO FIGHT FIRE. USE WATER SPRAY TO COOL EXPOSED
CONTAINERS. DIRECT WATER SPRAY MAY SPREAD FIRE
Unusual Fire/Explosion Hazard:VAPORS ARE HEAVIER THAN AIR AND MAY
TRAVEL ALONG GROUND OR FLOOR, THEN 'FLASH BACK' FROM A DISTANT
IGNITION SOURCE. TOXIC FUMES & GASES ARE PRODUCED BY FIRE.

=====
===== Accidental Release Measures =====

Spill Release Procedures:EVACUATE AREA. WEAR PROTECTIVE EQUIPMENT. SHUT
OFF SOURCE IF POSSIBLE & CONTAIN SPILL. REMOVE IGNITION SOURCES.
KEEP OUT OF WATER RESOURCES AND SEWERS. ABSORB IN INERT MATERIAL OR
RECOVER BY PUMPING. TRANSFER TO DISPOSAL DRUMS.
Neutralizing Agent:NONE

=====
===== Handling and Storage =====

Handling and Storage Precautions:KEEP AWAY FROM HEAT, SPARKS, FLAME.
STORE IN WELL VENTILATED AREA. GROUND CONTAINERS DURING TRANSFER.
STORE IN CLOSED CONTAINER.
Other Precautions:EMPTY CONTAINERS RETAIN RESIDUE. DO NOT PRESSURIZE,
CUT, WELD OR EXPOSE TO HEAT, FLAME, STATIC ELECTRICITY, OR OTHER
SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY.

=====
===== Exposure Controls/Personal Protection =====

Respiratory Protection:FOR CONCENTRATIONS EXCEEDING RECOMMENDED LEVEL,
USE NIOSH/MSHA APPROVED AIR PURIFYING RESPIRATOR. FOR SPILL OR IF
CONCENTRATION IS UNKNOWN, USE NIOSH/MSHA SUPPLIED AIR RESPIRATOR OR
SCBA.
Ventilation:GENERAL OR MECHANICAL
Protective Gloves:NEOPRENE OR NITRILE
Eye Protection:SAFETY GLASSES OR CHEMICAL SPLASH GOGGLE
Other Protective Equipment:PROTECTIVE GARMENTS TO PREVENT SKIN CONTACT.
Work Hygienic Practices:DO NOT EAT, DRINK OR SMOKE WHILE WORKING WITH
THIS PRODUCT.
Supplemental Safety and Health
DANGER! UNTREATED PRODUCT MAY CONTAIN OR RELEASE HYDROGEN SULFIDE. H2S
IS A HIGHLY TOXIC AND FLAMMABLE GAS WHICH CAN BE FATAL IF INHALED
AT CERTAIN CONCENTRATION.

=====
===== Physical/Chemical Properties =====

HCC:F4
NRC/State Lic Num:NONE

Boiling Pt:B.P. Text:325F,163C
Vapor Pres:<0.1 PSI
Vapor Density:3-7
Spec Gravity:0.84 - 0.93
Viscosity:8 CST @ -4F
Solubility in Water:NEGLIGIBLE
Appearance and Odor:CLEAR TO STRAW COLORED LIQUID, KEROSENE ODOR.
Percent Volatiles by Volume:NEGLIG

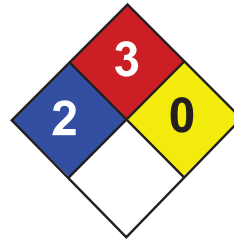
===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS, STRONG ACIDS, CAUSTICS AND HALOGENS.
Stability Condition to Avoid:OPEN FLAMES, SOURCES OF IGNITION, STATIC
ELECTRICITY.
Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE AND
REACTIVE HYDROCARBONS (LDEHYDES, AROMATICS, ETC) COMPOUNDS.

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND
FEDERAL REGULATIONS.

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particular situation.



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; $\log(\text{oil/water}) = 3.1$

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, ignition 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 consciousness, 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 gastrointestinal/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., National 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.

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BELMONT METALS INC -- MERCURY -- 9650-00-537-7929

===== Product Identification =====

Product ID:MERCURY
 MSDS Date:08/03/1989
 FSC:9650
 NIIN:00-537-7929
 MSDS Number: BWXRF
 === Responsible Party ===
 Company Name:BELMONT METALS INC
 Address:330 BELMONT AVE
 City:BROOKLYN
 State:NY
 ZIP:11207-4010
 Country:US
 Info Phone Num:718-342-4900
 Emergency Phone Num:718-342-4900
 Preparer's Name:BRUCE N REED
 CAGE:70774
 === Contractor Identification ===
 Company Name:BELMONT METALS INC
 Address:330 BELMONT AVE
 Box:City:BROOKLYN
 State:NY
 ZIP:11207
 Phone:718-342-4900
 CAGE:70774

===== Composition/Information on Ingredients =====

Ingrid Name:MERCURY, QUICKSILVER (IARC CANCER REVIEW GROUP 3) *94-4*
 CAS:7439-97-6
 RTECS #:OV4550000
 Fraction by Wt: 99.99%
 Other REC Limits:INORGANIC 0.1 MG/CUM
 OSHA PEL:0.1 MG/CUM
 ACGIH TLV:0.01 MG/CUM (SKIN)
 EPA Rpt Qty:1 LB
 DOT Rpt Qty:1 LB

===== Hazards Identification =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:CHRONIC MERCURY POISONING RESULTS IN
 NERVOUS IRRITABILITY, WEAKNESS, TREMOR, GINGIVITIS, ERETHISM,
 GREYING OF LENS OF EYE.
 Explanation of Carcinogenicity:NONE
 Effects of Overexposure:CHRONIC MERCURY POISONING RESULTS IN NERVOUS
 IRRITABILITY, WEAKNESS, TREMOR, GINGIVITIS, ERETHISM, GREYING OF
 LENS OF EYE.

===== First Aid Measures =====

First Aid:INHALATION: REMOVE TO FRESH AIR. INGESTION: INDUCE VOMITING.
 EYES/SKIN: FLUSH W/WATER. OBTAIN MEDICAL ATTENTION IN ALL CASES.

===== Fire Fighting Measures =====

Fire Fighting Procedures:WEAR DUST MASK W/CARTRIDGE FOR MERCURY VAPOR.
 Unusual Fire/Explosion Hazard:HIGH TEMPS INCREASE VAPORIZATION OF
 MERCURY.

===== Accidental Release Measures =====

Spill Release Procedures:SWEEP AREA TO REMOVE AS MUCH AS POSSIBLE.
 VACUUM AREA USING SPECIAL MERCURY VACUUM CLEANER.

===== Handling and Storage =====

Handling and Storage Precautions:STORE IN CLOSED CONTAINERS IN WELL
 VENTILATED COOL PLACES AWAY FROM AREAS OF HIGH TEMPS/ACUTE FIRE
 HAZARDS.

Other Precautions:AVOID INHALATION OF VAPORS/INGESTION. DON'T SMOKE/EAT
 IN IMMEDIATE AREA OF USE/STORAGE.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:WEAR A DUST MASK W/CARTRIDGE FOR MERCURY VAPOR.

Ventilation:LOCAL EXHAUST INCLUDING FLOOR LEVEL.

Protective Gloves:RUBBER/OTHER IMPERVIOUS

Eye Protection:SAFETY GLASSES

Other Protective Equipment:SHOWERS, PROTECTIVE CLOTHING

Work Hygienic Practices:REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE
 REUSE. WASH THOROUGHLY AFTER HANDLING.

Supplemental Safety and Health

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:676F

Melt/Freeze Pt:M.P/F.P Text:-39F

Vapor Pres:0.0012

Vapor Density:>1

Spec Gravity:13.55

Evaporation Rate & Reference:SLOWER THAN ETHER

Appearance and Odor:SILVERY LIQUID AT 70F.

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

HALOGENS, NITRIC ACID

Stability Condition to Avoid:HIGH TEMPS

===== Disposal Considerations =====

Waste Disposal Methods:RETURN TO SUPPLIER IAW/FEDERAL, STATE & LOCAL
 REGULATIONS.

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SUPELCO INC -- 48499, INDENO (1,2,3-CD) PYRENE 10MG -- 6810-00N032522

===== Product Identification =====

Product ID:48499, INDENO (1,2,3-CD) PYRENE 10MG

MSDS Date:06/06/1985

FSC:6810

NIIN:00N032522

MSDS Number: BNSSK

=== Responsible Party ===

Company Name:SUPELCO INC

Address:SUPELCO PARK

City:BELLEFONTE

State:PA

ZIP:16823-0048

Country:US

Info Phone Num:814-359-3441

Emergency Phone Num:814-359-3441

CAGE:54968

=== Contractor Identification ===

Company Name:SIGMA-ALDRICH INC.

Address:3050 SPRUCE STREET

Box:14508

City:ST. LOUIS

State:MO

ZIP:63103

Country:US

Phone:314-771-5765/414-273-3850X5996

CAGE:54968

===== Composition/Information on Ingredients =====

Ingred Name:INDENO 1,2,3-CD PYRENE

CAS:193-39-5

RTECS #:NK9300000

EPA Rpt Qty:100 LBS

DOT Rpt Qty:100 LBS

===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES

Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:NO

Health Hazards Acute and Chronic:REPORTED ANIMAL CARCINOGEN.

Explanation of Carcinogenicity:INDENO(1,2,3-CD) PYRENE: GROUP 2B(IARC),
ANTICIPATED TO BE CARCINOGEN (NTP).

Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

===== First Aid Measures =====

First Aid:EYES: FLUSH WITH WATER FOR AT LEAST 15 MIN. SKIN: FLUSH WITH
LARGE VOLUMES OF WATER. REMOVE CONTAMINATED CLOTHING. INHAL: MOVE
TO FRESH AIR. IF BREATHING STOPS, GIVE ARTF RESP. INGEST: IMMED
CONTACT A PHYSICIAN.

===== Fire Fighting Measures =====

Flash Point:400F,204C

Extinguishing Media:CO2, DRY CHEMICAL.

Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL
PROTECTIVE EQUIPMENT .

===== Accidental Release Measures =====

Spill Release Procedures:SWEEP UP MATERIAL. AVOID GENERATING DUST.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:STORE IN SEALED CONTR IN COOL, DRY
LOCATION. KEEP AWAY FROM OXIDIZERS. STORE IN DRY, WELL VENTILATED
AREA.

Other Precautions:REPORTED CANCER HAZARD. AVOID EYE OR SKIN CONTACT.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:WEAR NIOSH/MSHA APPROVED SCBA AND FULL
PROTECTIVE EQUIPMENT .

Ventilation:USE ONLY IN EXHAUST HOOD.

Protective Gloves:NEOPRENE GLOVES.

Eye Protection:CHEMICAL WORKERS GOGGLES .

Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

===== Physical/Chemical Properties =====

HCC:T6

Melt/Freeze Pt:M.P/F.P Text:324F,162C

Vapor Pres:0.10

Appearance and Odor:YELLOW CRYSTALS

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS. METALLIC SODIUM & POTASSIUM.

===== Disposal Considerations =====

Waste Disposal Methods:COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR
LOCAL REGULATIONS.

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particular situation.

SCOTT SPECIALTY GASES -- ISOBUTYLENE IN AIR -- 6665-01-214-8247

===== Product Identification =====

Product ID:ISOBUTYLENE IN AIR
 MSDS Date:04/23/1992
 FSC:6665
 NIIN:01-214-8247
 MSDS Number: BVRGC
 === Responsible Party ===
 Company Name:SCOTT SPECIALTY GASES
 Address:ROUTE 611 NORTH
 City:PLUMSTEADVILLE
 State:PA
 ZIP:18949
 Country:US
 Info Phone Num:215-766-8861
 Emergency Phone Num:215-766-8861; 908-754-7700
 CAGE:51847

=== Contractor Identification ===
 Company Name:SCOTT SPECIALTY GASES
 Address:6141 EASTON RD (6141 ROUTE 611)
 Box:310
 City:PLUMSTEADVILLE
 State:PA
 ZIP:18934
 Country:US
 Phone:215-766-8861/ FAX: 215-766-0416
 CAGE:51847

===== Composition/Information on Ingredients =====

Ingred Name:PROPENE, 2-METHYL-; (ISOBUTYLENE)
 CAS:115-11-7
 RTECS #:UD0890000
 OSHA PEL:N/K
 ACGIH TLV:N/K

Ingred Name:AIR, REFRIGERATED LIQUID; AIR COMPRESSED (UN1002, DOT); AIR
 REFRIGERATED LIQUID (CRYOGENIC LIQUID) (UN1003) (DOT)
 RTECS #:AX5271000
 OSHA PEL:N/K
 ACGIH TLV:N/K

===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
 Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Health Hazards Acute and Chronic:ACUTE:CONCENTRATION OF ISOBUTYLENE IS
 THIS MIXTURE SHOULD NOT PRESENT ANY SYMPTOMS OF TOXICITY.
 CHRONIC:NONE.
 Explanation of Carcinogenicity:NOT RELEVANT
 Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.
 Medical Cond Aggravated by Exposure:NONE.

===== First Aid Measures =====

First Aid:INGEST:CALL MD IMMEDIATELY . EYES:IMMEDIATELY FLUSH W/POTABLE

WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD .
SKIN:FLUSH W/COPIOUS AMOUNTS OF WATER. CALL MD . INHAL:IMME DIATELY
REMOVE VICTIM TO FRESH AIR. IF BREATHING HAS STOPPED, GIVE
ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

=====
===== Fire Fighting Measures =====

Flash Point:NONFLAMMABLE
Extinguishing Media:USE WHAT IS APPROPRIATE FOR SURROUNDING FIRE.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE
EQUIPMENT . USE WATER SPRAY TO KEEP FIRE EXPOSED CYLINDERS COOL.
Unusual Fire/Explosion Hazard:COMPRESSED AIR AT HIGH PRESSURES WILL
ACCELERATE THE BURNING OF FLAMMABLE MATERIALS.

=====
===== Accidental Release Measures =====

Spill Release Procedures:EVACUATE & VENTILATE AREA. REMOVE LEAKING
CYLINDER TO EXHAUST HOOD OR SAFE OUTDOORS AREA IF THIS CAN BE DONE
SAFELY.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

=====
===== Handling and Storage =====

Handling and Storage Precautions:STORE IN WELL VENTILATED AREAS ONLY.
KEEP VALVE PROT CAP ON CYLS WHEN NOT IN USE & SECURE CYL WHEN USING
TO PROT FROM FALLING.
Other Precautions:USE SUITABLE HAND TRUCK TO MOVE CYLS. PROT CYLS FROM
PHYSICAL DMG. DO NOT DEFACE CYLS/LBLS. MOVE CYL W/ADEQ HAND TRUCK.
CYL SHOULD BE REFILLED BY QUALIFIED PRODUCERS OF COMPRESSED GAS.
SHIPMENT OF COM PRESSED GAS CYL WHICH HAS NOT (SUPDAT)

=====
===== Exposure Controls/Personal Protection =====

Respiratory Protection:USE NIOSH/MSHA APPROVED SCBA IN CASE OF
EMERGENCY OR NON-ROUTINE USE.
Ventilation:PROVIDE ADEQUATE GENERAL & LOCAL EXHAUST VENTILATION.
Protective Gloves:RUBBER GLOVES.
Eye Protection:ANSI APPROVED CHEM WORKERS GOGGS .
Other Protective Equipment:WEAR SAFETY SHOES. A SAFETY SHOWER & EYEWASH
STATION SHOULD BE READILY AVAILABLE.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
OTHER PREC:BEEN FILLED BY OWNER OR WITH HIS WRITTEN CONSENT IS A
VIOLATION OF FEDERAL LAW (49 CFR).

=====
===== Physical/Chemical Properties =====

HCC:G3
Boiling Pt:B.P. Text:-318F,-194C
Vapor Density:1.2
Spec Gravity:0.88 (H*20=1)
Solubility in Water:INSOLUBLE
Appearance and Odor:COLORLESS GAS W/POSSIBLE SLIGHT OLEFINIC ODOR.
Percent Volatiles by Volume:100

=====
===== Stability and Reactivity Data =====

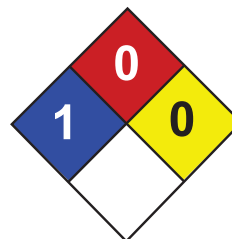
Stability Indicator/Materials to Avoid:YES
NONE.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:NONE.

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS . RETURN CYLS TO SUPPLIER FOR PROPER DISP W/ANY VALVE OUTLET PLUGS/CAPS SECURED & VALVE PROT CAP IN PLACE. ALLOW GAS TO DISCHARGE AT SLO W RATE TO ATM IN UNCONFINED AREA/EXHST HOOD.

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Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet

Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

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
Lead	7439-92-1	100

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

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:

Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, 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 if irritation occurs.

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: 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: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, 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.

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: When heated to decomposition it emits highly toxic fumes of lead.

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. 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. 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. 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.

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:

TWA: 0.05 (mg/m³) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m³) from OSHA (PEL) [United States] TWA: 0.03 (mg/m³) from NIOSH [United States] TWA: 0.05 (mg/m³) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

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

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (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.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

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: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungs by mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually absorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, delirium, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: 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: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead colic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

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:**

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: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 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: Lead 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: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

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 D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 1

Flammability: 0

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. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:21 PM

Last Updated: 06/09/2012 12:00 PM

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CONOCO,INC. -- CONOCO TRACON MOTOR OIL 10W-40 -- 9150-00B030018

===== Product Identification =====

Product ID:CONOCO TRACON MOTOR OIL 10W-40
 MSDS Date:10/21/1985
 FSC:9150
 NIIN:00B030018
 MSDS Number: BBBHW
 === Responsible Party ===
 Company Name:CONOCO, INC.
 Box:1267
 City:PONCA CITY
 State:OK
 ZIP:74603
 Country:US
 Info Phone Num:405 767-6000
 Emergency Phone Num:800 424-9300
 CAGE:DO836

=== Contractor Identification ===

Company Name:CONOCO, INC.
 Box:1267
 City:PONCA CITY
 State:OK
 ZIP:74603
 Country:US
 Phone:405 767-6000
 CAGE:DO836

===== Composition/Information on Ingredients =====

Ingred Name:NO HAZARDOUS MATERIALS

===== Hazards Identification =====

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
 Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
 Effects of Overexposure:THIS PRODUCT MAY CAUSE IRRITATION TO
 EYES,LUNGS,OR SKIN AFTER PROLONGED EXPOSURE.

===== First Aid Measures =====

First Aid:EYES:QUICKLY WASH WITH FRESH WATER FOR 15 MIN AND GET MEDICAL
 ATTENTION.SKIN:WASH WITH SOAP AND WATER AND REMOVE CONTAMINATED
 CLOTHING.INHALATION: IF OVEREXPOSED,REMOVE INDIVIDUAL TO FRESH AIR.
 IF BRE ATHING STOPS,ADMINISTER ARTIFICIAL RESPIRATION.INGESTION:IF
 SWALLOWED,DONOT INDUCE VOMITING.IF VOMITING BEGINS,LOW VICTIMS HEAD
 IN AN EFFECT TO PREVENT VOMITUS FROM ENTERING LUNGS.CALL PHYSICIAN.

===== Fire Fighting Measures =====

Flash Point Method:PMCC
 Flash Point:340
 Extinguishing Media:USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE
 Fire Fighting Procedures:WATER OR FOAM MAY CAUSE FROTHING. USE WATER TO
 KEEP FIRE EXPOSED CONTAINERS COOL. WATER SPRAY MAY BE USED TO FLUSH
 SPILLS AWAY FROM EXPOSURES.
 Unusual Fire/Explosion Hazard:PRODUCTS OF COMBUSTION MAY CONTAIN CARBON
 MONOXIDE,CARBON DIOXIDE,AND OTHER TOXIC MATERIALS. DONOT ENTER

ENCLOSED SPACE WITHOUT PROTECTIVE EQUIPMENT.

===== Accidental Release Measures =====

Spill Release Procedures:CONTAIN SPILL IMMEDIATELY IN SMALLEST AREA POSSIBLE.RECOVER AS MUCH OF THE PRODUCT ITSELF AS POSSIBLE BY VACUUMING,FOLLOWED BY SOAKING UP RESIDUAL FLUIDS BY USE OF ABSORBENT MATERIALS.

===== Handling and Storage =====

Handling and Storage Precautions:PRODUCT IS CLASS IIIB COMBUSTIBLE LIQUID STORE AND HANDLE ACCORDINGLY.
Other Precautions:PROLONGED OR REPEATED SKIN CONTACT WITH USED MOTOR OIL MAY BE HARMFUL. WASH THOROUGHLY WITH SOAP AND WATER AFTER CONTACT.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:NONE REQUIRED EXCEPT UNDER UNUSUAL CIRCUMSTANCES.
Ventilation:NORMAL SHOP VENTILATION.
Protective Gloves:NONE REQUIRED
Eye Protection:NONE REQUIRED
Other Protective Equipment:NONE REQUIRED
Supplemental Safety and Health

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:650-1200 F
Spec Gravity:0.88
Solubility in Water:INSOLUBLE
Appearance and Odor:BROWN LIQUID;MILD PETROLEUM HYDROCARBON ODOR

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
Stability Condition to Avoid:STRONG OXIDIZING MATERIALS,HEAT,FLAME
Hazardous Decomposition Products:NORMAL COMBUSTION FORMS,CARBON DIOXIDE.INCOMPLETE COMBUSTION MAY PRODUCE CARBON MONOXIDE.

===== Disposal Considerations =====

Waste Disposal Methods:RECYCLE AS MUCH OF THE RECOVERABLE PRODUCT AS POSSIBLE.DISPOSE OF NONRECYCLABLE MATERIAL BY SUCH METHODS AS CONTROLLED INCINERATION,COMPLYING WITH FEDERAL,STATE AND LOCAL REGULATIONS.

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**Material Safety
Data Sheets**

[Division of Facilities Services](#)

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

NICKEL POWDER, NI02-10

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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**Section 1 - Product and Company Identification
NICKEL POWDER, NI02-10**

Product Identification: NICKEL POWDER, NI02-10

Date of MSDS: 07/11/1989 **Technical Review Date:** 10/18/1995

FSC: 9630 **NIIN:** LIIN: 00N044226

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: SPEX IND INC
Manufacturer's Address1: 3880 PARK AVE
Manufacturer's Address2: EDISON, NJ 08820
Manufacturer's Country: US
General Information Telephone: 201-549-7144
Emergency Telephone: 201-549-7144
Emergency Telephone: 201-549-7144
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: IO044
Special Project Code: N

Contractor Information

Contractor's Name: SPEX CERTIPREP INC
Contractor's Address1: 203 NORCROSS AVE
Contractor's Address2: METUCHEN, NJ 08840
Contractor's Telephone: 732-549-7144
Contractor's CAGE: 07977

Contractor Information

Contractor's Name: SPEX IND INC
Contractor's Address1: 3880 PARK AVE
Contractor's Address2: EDISON, NJ 08820
Contractor's Telephone: 908-549-7144
Contractor's CAGE: IO044

Section 2 - Compositon/Information on Ingredients NICKEL POWDER, NI02-10

Ingredient Name: NICKEL (SARA III)
Ingredient CAS Number: 7440-02-0 **Ingredient CAS Code:** M
RTECS Number: QR5950000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 1 MG/M3 **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**

ACGIH TLV: 1 MG/M3 **ACGIH TLV Code:** M

ACGIH STEL: N/P **ACGIH STEL Code:**

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview

NICKEL POWDER, NI02-10

Health Hazards Acute & Chronic: ACUTE:SKIN CONTACT WITH NICKEL MAY CAUSE "NICKEL ITCH." THIS IS A DERMATITIS RESULTING FROM SENSITIZATION TO NICKEL CHARACTERIZED BY SKIN ERUPTION & MAY BE FOLLOWED BY SUPERFICIAL ULCERS WHICH DISCHARGE & BECOME CRUSTED. ECZEMA MAY ALSO OCCUR FORMING PIGMENTED/ DEPIGMENTED PLAQUES. RECOVERY OF (EFTS OF OVEREXP)

Signs & Symptoms of Overexposure:

HLTH HAZ:DERMATITIS MAY TAKE FROM SEVEN DAYS TO SEVERAL WEEKS. INHALATION MAY RESULT IN PNEUMONITIS. CHRONIC: CANCER OF THE PARANASAL SINUSES & LUNGS CAN OCCUR FROM CHRONIC EXPOSURE TO NICKEL.

Medical Conditions Aggravated by Exposure:

NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Indicators

NTP: YES

IARC: YES

OSHA: NO

Carcinogenicity Explanation: NICKEL:IARC MONOGRAPHS ON THE EVALUATION OF CARCINOGENIC RISK OF CHEMICALS TO MAN, VOL 49, PG 257, 1990: (SUPDAT)

Section 4 - First Aid Measures

NICKEL POWDER, NI02-10

First Aid:

INGESTION: CALL MD IMMEDIATELY (FP N). INHALATION: MOVE TO FRESH AIR. EYES: FLUSH WITH WATER FOR AT LEAST 15 MINUTES OCCASIONALLY LIFTING UPPER AND LOWER EYELIDS. SKIN: REMOVE CONTAMINATED CLOTHING, THEN FLUSH WITH WATER FOR AT LEAST 15 MINUTES. WASH CLOTHING THOROUGHLY BEFORE REUSE. IF IRRITATION CONTINUES, GET MEDICAL ATTENTION IMMEDIATELY.

Section 5 - Fire Fighting Measures

NICKEL POWDER, NI02-10

Fire Fighting Procedures:

USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

FLAMMABLE. USE NON-SPARKING TOOLS WHEN HANDLING.

Extinguishing Media:

DRY CHEMICAL POWDER.

Flash Point: Flash Point Text: N/A

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
NICKEL POWDER, NI02-10

Spill Release Procedures:

EVACUATE AND VENTILATE AREA. SWEEP UP AND PLACE IN BAG. HOLD FOR PROPER DISPOSAL. WEAR PROTECTIVE CLOTHING.

Section 7 - Handling and Storage
NICKEL POWDER, NI02-10

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection
NICKEL POWDER, NI02-10

Respiratory Protection:

NIOSH/MSHA APPROVED RESPIRATOR.

Ventilation:

CHEMICAL FUME HOOD.

Protective Gloves:

IMPERVIOUS GLOVES (FP N).

Eye Protection: CHEMICAL SAFETY GOGGLES (FP N).

Other Protective Equipment: LAB COAT.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: MATLS TO AVOID:PERCHLORATE & TITANIUM.

EXPLAN OF CARCIN:GROUP 2B. NTP 6TH ANNUAL REPORT ON CARCINOGENS, 1991:
ANTICIPATED TO BE CARCINOGEN.

Section 9 - Physical & Chemical Properties
NICKEL POWDER, NI02-10

HCC: N1

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 4946F,2730C

Melting/Freezing Point: Melting/Freezing Text: 2651F,1455C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/A **Vapor Density:** N/A

Percent Volatile Organic Content:

Specific Gravity: 8.9

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/A

Solubility in Water: INSOLUBLE

Appearance and Odor: SILVER METAL

Percent Volatiles by Volume: N/A

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
NICKEL POWDER, NI02-10

Stability Indicator: YES

Materials to Avoid:

ACIDS, OXIDIZING AGENTS, & SULFUR. VIOLENT RXN WILL OCCUR W/CNTCT W/AMMONIUM NITRATE, HYDRAZOIC ACID, POTASSIUM (SUPDAT)

Stability Condition to Avoid:

NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:

TOXIC FUMES.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT

Section 11 - Toxicological Information
NICKEL POWDER, NI02-10

Toxicological Information:

N/P

Section 12 - Ecological Information
NICKEL POWDER, NI02-10

Ecological Information:

N/P

Section 13 - Disposal Considerations
NICKEL POWDER, NI02-10

Waste Disposal Methods:

DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N). CONTACT LOCAL HAZARDOUS OR CHEMICAL WASTE DISPOSAL AGENCY FOR REGULATIONS.

Section 14 - MSDS Transport Information
NICKEL POWDER, NI02-10

Transport Information:

N/P

Section 15 - Regulatory Information**NICKEL POWDER, NI02-10**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information**NICKEL POWDER, NI02-10**

Other Information:

N/P

HAZCOM Label Information**Product Identification:** NICKEL POWDER, NI02-10**CAGE:** IO044**Assigned Individual:** Y**Company Name:** SPEX IND INC**Company PO Box:****Company Street Address1:** 3880 PARK AVE**Company Street Address2:** EDISON, NJ 08820 US**Health Emergency Telephone:** 201-549-7144**Label Required Indicator:** Y**Date Label Reviewed:** 10/05/1993**Status Code:** C**Manufacturer's Label Number:****Date of Label:** 10/05/1993**Year Procured:** N/K**Organization Code:** G**Chronic Hazard Indicator:** Y**Eye Protection Indicator:** YES**Skin Protection Indicator:** YES**Respiratory Protection Indicator:** YES**Signal Word:** CAUTION**Health Hazard:** Slight**Contact Hazard:** Slight**Fire Hazard:** Slight**Reactivity Hazard:** None

8/9/2002 8:15:58 AM



**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

POLYCHLORINATED BIPHENYLS

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
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Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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**Section 1 - Product and Company Identification
POLYCHLORINATED BIPHENYLS**

Product Identification: POLYCHLORINATED BIPHENYLS
Date of MSDS: 10/01/1988 **Technical Review Date:** 03/11/1999
FSC: 5910 **NIIN:** 00-903-2947
Submitter: D DG
Status Code: A
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: MONSANTO CO
Post Office Box: UNKNOW
Manufacturer's Address1: 800 N LINDBERGH BLVD
Manufacturer's Address2: ST LOUIS, MO 63167
Manufacturer's Country: US
General Information Telephone: 314-694-1000
Emergency Telephone: 314-694-1000
Emergency Telephone: 314-694-1000
MSDS Preparer's Name: PAUL R MICHAEL, SAFETY
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 3Y784
Special Project Code: N

Item Description

Item Name: CAPACITOR, FIXED, PAPER DIELECTRIC
Item Manager: S9E
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: EA
Unit of Issue Quantity: 1
Type of Container:

Contractor Information

Contractor's Name: GENERAL ELECTRIC CO CAPACITOR PRODUCTS DEPARTMENT
Contractor's Address1: JOHN ST
Contractor's Address2: HUDSON FALLS, NY 12839
Contractor's Telephone: 518-746-5750
Contractor's CAGE: 01002

Contractor Information

Contractor's Name: MONSANTO CO, FIBERS BUSINESS UNIT
Contractor's Address1: 800 N LINDBERGH BLVD
Contractor's Address2: SAINT LOUIS, MO 63167
Contractor's Telephone: 314-694-1000
Contractor's CAGE: 3Y784

Section 2 - Composition/Information on Ingredients POLYCHLORINATED BIPHENYLS

Ingredient Name: POLYCHLORINATED BIPHENYLS (PCBS) (SARA III)
Ingredient CAS Number: 1336-36-3 **Ingredient CAS Code:** M
RTECS Number: TQ1350000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:

>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/P
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: NOT ESTABLISHED OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT ESTABLISHED ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
POLYCHLORINATED BIPHENYLS

Health Hazards Acute & Chronic: EYES: MODERATELY IRRITATING TO EYE TISSUES. SKIN: CAN BE ABSORBED THROUGH INTACT SKIN. MAY CAUSE DEFATTING. A POTENTIAL FOR CONTACTING CHLORACNE. INHALATION: POSSIBLE LIVER INJURY. INGESTION: SLIGH TLY TOXIC.

Signs & Symptoms of Overexposure:
CAN CAUSE DERMATOLOGICAL SYMPTOMS; HOWEVER, THESE ARE REVERSIBLE UPON REMOVAL OF EXPOSURE SOURCE.

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: N/P

Carcenogenicity Indicators
NTP: YES
IARC: YES
OSHA: NO

Carcinogenicity Explanation: IARC: PROBABLE CARCINOGENIC. NTP: REASONABLY ANTICIPATED TO BE CARCINOGENIC.

Section 4 - First Aid Measures
POLYCHLORINATED BIPHENYLS

First Aid:

EYES: IRRIGATE IMMEDIATELY WITH COPIOUS QUANTITIES OF RUNNING WATER FOR AT LEAST 15 MIN IF LIQUID OR SOLID PCBS GET INTO THEM. SKIN: CONTAMINATED CLOTHING SHOULD BE REMOVED AND THE SKIN WASHED THOROUGHLY WITH SOAP AND WATER. HOT PCBS MAY CAUSE THERMAL BURNS. INHALATION: REMOVE TO FRESH AIR. IF SKIN RASH OR RESPIRATORY IRRITATION PERSISTS, CONSULT A PHYSICIAN. (IF ELECTRICAL EQUIPMENT ARCS OVER, PCBS MAY DECOMPOSE TO PRODUCE HYDROCHLORIC ACID). INGESTION: CONSULT A PHYSICIAN. DO NOT INDUCE VOMITING OR GIVE ANY OILY LAXATIVES. (IF LARGE AMOUNTS ARE INGESTED, GASTRIC LAVAGE IS SUGGESTED).

**Section 5 - Fire Fighting Measures
POLYCHLORINATED BIPHENYLS**

Fire Fighting Procedures:

STANDARD FIRE FIGHTING WEARING APPAREL AND SELF-CONTAINED BREATHING APPARATUS SHOULD BE WORN WHEN FIGHTING FIRES THAT INVOLVE POSSIBLE EXPOSURE TO CHEMICAL COMBUSTION PRODUCTS. FIRE FIGHTING EQUIPMENT SHOULD BE THOROUGHLY CLEANED AND DECONTAMINATED AFTER USE.

Unusual Fire or Explosion Hazard:

IF A PCB TRANSFORMER IS INVOLVED IN A FIRE-RELATED INCIDENT, THE OWNER OF THE TRANSFORMER MAY BE REQUIRED TO REPORT THE INCIDENT. CONSULT AND FOLLOW APPROPRIATE FEDERAL, STATE, AND LOCAL REGULATIONS.

Extinguishing Media:

PCBS ARE FIRE-RESISTANT COMPOUNDS.

Flash Point: >141.C, 285.8F **Flash Point Text:** N/A

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s):

Upper Limit(s):

**Section 6 - Accidental Release Measures
POLYCHLORINATED BIPHENYLS**

Spill Release Procedures:

CLEANUP & DISPOSAL OF LIQUID PCBS ARE STRICTLY REGULATED BY THE FEDERAL GOVERNMENT. VENTILATE AREA. CONTAIN SPILL/LEAK. REMOVE SPILL BY MEANS OF ABSORPTIVE MATERIAL. SPILL CLEANUP PERSONNEL SHOULD USE PROPER PROTECTIVE CLOTHING. ALL WASTES AND RESIDUES CONTAINING PCBS SHOULD BE COLLECTED, CONTAINERIZED, MARKED AND DISPOSED OF IN THE MANNER PRESCRIBED BY EPA, & APPLICABLE STATE AND LOCAL LAWS.

**Section 7 - Handling and Storage
POLYCHLORINATED BIPHENYLS**

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection

POLYCHLORINATED BIPHENYLS

Respiratory Protection:

USE NIOSH/MSHA APPROVED EQUIPMENT WHEN AIRBORNE EXPOSURE LIMITS ARE EXCEEDED. FULL FACEPIECE EQUIPMENT IS RECOMMENDED AND, IF USED, REPLACES NEED FOR FACE SHIELD AND/OR CHEMICAL SPLASH GOGGLES. THE RESPIRATOR USE LIMITATIONS SPECIFIED BY NIOSH/MSHA OR THE MANUFACTURER MUST BE OBSERVED.

Ventilation:

PROVIDE NATURAL OR MECHANICAL VENTILATION TO CONTROL EXPOSURE LEVELS BELOW AIRBORNE EXPOSURE LEVELS.

Protective Gloves:

WEAR APPROPRIATE CHEMICAL RESISTANT GLOVES TO PREVENT SKIN CONTACT.

Eye Protection: WEAR CHEMICAL SPLASH GOGGLES AND HAVE EYE BATHS AVAILABLE.

Other Protective Equipment: WEAR APPROPRIATE PROTECTIVE CLOTHING. PROVIDE A SAFETY SHOWER AT ANY LOCATION WHERE SKIN CONTACT CAN OCCUR.

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Supplemental Health & Safety Information: NONE

Section 9 - Physical & Chemical Properties
POLYCHLORINATED BIPHENYLS

HCC: Z3

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: N/A

Melting/Freezing Point: Melting/Freezing Text: N/A

Decomposition Point: Decomposition Text: N/A

Vapor Pressure: (MM HG @100F):0.005-.00006 **Vapor Density:** N/P

Percent Volatile Organic Content:

Specific Gravity: N/K

Volatile Organic Content Pounds per Gallon:

pH: N/P

Volatile Organic Content Grams per Liter:

Viscosity: (CENTISTOKES):3.6-540

Evaporation Weight and Reference: N/P

Solubility in Water: N/P

Appearance and Odor: N/P

Percent Volatiles by Volume: N/P

Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
POLYCHLORINATED BIPHENYLS

Stability Indicator: YES

Materials to Avoid:

N/P

Stability Condition to Avoid:

PCBS ARE VERY STABLE, FIRE-RESISTANT COMPOUNDS.

Hazardous Decomposition Products:

CARBON MONOXIDE, CARBON DIOXIDE, HYDROGEN CHLORIDE, PHENOLICS, ALDEHYDES AND OTHER TOXIC COMBUSTION PRODUCTS.

Hazardous Polymerization Indicator: N/P

Conditions to Avoid Polymerization:

N/P

Section 11 - Toxicological Information
POLYCHLORINATED BIPHENYLS

Toxicological Information:

N/P

Section 12 - Ecological Information
POLYCHLORINATED BIPHENYLS

Ecological Information:

N/P

Section 13 - Disposal Considerations
POLYCHLORINATED BIPHENYLS

Waste Disposal Methods:

CONSULT THE APPLICABLE STATE AND LOCAL REGULATIONS PRIOR TO ANY DISPOSAL OF PCBs OR PCB-CONTAMINATED ITEMS. CONSULT WITH 40 CFR PART 761 FOR FEDERAL REQUIREMENTS.

Section 14 - MSDS Transport Information
POLYCHLORINATED BIPHENYLS

Transport Information:

N/P

Section 15 - Regulatory Information
POLYCHLORINATED BIPHENYLS

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
POLYCHLORINATED BIPHENYLS

Other Information:

N/P

HMIS Transportation Information**Product Identification:** POLYCHLORINATED BIPHENYLS**Transportation ID Number:** 139624**Responsible Party CAGE:** 3Y784**Date MSDS Prepared:** 10/01/1988**Date MSDS Reviewed:** 03/11/1999**MFN:** 03/11/1999**Submitter:** D DG

Status Code: A

Container Information

Unit of Issue: EA

Container Quantity: 1

Type of Container:

Net Unit Weight: U/K

Article without MSDS: N

Technical Entry NOS Shipping Number:

Radioactivity:

Form:

Net Explosive Weight:

Coast Guard Ammunition Code:

Magnetism:

AF MMAC Code:

DOD Exemption Number: N/A

Limited Quantity Indicator: N

Multiple Kit Number: 0

Kit Indicator: N

Kit Part Indicator: N

Review Indicator: N

Additional Data:

P/N (GENERAL ELECTRIC CO): 23F1071G202

Department of Transportation Information

DOT Proper Shipping Name: POLYCHLORINATED BIPHENYLS

DOT PSN Code: LWI

Symbols: AW

DOT PSN Modifier:

Hazard Class: 9

UN ID Number: UN2315

DOT Packaging Group: II

Label: CLASS 9

Special Provision(s): 9,81

Packaging Exception:

Non Bulk Packaging: 202

Bulk Packaging: 241

Maximum Quantity in Passenger Area: 100 L

Maximum Quantity in Cargo Area: 220 L

Stow in Vessel Requirements: A

Requirements Water/Sp/Other: 34

IMO Detail Information

IMO Proper Shipping Name: POLYCHLORINATED BIPHENYLS

IMO PSN Code: LZM

IMO PSN Modifier: PP

IMDG Page Number: 9034

UN Number: 2315

UN Hazard Class: 9

IMO Packaging Group: II

Subsidiary Risk Label: -

EMS Number: 6.1-02

Medical First Aid Guide Number: NON

IATA Detail Information

IATA Proper Shipping Name: POLYCHLORINATED BIPHENYLS, LIQUID

IATA PSN Code: UKT

IATA PSN Modifier:

IATA UN Id Number: 2315

IATA UN Class: 9

Subsidiary Risk Class:

UN Packaging Group: II

IATA Label: MISCELLANEOUS

Packaging Note for Passengers: 907

Maximum Quantity for Passengers: 100 L

Packaging Note for Cargo: 907

Maximum Quantity for Cargo: 220 L

Exceptions:

AFI Detail Information

AFI Proper Shipping Name: POLYCHLORINATED BIPHENYLS

AFI Symbols:

AFI PSN Code: UKT

AFI PSN Modifier:

AFI UN Id Number: UN2315

AFI Hazard Class: 9

AFI Packing Group: II

AFI Label:

Special Provisions: P5, 9

Back Pack Reference: A13.3

HAZCOM Label Information

Product Identification: POLYCHLORINATED BIPHENYLS

CAGE: 3Y784

Assigned Individual: N

Company Name: MONSANTO CO, FIBERS BUSINESS UNIT

Company PO Box:

Company Street Address1: 800 N LINDBERGH BLVD

Company Street Address2: SAINT LOUIS, MO 63167 US

Health Emergency Telephone: 314-694-1000

Label Required Indicator: Y

Date Label Reviewed: 03/11/1999

Status Code: A

Manufacturer's Label Number:

Date of Label:

Year Procured: N/K

Organization Code: F

Chronic Hazard Indicator: Y

Eye Protection Indicator: YES

Skin Protection Indicator: YES

Respiratory Protection Indicator: YES

Signal Word: DANGER

Health Hazard: Severe

Contact Hazard: Moderate

Fire Hazard: None

Reactivity Hazard: None

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[Division of Facilities Services](#)

DOD Hazardous Material Information (ANSI Format) For Cornell University Convenience Only

PHENANTHRENE, MS-2283

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification PHENANTHRENE, MS-2283

Product Identification: PHENANTHRENE, MS-2283

Date of MSDS: 11/22/1985 **Technical Review Date:** 09/22/1992

FSC: 6810 **NIIN:** LIIN: 00N034845

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINT CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients PHENANTHRENE, MS-2283

Ingredient Name: PHENANTHRENE
Ingredient CAS Number: 85-01-8 **Ingredient CAS Code:** M
RTECS Number: SF7175000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview PHENANTHRENE, MS-2283

Health Hazards Acute & Chronic: CANCER & MUTAGEN INDICATIONS; SKIN PHOTSENSITIZER.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: LD50:(ORAL,RAT)700 MG/KG

Route of Entry Indicators:

Inhalation: NO

Skin: NO

Ingestion: NO

Carcenogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures PHENANTHRENE, MS-2283

First Aid:

SKIN: WASH WITH WATER. GET MED ATTN (FP N). EYE: IMMEDIATELY FLUSH WITH POTABLE WATER FOR A MINIMUM OF 15 MIN, SEEK ASSISTANCE FROM MD (FP N). INHAL: REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION OR OXYGEN IF NECESSARY. GET MED ATTN (FP N).INGEST: GIVE WATER AND INDUCE VOMITING. SUMMON A PHYSICIAN.

Section 5 - Fire Fighting Measures PHENANTHRENE, MS-2283

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

CANCER INDICATIONS.

Extinguishing Media:

CARBON DIOXIDE, DRY CHEMICAL, ALCOHOL FOAM.

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
PHENANTHRENE, MS-2283

Spill Release Procedures:

PROVIDE ADEQUATE VENTILATION. CAREFULLY SCOOP UP & TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
PHENANTHRENE, MS-2283

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
PHENANTHRENE, MS-2283

Respiratory Protection:

NIOSH/MSHA APPROVED SCBA OR CHEMICAL CARTRIDGE.

Ventilation:

LOCAL EXHAUST: GOOD FUMEHOOD. SPECIAL: CANCER INDICATIONS.

Protective Gloves:

RUBBER GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWERS & EYEWASH STATION NEAR WORKPLACE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
PHENANTHRENE, MS-2283

HCC: N1

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 642F,339C

Melting/Freezing Point: Melting/Freezing Text: 212F,100C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: 1 Vapor Density: 6.14

Percent Volatile Organic Content:

Specific Gravity: 1.18(H*2O=1)

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: <0.1%

Appearance and Odor: WHITE-PALE YELLOW SOLID.

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
PHENANTHRENE, MS-2283

Stability Indicator: YES

Materials to Avoid:

STRONG OXIDIZING AGENTS.

Stability Condition to Avoid:

NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:

CARBON MONOXIDE/CARBON DIOXIDE ON COMBUSTION.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT

Section 11 - Toxicological Information
PHENANTHRENE, MS-2283

Toxicological Information:

N/P

Section 12 - Ecological Information
PHENANTHRENE, MS-2283

Ecological Information:

N/P

Section 13 - Disposal Considerations
PHENANTHRENE, MS-2283

Waste Disposal Methods:

VIA LICENSED DISPOSAL COMPANY. DISPOSE OF ACCORDING TO FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
PHENANTHRENE, MS-2283

Transport Information:

N/P

Section 15 - Regulatory Information
PHENANTHRENE, MS-2283

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
PHENANTHRENE, MS-2283

Other Information:

N/P

HMIS Transportation Information**Product Identification:** PHENANTHRENE, MS-2283**Transportation ID Number:** 39316**Responsible Party CAGE:** 09578**Date MSDS Prepared:** 11/22/1985**Date MSDS Reviewed:** 02/17/1993**MFN:** 02/17/1993**Submitter:** N TN**Status Code:** C**Container Information****Unit of Issue:** NK**Container Quantity:** NK**Type of Container:****Net Unit Weight:****Article without MSDS:** N**Technical Entry NOS Shipping Number:****Radioactivity:****Form:****Net Explosive Weight:****Coast Guard Ammunition Code:****Magnetism:** N/P**AF MMAC Code:****DOD Exemption Number:****Limited Quantity Indicator:****Multiple Kit Number:** 0**Kit Indicator:** N**Kit Part Indicator:** N**Review Indicator:** Y**Additional Data:**

NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information**DOT Proper Shipping Name:** NOT REGULATED BY THIS MODE OF TRANSPORTATION**DOT PSN Code:** ZZZ**Symbols:** N/R**DOT PSN Modifier:****Hazard Class:** N/R**UN ID Number:** N/R**DOT Packaging Group:** N/R**Label:** N/R**Special Provision(s):** N/R**Packaging Exception:** N/R**Non Bulk Packaging:** N/R**Bulk Packaging:** N/R

Maximum Quantity in Passenger Area: N/R

Maximum Quantity in Cargo Area: N/R

Stow in Vessel Requirements: N/R

Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION

IMO PSN Code: ZZZ

IMO PSN Modifier:

IMDG Page Number: N/R

UN Number: N/R

UN Hazard Class: N/R

IMO Packaging Group: N/R

Subsidiary Risk Label: N/R

EMS Number: N/R

Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

IATA PSN Code: ZZZ

IATA PSN Modifier:

IATA UN Id Number: N/R

IATA UN Class: N/R

Subsidiary Risk Class: N/R

UN Packaging Group: N/R

IATA Label: N/R

Packaging Note for Passengers: N/R

Maximum Quantity for Passengers: N/R

Packaging Note for Cargo: N/R

Maximum Quantity for Cargo: N/R

Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

AFI Symbols:

AFI PSN Code: ZZZ

AFI PSN Modifier:

AFI UN Id Number: N/R

AFI Hazard Class: N/R

AFI Packing Group: N/R

AFI Label: N/R

Special Provisions: N/A

Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: PHENANTHRENE, MS-2283

CAGE: 09578

Assigned Individual: N

Company Name: MERCK FROSST CANADA INC

Company PO Box:

Company Street Address1: UNKNOWN

Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US

Health Emergency Telephone: 800-325-9034;514-697-2823

Label Required Indicator: Y

Date Label Reviewed: 09/22/1992

Status Code: C
Manufacturer's Label Number:
Date of Label: 09/22/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None

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AMERADA HESS CORP -- PREMIUM UNLEADED GASOLINE -- 9130-00N038435

===== Product Identification =====

Product ID:PREMIUM UNLEADED GASOLINE
MSDS Date:01/13/1989
FSC:9130
NIIN:00N038435
MSDS Number: BQXMS
=== Responsible Party ===
Company Name:AMERADA HESS CORP
Address:1 HESS PLAZA
City:WOODBIDGE
State:NJ
ZIP:07095
Country:US
Info Phone Num:201-750-6000
Emergency Phone Num:800-424-9300 (CHEMTREC)
CAGE:4N717

=== Contractor Identification ===

Company Name:AMERADA HESS CORP
Address:1 HESS PLAZA
Box:City:WOODBIDGE
State:NJ
ZIP:07095-1229
Country:US
Phone:908-750-6000, CHEMTREC 800-424-9300
CAGE:4N717

===== Composition/Information on Ingredients =====

Ingred Name:ING 17:OPEN SPILLS MAY EMIT FLAMM VAPS. APPROACH FROM
UPWIND IF POSS. AVOID BRTHG EMITTED VAPS. WEAR NIOSH/MSHA (ING 19)
RTECS #:9999999ZZ

Ingred Name:ING 18:APPRVD SELF CNTND POSITIVE PRESS BRTHG APPARATUS, IF
REQD, TO PVNT INHAL OF VAPS.
RTECS #:9999999ZZ

Ingred Name:WASTE DISP METH:OF VOLATILE, FLAMMABLE, VAPORS.
RTECS #:9999999ZZ

Ingred Name:OTHER PREC: IGNIT. USE ONLY AS A MOTOR FUEL. HNDLE,
TRANSPORT & STORE I/A/W APPLIC LAWS & REGS. ELEC EQUIP (ING 22)
RTECS #:9999999ZZ

Ingred Name:ING 21:SHOULD BE APPRVD FOR CLASSIFIED AREA. REMOVE SOILED
CLTHG & LAUNDER BEFORE-REUSE. DISCARD OIL SOAKED (ING 23)
RTECS #:9999999ZZ

Ingred Name:ING 22:SHOES. WEAR FULL LNGTH CLTHG, & LAUNDER ON A REGULAR
& FREQ BASIS. VENT MUST BE SUFFICIENT TO PVNT (ING 24)
RTECS #:9999999ZZ

Ingred Name:ING 23:ACCUMULATION OF TOX/FLAMM CONC OF VAPOR IN AIR.
RTECS #:9999999ZZ

Ingred Name:HYGIENE PRACT: UPWIND OF VAPOR OR MIST RELEASE, SPILL OR
LEAK.

RTECS #:9999999ZZ

Ingred Name:ETHER, TERT-BUTYL METHYL; (METHYL TERT-BUTYL ETHER &/OR
TERT-AMYL METHYL ETHER, CAS # 994-05-8)

CAS:1634-04-4

RTECS #:KN5250000

Fraction by Wt: <15%

EPA Rpt Qty:1 LB

DOT Rpt Qty:1 LB

Ingred Name:TOLUENE

CAS:108-88-3

RTECS #:XS5250000

Fraction by Wt: 15-<30%

OSHA PEL:200 PPM/150 STEL

ACGIH TLV:50 PPM; 9293

EPA Rpt Qty:1000 LBS

DOT Rpt Qty:1000 LBS

Ingred Name:XYLENE (MIXED ISOMERS)

CAS:1330-20-7

RTECS #:ZE2100000

Fraction by Wt: 10-<15%

OSHA PEL:100 PPM;150 PPM STEL

ACGIH TLV:100 PPM;150 PPM STEL

EPA Rpt Qty:1000 LBS

DOT Rpt Qty:1000 LBS

Ingred Name:BENZENE

CAS:71-43-2

RTECS #:CY1400000

Fraction by Wt: 0.1-<5%

OSHA PEL:10 PPM

ACGIH TLV:10 PPM

EPA Rpt Qty:10 LBS

DOT Rpt Qty:10 LBS

Ingred Name:BENZENE, ETHYL-; (ETHYL BENZENE)

CAS:100-41-4

RTECS #:DA0700000

Fraction by Wt: <3%

OSHA PEL:100 PPM;125 STEL

ACGIH TLV:100 PPM;125 STEL

EPA Rpt Qty:1000 LBS

DOT Rpt Qty:1000 LBS

Ingred Name:BENZENE, 1,2,4-TRIMETHYL-; (1,2,4-TRIMETHYLBENZENE)

CAS:95-63-6

RTECS #:DC3325000

Fraction by Wt: <6%

Ingred Name:SUPP DATA: IGNIT. VAPS CAN READILY FORM EXPLOS MIXT IN AIR.

HVR/AIR VAPS CAN FLOW ALONG SURF TO DIST SOURCES (ING 9)

RTECS #:9999999ZZ

Ingred Name:ING 8:IGNIT & FLASH BACK. FLOWING GASOLINE CAN BE IGNITED

BY SELF-GENERATED STATIC ELEC. RUNOFF TO SEWERS (ING 10)

RTECS #:9999999ZZ

Ingred Name:ING 9: MAY CREATE FIRE &/OR EXPLOSION HAZARD.

RTECS #:9999999ZZ

Ingred Name:EFTS OF OVEREXP:DISEASE, INCL LEUKEMIA, AFTER RPTD & PRLNGD EXPOS @ HIGH CONC.INHAL TO 100 PPM MAY CAUSE SLIGHT (ING 12)

RTECS #:9999999ZZ

Ingred Name:ING 11:DROW & HDCH. 100-200 PPM MAY CAUSE FATG, NAUS, ITCH & WILL FATG OLFATORY SENSES.IMMED DANGER TO HLTH/ (ING 13)

RTECS #:9999999ZZ

Ingred Name:ING 12:LIFE IS REPRESENTED BY 2,000 PPM. INGEST & INHAL OF LIQ &/OR EXCESS VAPS CAN HAVE AN ANESTH EFT, CAUSE (ING 14)

RTECS #:9999999ZZ

Ingred Name:ING 13:VERTIGO, BLURRED VISION, VOMIT & CYANOSIS. OVEREXP MAY CAUSE CNS DEPRESS. NOTE: TOLUENE CAS# 108-88-3 (ING 15)

RTECS #:9999999ZZ

Ingred Name:ING 14:APPEARS ON NAVY LIST OF OCCUP REPROD HAZ. SEEK CONSULTATION FROM APPROP HLTH PROFESSIONALS CONCERNING (ING 16)

RTECS #:9999999ZZ

Ingred Name:ING 15:LATEST HAZ LIST INFO & SAFE HANDLING AND EXPOSURE RECOMMENDATION .

RTECS #:9999999ZZ

Ingred Name:SPILL PROC: ANIMAL/AQUATIC LIFE. CAUTION-EVAC ALL NON-ESSENTIAL PERS. SPILLED MATL MAY CAUSE SLIPPERY CNDTNS. (ING 18)

RTECS #:9999999ZZ

Ingred Name:GASOLINE CONTAINING INGS 2-7

CAS:8006-61-9

RTECS #:LX3300000

Fraction by Wt: 100%

OSHA PEL:300 PPM;500 STEL

ACGIH TLV:300 PPM;500 STEL

===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES

Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:YES

Health Hazards Acute and Chronic:ACUTE/CHRONIC: HARMFUL/FATAL IF SWALLOWED/ASPIRATED. LONG TERM EXPOS TO VAPS HAS CAUSED CANCER IN SOME LAB ANIMALS. INGEST MAY CAUSE GI DISTURB. ASPIR INTO LUNGS MAY CAUSE PNEUM. PRLNGD CONT W/SKIN MA Y RSLT IN DEFAT/RED, ITCH, INFLAMM, CRACK & POSS SECONDARY INFECTION. HAS A LOW ORDER OF ACUTE ORAL TOX(EFTS OF OVEREXP)

Explanation of Carcinogenicity:BENZENE: OSHA REG 29 CFR 1910.1028, REV JUL 92; KNOWN CARCINOGEN (NTP) NTP 6TH ANN RPT, 1991; IARC 2B,VOL45,P159,1989.

Effects of Overexposure:HLTH HAZ:IF INGESTED, BUT MIN AMTS ASPIRATED DURING SUCH INGEST MAY CAUSE DEATH. HIGH PRESS SKIN INJECTIONS ARE SERIOUS MED EMER! RPTD/PRLNGD EXPOS TO VAPS CNTNG HIGH CONC OF BENZENE MAY CAUSE ANEMIA & OTHER BLOOD DISEASES, INCL LEUKEMIA. BENZENE IS RECOGNIZED AS HAVING POTNTL TO INDUCE ANEMIA & OTHER BLOOD (ING 11)

Medical Cond Aggravated by Exposure:OPEN WOUNDS, SKIN DISORDERS, CHRONIC RESPIRATORY DISEASE OR PRE-EXISTING CENTRAL NERVOUS SYSTEM

DISEASE.

=====
 ===== First Aid Measures =====

First Aid:INHAL: REMOVE TO FRESH AIR, PROVIDE OXYGEN THERAPY &/OR RESUSCITATION AS INDICATED. SKIN: REMOVE CONTAMINATED CLOTHING & FLUSH WITH SOAP AND WATER. EYE: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. INGEST: RINSE MOUTH W/WATER. KEEP CALM AND WARM. DO NOT INDUCE VOMIT! ASPIRATION OF MATERIAL INTO LUNGS MAY CAUSE CHEMICAL PNEUMONIA. CALL PHYSICIAN IMMEDIATELY.

=====
 ===== Fire Fighting Measures =====

Flash Point Method:TCC
 Flash Point:-40F,-40C
 Lower Limits:1.4%
 Upper Limits:7.4%
 Extinguishing Media:ANY APPRVD EXTING AGENT FOR CLASS B FIRES, DRY CHEM, FOAM, CARBON DIOXIDE/HALON. WATER IS NOT EFFECTIVE. (SUPP DATA)
 Fire Fighting Procedures:NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP. AVOID INHAL OF VAPS. WATER SHOULD BE USED TO KEEP EXPOS CONTRS COOL. APPROACH FROM UPWIND IF POSSIBLE.
 Unusual Fire/Explosion Hazard:CLASS 1A FLAMM LIQ. KEEP AWAY FROM HEAT, SOURCES OF IGNIT & OXIDIZERS. BURNING MAY CAUSE EMISSION OF TOX PROD OF COMBUST. EMPTY PROD CNTRS/VESSELS (SUPP DATA)

=====
 ===== Accidental Release Measures =====

Spill Release Procedures:CONTN ALL SPILLS. ABSORB ALL FREE LIQ. REMOVE ALL IGNIT SOURCES & SAFELY STOP FLOW OF SPILL. PVNT FROM ENTERING ALL BODIES OF WATER. COMPLY W/ALL APPLIC LAWS & REGS. ABSORB MATL, PADS, SAND/EARTH MAY BE USED. CONTAM WATER/SOIL MAY BE HAZ TO (ING 17)
 Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

=====
 ===== Handling and Storage =====

Handling and Storage Precautions:KEEP AWAY FROM HEAT, SPARKS & OPEN FLAME. AVOID BRTHG VAP/MIST. AVOID SKIN/EYE CONTACT. KEEP CONTAINERS CLOSED & PLAINLY LABELED.
 Other Precautions:TRANSFER LINES MUST BE BONDED & GROUNDED TO PVNT POTNTL ACCUMULATION OF STATIC ELEC. NO SMOKING IN AREAS OF HNDLG/STOR. STOR SHOULD BE IN TIGHTLY CLSD CONTRS IN COOL, DRY, ISOLATED & WELL VENTD AREA A WAY FROM POTNTL SOURCE OF (ING 21)

=====
 ===== Exposure Controls/Personal Protection =====

Respiratory Protection:NIOSH/MSHA APPRVD SELF CNTND, POSITIVE PRESSURE, BREATHING APPARATUS IN CONFINED SPACES/WHEN EXPOSED TO HEAVY MIST.
 Ventilation:LOCAL EXHAUST: GENERALLY NOT REQD. MECH(GEN): EXPLOSION PROOF (APPROVED FOR CLASSIFIED AREA). SPECIAL: NONE REQUIRED.
 Protective Gloves:IMPERVIOUS.
 Eye Protection:CHEM WORK GOG OR FULL LNGTH FSHLD.
 Other Protective Equipment:IMPERVIOUS CLOTHING AS REQUIRED TO PREVENT SKIN CONTACT. EYE WASH/BATH READILY AVAILABLE WHERE EYE CONTACT IS POSSIBLE.
 Work Hygienic Practices:WASH SKIN THORO W/SOAP & WATER BEFORE EATING, DRINK/SMOKING. VENT MAY BE USED TO CTL/REDUCE AIRBORNE CONC. STAND (ING 25)

Supplemental Safety and Health

VP: 275-475@68F (VARIES SEASONALLY). APPEAR/ODOR: (CLEAR RED, BRONZE & YELLOW ARE TYPICAL). EXTING MEDIA: HOWEVER, WATER FOG MAY BE USED BY EXPER FIRE FIGHTERS FOR INTENSITY CTL, & TO COOL EXPOSED ARE AS. EXPLO HAZ: MAY CNTN EXPLOS VAPS. DONOT PRESSURIZE, CUT, HEAT, WELD/EXPOSE SUCH CONTRS/VESSELS TO SOURCE OF (ING 8)

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:>85F,>29.4C
Vapor Pres:SUPP DATA
Vapor Density:3-4
Spec Gravity:0.76(H*20=1)
Evaporation Rate & Reference:10-11(BUTYL ACETATE=1)
Solubility in Water:SLIGHT
Appearance and Odor:CLEAR LIQ W/CHARACT AROMATIC ODOR.MAY BE DYED FOR IDENTIFICATION (SUPP DATA)
Percent Volatiles by Volume:100

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES
OXIDIZING AGENTS. COMBINATION OF NITRIC AND SULFURIC ACIDS.
Stability Condition to Avoid:AVOID HANDLING OR STORING NEAR HEAT, SPARKS/OPEN FLAME.
Hazardous Decomposition Products:CONTACT WITH NITRIC AND SULFURIC ACIDS WILL FORM NITROCRESOLS THAT CAN DECOMPOSE VIOLENTLY.

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSE OF PROD & CONTAMD MATL AS EPA "IGNITABLE HAZ WASTE". USE ONLY APPRVD TRTMT TRANSPORTERS & DISP SITE IN COMPLIANCE W/ALL APPLIC FED, ST & LOC REGS . MAINTAIN SURVEILLANCE OF ABSORBED MATL UNTIL FINAL DISP TO OBSERVE FOR EMISSION (ING 20)

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SAFETY DATA SHEET

Creation Date 26-Sep-2009

Revision Date 19-Jan-2015

Revision Number 1

1. Identification

Product Name Propylbenzene

Cat No. : AC418430000; AC418430250; AC418431000; AC418435000

Synonyms 1-Phenyl Propane.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company	Entity / Business Name	Emergency Telephone Number
Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410 Tel: (201) 796-7100	Acros Organics One Reagent Lane Fair Lawn, NJ 07410	For information US call: 001-800-ACROS-01 / Europe call: +32 14 57 52 11 Emergency Number US :001-201-796-7100 / Europe : +32 14 57 52 99 CHEMTREC Tel. No. US :001-800-424-9300 / Europe :001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Aspiration Toxicity	Category 1

Label Elements

Signal Word

Danger

Hazard Statements

Flammable liquid and vapor
May be fatal if swallowed and enters airways
May cause respiratory irritation



Precautionary Statements**Prevention**

Avoid breathing dust/fume/gas/mist/vapors/spray
 Use only outdoors or in a well-ventilated area
 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
 Keep container tightly closed
 Ground/bond container and receiving equipment
 Use explosion-proof electrical/ventilating/lighting/equipment
 Use only non-sparking tools
 Take precautionary measures against static discharge
 Wear protective gloves/protective clothing/eye protection/face protection
 Keep cool

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
 Call a POISON CENTER or doctor/physician if you feel unwell

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

Ingestion

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
 Do NOT induce vomiting

Fire

In case of fire: Use CO₂, dry chemical, or foam for extinction

Storage

Store locked up
 Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Propyl benzene	103-65-1	98

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Obtain medical attention.
Ingestion	Do not induce vomiting. Call a physician or Poison Control Center immediately.
Most important symptoms/effects	Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray. Carbon dioxide (CO ₂). Dry chemical. Use water spray to cool unopened containers. chemical foam.
-------------------------------------	---

Unsuitable Extinguishing Media	No information available
Flash Point	47 °C / 116.6 °F
Method -	No information available
Autoignition Temperature	450 °C / 842 °F
Explosion Limits	
Upper	6.00%
Lower	.80%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO₂)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health
1

Flammability
3

Instability
0

Physical hazards
N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition.
Environmental Precautions	See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling	Ensure adequate ventilation. Wear personal protective equipment. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Use explosion-proof equipment. Use only non-sparking tools. Wash hands before breaks and immediately after handling the product.
Storage	Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.
Engineering Measures	Ensure adequate ventilation, especially in confined areas.
Personal Protective Equipment	
Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Light yellow
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-99 °C / -146.2 °F
Boiling Point/Range	158 °C / 316.4 °F @ 760 mmHg
Flash Point	47 °C / 116.6 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	6.00%
Lower	.80%
Vapor Pressure	No information available
Vapor Density	4.1
Relative Density	0.860
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	450 °C / 842 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C9 H12
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Propyl benzene	6040 mg/kg (Rat)	Not listed	65000 ppm (Rat) 2 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation May cause eye, skin, and respiratory tract irritation

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Propyl benzene	103-65-1	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard Category 1

Symptoms / effects, both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility

Component	log Pow
Propyl benzene	3.68

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN2364
Proper Shipping Name N-PROPYL BENZENE
Hazard Class 3
Packing Group III

TDG

UN-No UN2364
Proper Shipping Name N-PROPYL BENZENE
Hazard Class 3
Packing Group III

IATA

UN-No UN2364
Proper Shipping Name n-PROPYLBENZENE
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No UN2364
 Proper Shipping Name PROPYL BENZENE
 Hazard Class 3
 Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Propyl benzene	X	X	-	203-132-9	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicableCERCLA
Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Propyl benzene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B2 Flammable liquid
D2B Toxic materials

**16. Other information**

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 26-Sep-2009
Revision Date 19-Jan-2015
Print Date 19-Jan-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS



**Material Safety
Data Sheets**

[Division of Facilities Services](#)

DOD Hazardous Material Information (ANSI Format) For Cornell University Convenience Only

BENZO (A) PYRENE, MD-1956

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Composition/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification BENZO (A) PYRENE, MD-1956

Product Identification: BENZO (A) PYRENE, MD-1956

Date of MSDS: 03/25/1986 **Technical Review Date:** 09/30/1992

FSC: 6810 **NIIN:** LIIN: 00N034844

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: MERCK FROSST CANADA INC
Post Office Box: 899
Manufacturer's Address1:
Manufacturer's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, NK 00000
Manufacturer's Country: NK
General Information Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
Emergency Telephone: 800-325-9034;514-697-2823
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 09578
Special Project Code: N

Contractor Information

Contractor's Name: MERCK FROSST CANADA INC
Contractor's Address1: UNKNOWN
Contractor's Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000
Contractor's Telephone: 800-325-9034; 514-697-2823
Contractor's CAGE: 09578

Section 2 - Compositon/Information on Ingredients BENZO (A) PYRENE, MD-1956

Ingredient Name: BENZO (A) PYRENE
Ingredient CAS Number: 50-32-8 **Ingredient CAS Code:** M
RTECS Number: DJ3675000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >99
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.2 MG/M3 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: A2, MG/M3;9394 **ACGIH TLV Code:** M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview BENZO (A) PYRENE, MD-1956

Health Hazards Acute & Chronic: CANCER SUSPECT (GASTRIC), MUTAGENIC, NEOPLASTIC.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES

Skin: NO

Ingestion: YES

Carcenogenicity Indicators

NTP: YES

IARC: YES

OSHA: NO

Carcinogenicity Explanation: BENZO (A) PYRENE: GROUP 2A (IARC), ANTICIPATED TO BE A CARCINOGEN (NTP).

Section 4 - First Aid Measures BENZO (A) PYRENE, MD-1956

First Aid:

SUMMON A PHYSICIAN. SKIN: WASH WITH WATER. INHALATION: REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION OR OXYGEN IF NECESSARY. INGESTION: GIVE WATER AND INDUCE VOMITING. MEDICAL ASSISTANCE FOR GASTRIC LAV AGE. EYE: FLUSH WITH WATER FOR AT LEAST 15 MINUTES (FP N).

Section 5 - Fire Fighting Measures BENZO (A) PYRENE, MD-1956

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

NONE SPECIFIED BY MANUFACTURER.

Extinguishing Media:

CO*2, DRY CHEMICAL, ALCOHOL FOAM.

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
BENZO (A) PYRENE, MD-1956

Spill Release Procedures:

PROVIDE GOOD VENTILATION. CAREFULLY SCOOP UP AND TRANSFER TO A CLOSED CONTAINER.

Section 7 - Handling and Storage
BENZO (A) PYRENE, MD-1956

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
BENZO (A) PYRENE, MD-1956

Respiratory Protection:

WEAR NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS.

Ventilation:

LOCAL EXHAUST: STRONG FUMEHOOD.

Protective Gloves:

RUBBER GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: PROTECTIVE CLOTHING. PROVIDE SAFETY SHOWER AND EYEWASH STATION NEAR WORKPLACE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
BENZO (A) PYRENE, MD-1956

HCC: N1

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 594F,312C

Melting/Freezing Point: Melting/Freezing Text: 354F,179C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/K Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: N/K

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: <0.1

Appearance and Odor: YELLOW SOLID.

Percent Volatiles by Volume: LOW

Corrosion Rate: N/K

**Section 10 - Stability & Reactivity Data
BENZO (A) PYRENE, MD-1956**

Stability Indicator: YES

Materials to Avoid:

STRONG OXIDIZING AGENTS.

Stability Condition to Avoid:

NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:

CARBON MONOXIDE, CARBON DIOXIDE ON COMBUSTION.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT.

**Section 11 - Toxicological Information
BENZO (A) PYRENE, MD-1956**

Toxicological Information:

N/P

**Section 12 - Ecological Information
BENZO (A) PYRENE, MD-1956**

Ecological Information:

N/P

**Section 13 - Disposal Considerations
BENZO (A) PYRENE, MD-1956**

Waste Disposal Methods:

VIA LICENSED DISPOSAL COMPANY. DISPOSE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).

**Section 14 - MSDS Transport Information
BENZO (A) PYRENE, MD-1956**

Transport Information:

N/P

**Section 15 - Regulatory Information
BENZO (A) PYRENE, MD-1956**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
BENZO (A) PYRENE, MD-1956

Other Information:

N/P

HMIS Transportation Information**Product Identification:** BENZO (A) PYRENE, MD-1956**Transportation ID Number:** 39315**Responsible Party CAGE:** 09578**Date MSDS Prepared:** 03/25/1986**Date MSDS Reviewed:** 02/17/1993**MFN:** 02/17/1993**Submitter:** N TN**Status Code:** C**Container Information****Unit of Issue:** NK**Container Quantity:** NK**Type of Container:****Net Unit Weight:****Article without MSDS:** N**Technical Entry NOS Shipping Number:****Radioactivity:****Form:****Net Explosive Weight:****Coast Guard Ammunition Code:****Magnetism:** N/P**AF MMAC Code:****DOD Exemption Number:****Limited Quantity Indicator:****Multiple Kit Number:** 0**Kit Indicator:** N**Kit Part Indicator:** N**Review Indicator:** Y**Additional Data:**

NOT REGULATED FOR TRANSPORTATION

Department of Transportation Information**DOT Proper Shipping Name:** NOT REGULATED BY THIS MODE OF TRANSPORTATION**DOT PSN Code:** ZZZ**Symbols:** N/R**DOT PSN Modifier:****Hazard Class:** N/R**UN ID Number:** N/R**DOT Packaging Group:** N/R**Label:** N/R**Special Provision(s):** N/R**Packaging Exception:** N/R**Non Bulk Packaging:** N/R

Bulk Packaging: N/R
Maximum Quantity in Passenger Area: N/R
Maximum Quantity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

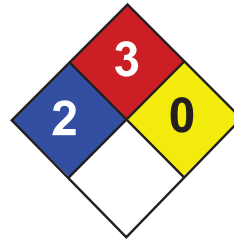
AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: BENZO (A) PYRENE, MD-1956
CAGE: 09578
Assigned Individual: N
Company Name: MERCK FROSST CANADA INC
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: POINTE CLAIRE-DORVAL, QUEBEC, CANADA, PQ 00000 US
Health Emergency Telephone: 800-325-9034;514-697-2823
Label Required Indicator: Y

Date Label Reviewed: 09/30/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/30/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: Y
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: WARNING
Health Hazard: Slight
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None

8/8/2002 7:08:14 PM



Health	2
Fire	3
Reactivity	0
Personal Protection	H

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; $\log(\text{oil/water}) = 2.7$

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 abrasions. 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, Hypophosphatemia), 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.

HMS (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

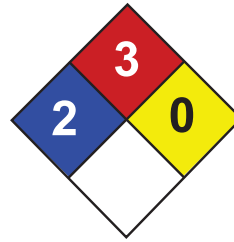
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 06/09/2012 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

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; $\log(\text{oil/water}) = 3.1$

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 female 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 also cause 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.

Created: 10/11/2005 12:54 PM

Last Updated: 06/09/2012 12:00 PM

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ATTACHMENT D

Standard Safe Work Practices

- 1) Eating, drinking, chewing tobacco, smoking and carrying matches or lighters is prohibited in a contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.
- 2) Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., ground, etc.).
- 3) All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved; i.e., presence of strong and irritating or nauseating odors.
- 4) Prevent, to the extent possible, spills. In the event that a spillage occurs, contain liquid if possible.
- 5) Field crew members shall be familiar with the physical characteristics of investigations, including:
 - Wind direction
 - Accessibility to associates, equipment, vehicles
 - Communication
 - Hot zone (areas of known or suspected contamination)
 - Site access
 - Nearest water sources
- 6) All wastes generated during activities on-site should be disposed of as directed by the project manager or his on-site representative.
- 7) Protective equipment as specified in the section on personnel protection will be utilized by workers during the initial site reconnaissance, and other activities.

Employees shall follow procedures to avoid at-risk behaviors that could result in an incident.

APPENDIX C

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 ground intrusive 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 non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

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.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ 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

APPENDIX D

Quality Assurance Project Plan

for

**KELLER HOTEL SITE
144-150 BARROW STREET
New York, New York
NYSDEC BCP No. C231092**

Prepared For:

**144-150 Barrow Street LLC
544 Hudson Street
New York, New York 10014**

Prepared By:

**Langan Engineering, Environmental, Surveying
and Landscape Architecture, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001**

**July 2015
170170901**

LANGAN

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is for the Keller Hotel Site, a 7,300 square-foot (± 0.17 acres) property at 144-150 Barrow Street (the "site") in New York, New York. The site was entered into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) by 144-150 Barrow Street LLC (the owner), as a Participant on June 16, 2015. BCP Site No. C231092 was assigned to the Site by NYSDEC. Additional information including site maps and data collected previously by Langan and others is provided in the Remedial Investigation Report (RIR) and Interim Remedial Measures (IRM) Work Plan.

This QAPP specifies analytical methods to be used to ensure that data collected during the remedial action are precise, accurate, representative, comparable, complete, and meet the sensitivity requirements of the project.

1.2 PROJECT OBJECTIVES

The environmental objectives of the IRM Work Plan include the following:

- Performance of a geophysical survey, after the contents of building on Lot 30 are removed, to identify remnant buried tank structures and associated piping;
- Excavation and off-site disposal of petroleum-impacted soil, to the extent practical within the garage building on Lot 30.
- Decommission underground storage tanks (USTs), if encountered.
- Backfilling the excavation with recycled concrete aggregate (RCA)
- Collection and analysis of documentation soil samples; and
- Development and execution of a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) for the protection of on-site workers, the community, and the environment during remediation and construction activities; and

Accordingly, this QAPP addresses sampling and analytical methods that are necessary as part of the redevelopment. These objectives have been established in order to meet standards that will protect public health and the environment for the site.

1.3 SCOPE OF WORK

Implementation of the IRMWPs will include waste characterization sampling; handling of contaminated soil; and post excavation documentation soil sampling. Disturbed soil will be sampled for laboratory analysis per disposal facility requirements, and visually examined, screened, and characterized to determine whether it is suitable for re-use or will be properly disposed at an approved disposal facility. A dust, odor, and organic vapor control and monitoring plan will be implemented during ground intrusive activities.

The following activities will be performed as part of the IRM:

- Waste Characterization Soil Sampling - Soil samples for waste classification and disposal purposes will be collected during remedial excavation. Soil samples will be collected at a frequency depending on the disposal facility requirements. Laboratory tests for characterization of a waste stream typically include all or a subset of the following list and will be determined by the facility's permit requirements: NYSDEC Part 375-list and NJ DEP-listed volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs); polychlorinated biphenyls (PCBs); metals, including hexavalent chromium, total cyanide), pesticides and herbicides; the Resource Conservation and Recovery Act (RCRA) hazardous characteristics of ignitability, corrosivity, and reactivity; RCRA toxicity characteristic using the Toxic Characteristics Leaching Procedure (TCLP) metals; Total Petroleum Hydrocarbons (TPH) Diesel Range Organics (DRO) and/or Gasoline Range Organics (GRO), and paint filter.
- Documentation Soil Sampling - Soil samples of the soil/fill remaining on site after excavation will be collected to document the quality of soil remaining following source removal. Documentation samples will be collected from the bottom of the excavation at a frequency of 1 per 900 square feet in accordance with NYSDEC DER-10. Sidewall endpoint samples will be collected at a frequency of one per 30 linear feet of sidewall. Documentation and sidewall samples will be analyzed for Part 375 listed VOCs, SVOCs, pesticides and metals.

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQOs) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall objective is document the soil remaining at the Site after excavation through the collection of soil samples. DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and QA/QC documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- **Precision** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and/or matrix spike duplicates.
- **Accuracy** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. For soil samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.
- **Representativeness** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a

sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOPs), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

- **Completeness** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- **Comparability** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in the QAPP, using standard reporting units and reporting formats, and data validation.
- **Sensitivity** – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

3.0 PROJECT ORGANIZATION

The Remedial Action will be overseen by Langan on behalf of 144-150 Barrow Street LLC. Langan will oversee implementation of the IRMWPs, including excavation of petroleum-impacted soil and loading of material for off-site disposal, and backfill. Langan will collect waste characterization and documentation samples as required by the IRM Work Plan.

The analytical services will be performed by York Analytical Laboratories, Inc. or another NYSDOH ELAP-approved laboratory. Data validation services will be performed by Emily Strake.

Key contacts for this project are as follows:

144-150 Barrow Street, LLC:

Mr. Neil Bender
Telephone: (212) 989-3100

Langan Project Manager:

Mr. Michael Burke, CHMM
Telephone: (212) 479-5582

Langan Quality Assurance Officer (QAO):

Ms. Jennifer Armstrong
Telephone: (212) 479-5537

Program Quality Assurance Monitor:

Ms. Julia Leung
Telephone: (212) 479-5452

Data Validator:

Ms. Emily Strake
Telephone: (215) 491-6526

Laboratory Representative:

York Analytical Laboratories, Inc.
Phil Murphy
Telephone: (203) 598-1371

Resumes for the above listed are provided in attachment A.

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA

The overall quality assurance objective is to develop and implement procedures for sampling, laboratory analysis, field measurements, and reporting that will provide data of sufficient quality to evaluate the engineering controls on the Site. The sample set, chemical analysis results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the Site. Quality assurance objectives are usually expressed in terms of accuracy or bias, sensitivity, completeness, representativeness, comparability, and sensitivity of analysis. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

4.1 PRECISION

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 2x the reporting limit (RL) meet the precision criteria if the absolute difference is less than $\pm 2x$ the RL and acceptable based on professional judgement. For results greater than 2x the RL, the acceptance criteria is a relative percent difference (RPD) of $\leq 50\%$. RLs and method detection limits (MDL) are provided in Attachment B.

4.2 ACCURACY

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of field blanks and through compliance to all sample handling, preservation, and holding time requirements. All field blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an

associated field blank will be evaluated against laboratory blanks (preparation or method) and evaluated against field samples collected on the same day to determine potential for bias. Trip blanks are not required for non-aqueous matrices but are planned for non-aqueous matrices where high concentrations of VOCs are anticipated.

Laboratory accuracy is assessed by evaluating the percent recoveries of matrix spike/matrix spike duplicate (MS/MSD) samples, laboratory control samples (LCS), surrogate compound recoveries, and the results of method preparation blanks. MS/MSD, LCS, and surrogate percent recoveries will be compared to either method-specific control limits or laboratory-derived control limits. Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

4.3 COMPLETENESS

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Soil data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

4.4 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the

sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. This is performed by following applicable standard operating procedures (SOPs) and this QAPP. All field technicians will be given copies of appropriate documents prior to sampling events and are required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is performed by following all applicable EPA methods, laboratory-issued SOPs, the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

4.5 COMPARABILITY

Comparability is an expression of the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the sampling plan is followed and that sampling is performed according to the SOPs or other project-specific procedures. Analytical data will be comparable when similar sampling and analytical methods are used as documented in the QAPP. Comparability will be controlled by requiring the use of specific nationally-recognized analytical methods and requiring consistent method performance criteria. Comparability is also dependent on similar quality assurance objectives. Previously collected data will be evaluated to determine whether they may be combined with contemporary data sets.

4.6 SENSITIVITY

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest. The project director will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the project director will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and

submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the reporting limit.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in DER-10, and as described in Section 5.3.

Site-specific MS and MSD samples will be prepared and analyzed by the analytical laboratory by spiking an aliquot of submitted sample volume with analytes of interest. Additional sample volume is not required by the laboratory for this purpose. An MS/MSD analysis will be analyzed at a rate of 1 out of every 20 samples, or one per analytical batch.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

Soil sampling will be conducted in accordance with the established NYSDEC protocols contained in DER-10/Technical Guidance for Site Investigation and Remediation (May 2010). The following sections describe procedures to be followed for specific tasks.

5.1 FIELD DOCUMENTATION PROCEDURES

Field documentation procedures will include summarizing field data in field books, and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability, and secure page binding. The pages of the notebook will not be removed.

Entries will be made in waterproof, permanent blue or black ink. No erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the change. Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number
- Reasons for being on-site or taking the sample
- Date and time of activity
- Sample identification numbers
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches will be made in the field logbook when appropriate

- Physical location of sampling locations such as depth below ground surface
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures
- Description of the sample including physical characteristics, odor, etc.
- Readings obtained from health and safety equipment
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.
- Names of sampling personnel and signature of persons making entries

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

5.1.2 Sample Labeling

Each sample collected will be assigned a unique identification number in accordance with the sample nomenclature guidance included in Attachment D, and placed in an appropriate sample container. Each sample container will have a sample label affixed to the outside with the date and time of sample collection and project name. In addition, the label will contain the sample identification number, analysis required and chemical preservatives added, if any. All documentation will be completed in waterproof ink.

5.2 EQUIPMENT CALIBRATION AND PREVENTATIVE MAINTENANCE

A PID will be used during the sampling activities to evaluate work zone action levels and screen soil samples. Field calibration and/or field checking of the PID will be the

responsibility of the field team leader and the site HSO, and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)
- Reference standard used for calibration
- Calibration and/or maintenance procedure used
- Other pertinent information

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by qualified personnel. A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

5.3 SAMPLE COLLECTION

Soil Samples

Soil samples will be visually classified and field screened using a PID to assess potential impacts from VOCs and for health and safety monitoring. Soil samples collected for analysis of VOCs will be collected using either EnCore® or Terra Core® sampling

equipment. For analysis of non-volatile parameters, samples will be homogenized and placed into glass jars. After collection, all sample jars will be capped and securely tightened, and placed in iced coolers and maintained at $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected soil samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected soil sample will meet all quality assurance criteria set forth by this QAPP and DER-10.

Sample Field Blanks and Duplicates

Field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative samples per matrix. Field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blank samples will be analyzed for the complete list of analytes on the day of sampling. Trip blanks will be collected at a rate of one per day if soil samples are analyzed for VOCs during that day.

Duplicate soil samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative samples per matrix and will be submitted to the laboratory as “blind” samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

5.4 SAMPLE CONTAINERS AND HANDLING

Certified, commercially clean sample containers will be obtained from the analytical laboratory. The laboratory will also prepare and supply the required field blank sample containers and reagent preservatives. Sample bottle containers, including the field blank containers, will be placed into plastic coolers by the laboratory. These coolers will be received by the field sampling team within 24 hours of their preparation in the laboratory. Prior to the commencement of field work, Langan field personnel will fill the plastic coolers with ice in Ziploc® bags (or equivalent) to maintain a temperature of $4^{\circ} \pm 2^{\circ}\text{C}$.

Soil samples collected in the field for laboratory analysis will be placed directly into the laboratory-supplied sample containers. Samples will then be placed and stored on-ice in laboratory provided coolers until shipment to the laboratory. The temperature in the coolers containing samples and associated field blanks will be maintained at a temperature of $4^{\circ}\pm 2^{\circ}\text{C}$ while on-site and during sample shipment to the analytical laboratory.

Possession of samples collected in the field will be traceable from the time of collection until they are analyzed by the analytical laboratory or are properly disposed. Chain-of-custody procedures, described in Section 5.9, will be followed to maintain and document sample possession. Samples will be packaged and shipped as described in Section 5.6.

5.5 SAMPLE PRESERVATION

Sample preservation measures will be used in an attempt to prevent sample decomposition by contamination, degradation, biological transformation, chemical interactions and other factors during the time between sample collection and analysis. Preservation will commence at the time of sample collection and will continue until analyses are performed. Should chemical preservation be required, the analytical laboratory will add the preservatives to the appropriate sample containers before shipment to the office or field. Samples will be preserved according to the requirements of the specific analytical method selected, as shown in Attachment C.

5.6 SAMPLE SHIPMENT

5.6.1 Packaging

Soil sample containers will be placed in plastic coolers. Ice in Ziploc[®] bags (or equivalent) will be placed around sample containers. Cushioning material will be added around the sample containers if necessary. Chains-of-custody and other paperwork will be placed in a Ziploc[®] bag (or equivalent) and placed inside the cooler. The cooler will be taped closed and custody seals will be affixed to one side of the cooler at a minimum. If the samples are being shipped by an express delivery company (e.g. FedEx) then laboratory address labels will be placed on top of the cooler.

5.6.2 Shipping

Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

- All environmental samples will be transported to the laboratory by a laboratory-provided courier under the chain-of-custody protocols described in Section 5.9.
- Prior notice will be provided to the laboratory regarding when to expect shipped samples. If the number, type or date of shipment changes due to site constraints or program changes, the laboratory will be informed.

5.7 DECONTAMINATION PROCEDURES

Decontamination procedures will be used for non-dedicated sampling equipment. Decontamination of field personnel is discussed in the Construction Health and Safety Plan (CHASP) included in Appendix F of the RAWP. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
2. Generous tap water rinse
3. Distilled/de-ionized water rinse

5.8 RESIDUALS MANAGEMENT

Debris (e.g., paper, plastic and disposable PPE) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings) will be placed back in the borehole from which it was sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the Site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

5.9 CHAIN OF CUSTODY PROCEDURES

A chain-of-custody protocol has been established for collected samples that will be followed during sample handling activities in both field and laboratory operations. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through shipping, storage and analysis to data reporting and disposal. Chain-of-custody refers to actual possession of the samples. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except the shipping courier, is responsible for sample integrity and safe keeping. Chain-of-custody procedures are provided below:

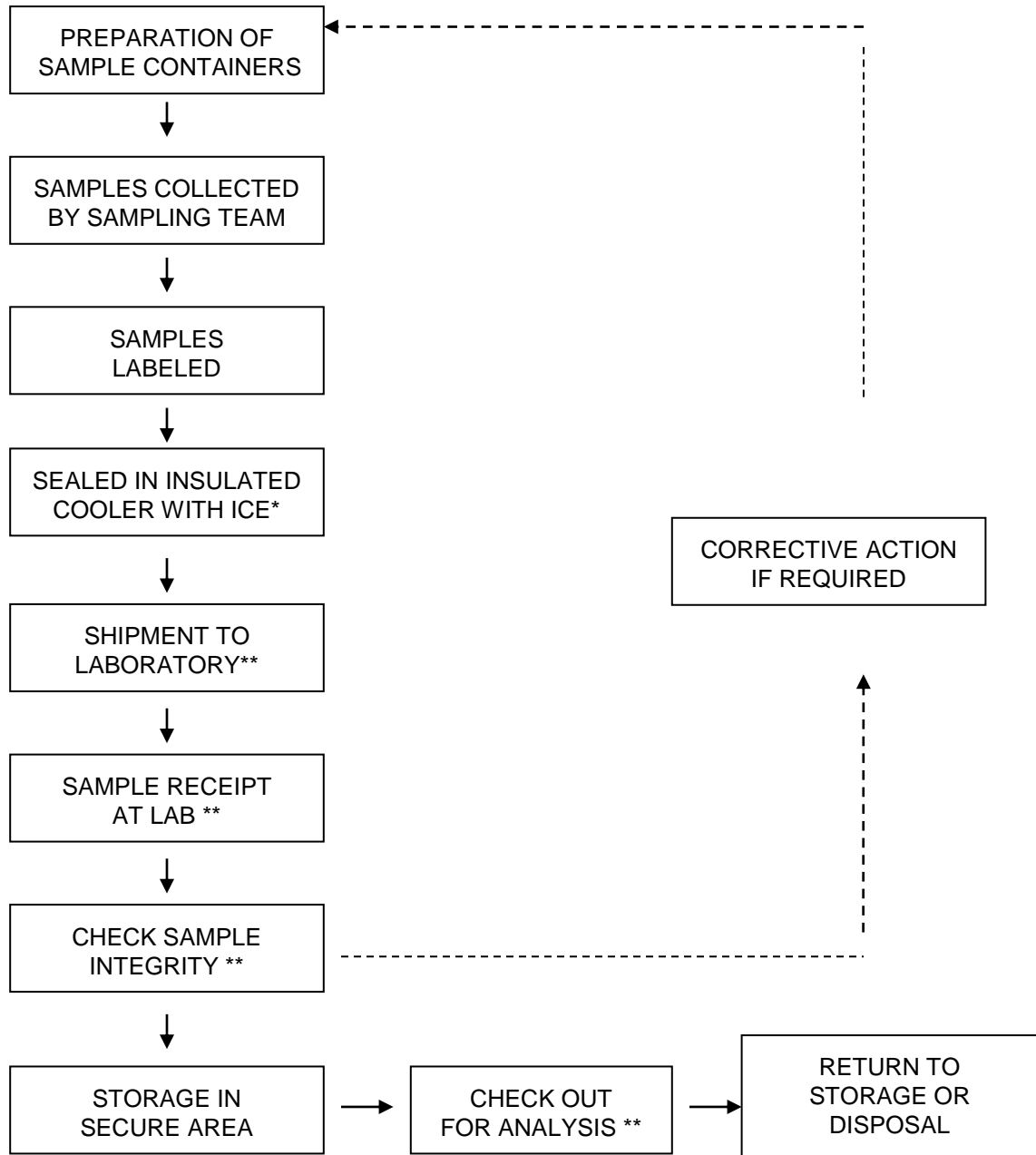
- Chain-of-custody will be initiated by the laboratory supplying the pre-cleaned and prepared sample containers. Chain-of-custody forms will accompany the sample containers.
- Following sample collection, the chain-of-custody form will be completed for the sample collected. The sample identification number, date and time of sample collection, analysis requested and other pertinent information (e.g., preservatives) will be recorded on the form. All entries will be made in waterproof, permanent blue or black ink.
- Langan field personnel will be responsible for the care and custody of the samples collected until the samples are transferred to another party, dispatched to the laboratory, or disposed. The sampling team leader will be responsible for enforcing chain-of-custody procedures during field work.
- When the form is full or when all samples have been collected that will fit in a single cooler, the sampling team leader will check the form for possible errors and sign the chain-of-custody form. Any necessary corrections will be made to the record with a single strike mark, dated, and initialed.

Sample coolers will be accompanied by the chain-of-custody form, sealed in a Ziploc[®] bag (or equivalent) and placed on top of the samples or taped to the inside of the cooler lid. If applicable, a shipping bill will be completed for each cooler and the shipping bill number recorded on the chain-of-custody form.

Samples will be packaged for shipment to the laboratory with the appropriate chain-of-custody form. A copy of the form will be retained by the sampling team for the project file and the original will be sent to the laboratory with the samples. Bills of lading will

also be retained as part of the documentation for the chain-of-custody records, if applicable. When transferring custody of the samples, the individuals relinquishing and receiving custody of the samples will verify sample numbers and condition and will document the sample acquisition and transfer by signing and dating the chain-of-custody form. This process documents sample custody transfer from the sampler to the analytical laboratory. A flow chart showing a sample custody process is included as Figure 5.1, and chain-of-custody forms from York are included as Figures 5.2 and 5.3.

Figure 5.1 Sample Custody



*SUMMA CANISTERS SHOULD NOT BE ICED
** REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

Laboratory chain-of-custody will be maintained throughout the analytical processes as described in the laboratory's Quality Assurance Manual. The analytical laboratory will provide a copy of the chain-of-custody in the analytical data deliverable package. The chain-of-custody becomes the permanent record of sample handling and shipment.

5.10 LABORATORY SAMPLE STORAGE PROCEDURES

The subcontracted laboratory will use a laboratory information management system (LIMS) to track and schedule samples upon receipt by the analytical laboratories. Any sample anomalies identified during sample log-in must be evaluated on individual merit for the impact upon the results and the data quality objectives of the project. When irregularities do exist, the environmental consultant must be notified to discuss recommended courses of action and documentation of the issue must be included in the project file.

For samples requiring thermal preservation, the temperature of each cooler will be immediately recorded. Each sample and container will be assigned a unique laboratory identification number and secured within the custody room walk-in coolers designated for new samples. Samples will be, as soon as practical, disbursed in a manner that is functional for the operational team. The temperature of all coolers and freezers will be monitored and recorded using a certified temperature sensor. Any temperature excursions outside of acceptance criteria (i.e., below 2°C or above 6°C) will initiate an investigation to determine whether any samples may have been affected. Samples for VOCs will be maintained in satellite storage areas within the VOC laboratory. Following analysis, the laboratory's specific procedures for retention and disposal will be followed as specified in the laboratory's SOPs and/or QA manual.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

6.1 INTRODUCTION

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

6.2 DATA REDUCTION

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQulS. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

6.3 DATA VALIDATION

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of the QC sample results,
- Verification of the identification of sample results (both positive hits and non-detects),
- Recalculation of 10% of all investigative sample results, and
- Preparation of Data Usability Summary Reports (DUSR).

A DUSR will be prepared and reviewed by the QAO before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup (if applicable);
- Compound quantitation and reported detection limits;
- System performance; and
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;
- Duplicates;
- Matrix Spike;
- Furnace atomic absorption analysis QC;
- ICP serial dilutions; and
- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method
- "N" – Tentative identification. Analyte is considered present in the sample;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and
- No Flag - Result accepted without qualification.

7.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

7.1 INTRODUCTION

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

7.2 SYSTEM AUDITS

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

7.3 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

7.4 FORMAL AUDITS

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

8.0 CORRECTIVE ACTION

8.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

8.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 12.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 8.1

CORRECTIVE ACTION REQUEST					
Number: _____		Date: _____			
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____					
CONDITION:					
REFERENCE DOCUMENTS:					
RECOMMENDED CORRECTIVE ACTIONS:					
_____	_____	_____	_____	_____	_____
Originator	Date	Approval	Date	Approval	Date
RESPONSE					
CAUSE OF CONDITION					
CORRECTIVE ACTION					
(A) RESOLUTION					
(B) PREVENTION					
(C) AFFECTED DOCUMENTS					
C.A. FOLLOWUP:					
CORRECTIVE ACTION VERIFIED BY: _____ DATE: _____					

9.0 REFERENCES

- NYSDEC. Division of Environmental Remediation. DER-10/Technical Guidance for Site Investigation and Remediation, dated May 3, 2010.
- NYSDOH. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.
- Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan
- USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D.C.
- USEPA, 1987. Data Quality Objectives for Remedial Response Actions Activities: Development Process, EPA/540/G-87/003, OSWER Directive 9355.0-7- U.S. Environmental Protection Agency, Washington, D.C.
- USEPA, 1992a. CLP Organics Data Review and Preliminary Review. SOP No. HW-6, Revision #8, dated January 1992. USEPA Region II.
- USEPA, 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90. SOP No. HW-2, Revision XI, dated January 1992. USEPA Region II.
- USEPA. Hazardous Waste Support Section. Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15. SOP No. HW-31, Revision #6, dated June 2014.

ATTACHMENT A

Resumes

Jennifer Armstrong, CHMM, LEED AP

Project Scientist

Environmental Investigation & Remedial Oversight



12 years in the industry

Ms. Armstrong has 12 years of experience working on environmental projects in New York. She manages Environmental Due Diligence projects, remedial investigations, soil vapor and indoor air quality surveys, and waste characterization investigations. She has also developed remedial investigation and remedial action work plans and managed groundwater monitoring programs. Her field experience includes soil, soil vapor, and groundwater sampling, indoor air investigations, and remedial excavation oversight.

Selected Projects

Consolidated Edison, Governors Island, New York, NY – Project Scientist. Spill delineation and product recovery.

Gowanus Village Sites, Brooklyn, NY – Project Scientist. Phase I Environmental Site Assessments.

West & Watts Development, New York, NY – Project Scientist. Phase I and II Environmental, waste characterization, Site Assessment and State Brownfield Cleanup Program management from remedial investigation through remedial oversight (including petroleum spill and soil containing hazardous lead) and closure reporting.

261 Hudson Street, New York, NY – Project Scientist. Phase I and II Environmental Site Assessment, waste characterization, and State Brownfield Cleanup Program management from remedial investigation and remedial oversight.

Greenpoint Marina, New York, NY – Project Scientist. Phase I Environmental Site Assessment, Remedial Investigation, spill delineation, and State Brownfield Cleanup Program Application.

55 West 17th Street, New York, NY – Project Scientist. Phase I Environmental Site Assessment, New York City Voluntary Cleanup Program management from Remedial Investigation Work Plan through Remedial Action Plan.

855 Avenue of the Americas, New York, NY – Project Scientist. Phase II Environmental Site Investigation, waste characterization, remedial excavation oversight, spill reporting, and tank removal.

50 West Street, New York, NY – Project Scientist. Phase I Environmental Site Assessment, waste characterization, and remedial excavation oversight.

Education

B.S., Environmental Science
Marist College

Professional Registration

Certified Hazardous Materials Manager
(CHMM)

LEED Accredited Professional
(LEED AP)

Jennifer Armstrong, CHMM, LEED AP

ACME Greenpoint Sites, Brooklyn, NY – Senior Staff Scientist. Document review and Remedial Investigation Work Plan for large solvent plume.

28-20 and 29-01 Borden Avenue, Long Island City, NY – Senior Staff Engineer. Phase I and II Environmental Site Assessments, spill delineation and remediation, underground storage tank removal, and closure reporting.

Consolidated Edison, Atlantic Avenue Station, Brooklyn, NY – Project Scientist. Ongoing groundwater monitoring.

Highline 13, 14, 10, New York, NY – Senior Staff Engineer. Phase I and II Environmental Site Assessments, spill delineation, and Remedial Action Plan for New York City Voluntary Cleanup Program.

NYCSCA, Various Locations, New York City, NY – Senior Staff Engineer. Phase I and II Environmental Site Assessments.

84 West 3rd Street, New York, New York – Senior Staff Engineer. Phase I Environmental Site Assessment and Soil Vapor Intrusion Assessment.

City University of New York (CUNY), John Jay College Expansion, New York, NY – Senior Staff Engineer. Remedial excavation oversight and community air monitoring.

Pelham Plaza, Pelham Manor, NY – Senior Staff Engineer. Third party oversight of remediation of former manufactured gas plant (MGP) site.

Con Edison, East 74th Street Steam Generation Plant, New York, NY – Project Scientist. Groundwater monitoring and spill closure.

Former Queens County Family Court House, Jamaica, NY – Senior Staff Engineer. Remedial excavation oversight, waste characterization, and community air monitoring.

Bronx Terminal Market and Pier 4, Bronx, NY – Senior Staff Engineer. Remedial excavation oversight and community air monitoring.

Bronx Mental Health Redevelopment Project, Bronx, NY – Senior Staff Engineer. Phase I Environmental Site Assessment for 20-acre parcel.

Silvercup West, New York Power Authority Site, Queens, NY – Senior Staff Engineer. Remedial Investigation for State Brownfield Cleanup Program.

Freshkills Landfill, Staten Island, NY – Assistant Project Scientist. Monthly reporting and public relations.

Phase I Environmental Site Assessments, Various Locations, Upstate New York

Emily G. Strake

**Project Chemist/ Risk Assessor
Environmental Engineering**



15 years in the industry ~ 2 years with Langan

Ms. Strake has fifteen years of environmental chemistry, risk assessment, auditing, and quality assurance experience. Most recently, she has focused her efforts on human health risk assessment, and has been the primary author or key contributor of risk assessment reports and screening evaluations for projects governed under RCRA, CERCLA, SWRCB, DTSC, DNREC, PADEP, NJDEP, CTDEEP, ODEQ, NYSDEC and MDE. She has experience in site-specific strategy development, which has enabled her to perform assessments to focus areas of investigation and identify risk-based alternatives for reducing remediation costs. Ms. Strake is a member of the Interstate Technology and Regulatory Council Risk Assessment Team responsible for the development and review of organizational risk assessment guidance documents and serves as a National Trainer in risk assessment for the organization.

Ms. Strake has ten years of experience assessing potential adverse health effect to humans from exposure to hazardous contaminants in soil, sediment, groundwater, surface water, ambient and indoor air, and various types of animal, fish, and plant materials. She understands and applies environmental cleanup guidance and policies associated with multiple federal and state agencies. Additionally, she has broad experience in the development of preliminary remediation goals and site-specific action levels. She is proficient with the USEPA and Cal/EPA Johnson and Ettinger Model for Subsurface Vapor Intrusion into Buildings, USEPA's Adult Lead Methodology, DTSC's Leadsread 7 and 8, and statistical evaluation of data using USEPA's ProUCL software.

Ms. Strake has extensive experience in environmental data validation, focused on ensuring laboratory deliverables follow specific guidelines as described by regulatory agencies and the analytical methods employed. In addition, she has experience in EQUS chemical database management. She also has a broad range of environmental field experience and maintains current OSHA HAZWOPER certification.

Ms. Strake is experienced in auditing laboratory and field-sampling activities for compliance with Quality Assurance Project Plans (QAPPs), the National Environmental Laboratory Accreditation Conference Standards Quality Systems manual, and applicable USEPA Guidance. Ms. Strake has also audited on-site laboratories in support of groundwater treatment operations and implemented corrective actions. Her responsibilities include writing reports on the value of laboratory work, writing/editing QAPPs for clients and project-specific sites, peer reviewing colleague's work, and mentoring staff within the office. She has also served as the Quality Assurance officer for several long-term projects, responsible for the achievement of all forms of Quality Control/Quality Assurance by onsite personnel relating to sampling, analysis, and data evaluation.

Ms. Strake has several years' experience analyzing investigative samples, writing laboratory Standard Operating Procedures (SOPs), and managing all

Education

MBA, Business Administration
The University of Scranton

B.S., Chemistry
Cedar Crest College

Training

40 hr. OSHA HAZWOPER Training/Nov 2002

8 hr. HAZWOPER Supervisor/June 2004

8 hr. OSHA HAZWOPER Refresher/Oct 2012

American Red Cross First Aid & CPR certified

Emily G. Strake

aspects of procedures and analyses for Optical Emission Spectrometry, X-Ray Fluorescence, Ignition analysis, and Atomic Absorption. Her experience also includes operating and performing routine instrument maintenance for GC/MS and IR. Ms. Strake has worked extensively on developing rapid soil characterization programs for PCB and pesticide analyses utilizing enzyme-linked immunosorbent assays, and was also involved in efforts to develop new instrumentation to quantify microbial nitrification of ammonium.

Selected Project Experience

Human Health Risk Assessment

- Major League Soccer's San Jose Earthquakes Stadium – Utilized the Johnson and Ettinger advanced soil gas model to calculate risk and hazard associated with inhalation of chlorinated solvents for the redevelopment of a public soccer stadium. Soil gas data was modeled assuming three soil stratum and site-specific soil, building, and exposure parameters. The Earthquakes' stadium is set to open in 2015.
- Exelon - Developed a human health risk assessment for a utility-owned former Manufactured Gas Plant (MGP) site in Pennsylvania, under Pennsylvania's Act 2 Program. Used ProUCL 4.0 statistical software to determine upper limits for full data sets and non-detect data. Conducted vapor intrusion modeling (via the Johnson & Ettinger model) and prepared vapor intrusion reports showing that risks to volatile organic compounds in soils and groundwater were not impacting indoor air quality.
- Texas Instruments – Participated in a collaboration with Robert Ettinger and Geosyntec Consulting to develop comments to USEPA Region IX and the San Francisco Regional Water Quality Control Board regarding vapor intrusion at South Bay Superfund Sites. The focus of the response was to outline scientific and policy objections to EPA's recommended TCE interim short-term indoor air response action levels and guidelines, and to clarify the use of California-modified indoor air screening levels for assessing and responding to TCE and PCE subsurface vapor intrusion into indoor air.
- Regency - Conducted vapor intrusion modeling for a dry cleaning facility in the Philadelphia area. Predictive modeling using the Johnson and Ettinger approach indicated that estimated contaminant levels would not adversely affect human receptors.
- Veteran's Affairs - Completed a human health risk evaluation of the potential future risk associated with inhalation of indoor air for the Veteran's Administration. Soil, soil gas, and groundwater samples were collected as part of the site characterization. Achieved DTSC approval of the risk assessment approach and conclusions.
- DOW Chemical - Calculated Medium Specific Concentrations (MSCs) for unregulated contaminants using the PADEP protocols to assist in the clean-up of a monomer tank explosion in Bristol, Pennsylvania. Selected appropriate surrogate toxicity data and evaluated novel on-site constituents by analogy.
- Santa Clara Landfill – Developed a risk assessment for the characterization of landfill gas at the Santa Clara All Purpose Landfill, requested by the San Francisco Regional Water Quality Control Board. The purpose of the landfill gas characterization is to evaluate specific compounds in landfill gas, their concentrations,

spatial patterns, and extent throughout the site, and to perform a vapor intrusion risk assessment for proposed future development.

- Avon - Completed a human health risk assessment in accordance with NYSDEC guidance for a redevelopment property located in Rye, New York. The objective of the evaluation was to characterize the risks associated with potential future human exposures to soil and groundwater affected by a release from the Site's former No. 2 fuel oil UST. The intended future use of the Site was a playground to be utilized by the general public for open play on commercial recreational equipment.
- Golden Gate National Parks Conservancy – Peer reviewed a Preliminary Endangerment Assessment Report for the Battery East Trail. The assessment included a human health risk evaluation that estimated carcinogenic risk from exposure to PAHs and dioxin/furans in soil using toxic equivalency to benzo(a)pyrene and 2,3,7,8-TCDD.
- Sunoco Refineries – Derived site-specific soil PRGs for lead using the EPA's adult lead model for two former Sunoco refineries. Completed receptor evaluations in accordance with USEPA risk assessment guidance to develop exposure parameters under current and reasonably anticipated future land use scenarios.
- Honeywell - Completed a focused human health risk evaluation of PAH contaminants for under NJDEP's Site Remediation Program. Applied a blended approach of qualitative risk characterization and quantitative risk calculation to propose closure of AOCs following the remedial investigation.
- Delaware City Refinery - Performed comprehensive human health risk assessment for a petroleum refinery in Delaware City, Delaware. The risk assessment was the basis for a thorough characterization and assessment of potential risks posed by site-specific conditions. Developed various human exposure scenarios by using both Federal and State-Specific guidance for soil, groundwater, and surface water exposure.
- Occidental Chemical - Completed multiple AOC-specific risk assessments utilizing and applying the guidance set forth by the DTSC's Human Health Risk Assessment Note 1 (Default Exposure Factors for Use in Risk Assessment), Note 3 (Recommended Methodology for Use of USEPA Regional Screening Levels, and Note 4 (Screening Level Human Health Risk Assessments).
- Floreffe Terminal - Performed human health risk assessment for contamination resulting from a 3.9 million gallon diesel oil tank collapse along the Monongahela River. Evaluated potential impacts to human health via exposure to soil, groundwater, and surface water. Calculated site-specific standards for soil remediation.
- Ryder – Developed Alternative Direct Exposure Criteria for PAH-impacted fill material at a commercial facility. Site-specific soil screening levels for incidental ingestion of soil were calculated following a forward risk evaluation for current on-site receptors.
- Rohm and Haas - Prepared an Act 2 site-specific human health risk assessment for the oldest industrial facility in the United States, located in southeast Philadelphia. The objective of the risk assessment was to determine achievable possible future land-use options under Pennsylvania's Land Recycling Program. The risk assessment included evolution of multiple site-COPCs and

Emily G. Strake

constituent suites: VOCs, SVOCs, PCBs, pesticides, and metals (including lead). Evaluated the potential for indoor air inhalation through J&E modeling of soil gas and groundwater.

- DuPont - Worked as a key participant in the human health risk evaluation of mercury associated with legacy contamination of the South River located in Waynesboro, Virginia.

Chemical Data Quality

- Audited multiple accredited laboratories in New Jersey and Pennsylvania on behalf of clients using USEPA Guidance on Technical Audits and Related Assessments for Environmental Data Operations. The audits included full-suite USEPA and SW-846 methodology; and included reviewing staff experience and training records, equipment and facilities, policies, practices, procedures, and documentation for sample receipt, analysis, instrument maintenance, standard preparation, calibration and traceability, control charting, corrective actions, data reduction and review, report generation, and waste disposal.
- Reviewed and validated data packages for RCRA Facilities Investigation at a Philadelphia-area chemical site; issued data validation reports to project personnel and regulatory agencies. The reviews included evaluation of quarterly groundwater, soil, and soil vapor matrices. Participated in RCRA groundwater sampling, developed and executed the investigation's QAPP, and coordinated with the laboratory to schedule and perform field-sampling events.
- Completed Data Usability Summary Reports in accordance with NYSDEC DER-10 guidance for soil, groundwater, sediment surface water, soil gas, ambient air and indoor air analytical results.
- Acted as the Quality Assurance Officer for several long-term projects in Pennsylvania, Maryland, and New Jersey, Delaware, responsible for the achievement of all forms of QA/QC as it related to sampling, analysis, and data evaluation.
- Participated in a CERCLA site investigation; assessed the usability of sample results for numerous matrices including dust, sediment, soils, and various aqueous matrices for a remedial investigation under the Contract Laboratory Program. Implemented an on-site pesticide immunoassay program to delineate soil contamination in real-time.
- EQUIS data manager for database migration of historical groundwater results associated with remediation activities; assisted with natural attenuation data evaluation and gained experience in geochemical trends associated with intrinsic biodegradation.
- Coordinated the collection of fish tissue samples and determined the validity of the analytical results associated with CERCLA and RCRA site characterizations. Assessed duck blood analytical results for the Connecticut Department of Energy and Environmental Protection Bureau of Natural Resources.

Anthony Moffa Jr, CHMM

**Corporate Health and Safety Manager
Health & Safety Coordinator, Contingency Planning,
Compliance Auditing**



19 years in the industry ~ 12 years with Langan

Mr. Moffa has over nineteen years experience in providing environmental compliance assistance to both commercial and industrial facilities. His compliance auditing experience includes facility and process specific including the areas of waste management, stormwater and wastewater issues and air emissions. He has an extensive background in the areas of hazardous, non-hazardous and universal waste management. His level of experience includes working with federal, state and local authorities to ensure clients environmental compliance status on all levels. His compliance reporting includes federal and state specific reports. Completed federal reports include the Tier II, Toxic Chemical Release Inventories under SARA Title III and Biennial Hazardous Waste Reporting. Completed state specific reporting includes the Pennsylvania Form 26R and the New Jersey Release Pollution Prevention Report. He is experienced in the preparation, submittal and compliance monitoring of NPDES & stormwater applications and permits. He has developed site specific contingency plans for both industrial and commercial facilities for facilities throughout Pennsylvania and New Jersey.

Selected Projects

Verizon - Pennsylvania, Inc. Philadelphia Naval Yard, PA
Confidential Client, Philadelphia, PA
Penn Color, Doylestown, PA
Verizon - Pennsylvania, Inc., Phase I Environmental Assessment,
Lansdowne, PA
Verizon - Pennsylvania, Inc. (formerly Bell Atlantic Corporation),
Various Locations, PA
Kinder Morgan Bulk Terminals, Inc. Fairless Hills, PA
PP&L – Martins Creek, Bangor, PA
Concord Beverage Company, Concordville, PA
Penn Color, Hatfield, PA
National Starch & Chemical Company, Bloomfield, NJ
Air Products and Chemicals, Inc., Middlesex, NJ
PSEG Services Corporation, Jersey City, NJ
Sampson Coatings, Richmond, VA
Custom Chemicals Corporation, Elmwood Park, NJ

Education

M.E., Science
Penn State University

B.S., Physics
West Chester University

Professional Registration

Certified Hazardous Material Manager
(CHMM)

Professional Affiliations

Pennsylvania Chamber of Business &
Industry

Chemical Council of New Jersey

New Jersey Business & Industry
Association

Professional Training

OSHA 40-Hour Hazardous Waste Site
Training Course

National Safety Council – CPR,
Bloodborne Pathogen and First Aid
Training

Steel Tank Institute Certified AST
Inspector

PADEP Pollution Prevention & Energy
Efficiency Qualified Assessor

LANGAN

Michael D. Burke, CHMM, LEED AP

Senior Associate/Vice President
Environmental Engineering and Remediation



16 years in the industry

Mr. Burke is a geologist/environmental scientist whose practice involves site investigation and remediation, environmental site assessments, in-situ remedial technology, sub-slab depressurization system design, emergency response, environmental and geotechnical site investigations, and health and safety monitoring. He has experience with projects in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup, Voluntary Cleanup and Spill Programs and New York City Department of Environmental Protection (NYCDEP) "E" Designated and New York City Brownfield Cleanup Program sites. He has extensive experience in soil and groundwater investigation and remediation, design of in-situ chemical oxidation and enhanced bioremediation strategies, Phase I Site Assessments, Phase II site investigations, UST Closures, NYSDEC spill closure, remedial excavation oversight and excavation and off-site treatment and/or disposal of contaminated soils.

Selected Projects

SunCap Property Group Environmental On-Call Consulting, Various Locations, Nationwide – Mr. Burke acts as the Environmental Program Manager for this on-call contract since 2010. Task orders issued under this on-call agreement involve transactional due diligence, remediation design, and construction oversight of former industrial sites throughout the United States, including NY, NJ, PA, CT, VA, FL, TX, CA, and WA. Mr. Burke's responsibilities involve coordination across Langan offices and disciplines, including negotiation of remedial action objectives with state regulators, and QA/QC review of all environmental deliverables, including, but not limited to, Phase I and II site assessments, construction specifications, work plans, soil management plans, and engineering reports.

Consolidated Edison Company of New York – Underground Storage Tank On-Call Contract, Five Boroughs of New York City, NY – Mr. Burke has been the Program Director of this on-call contract since 2006. Task orders issued as part of this on-call contract are associated with the investigation and remediation of Con Edison owned NYSDEC spill sites throughout the five boroughs of New York City. Work sites include Con Edison service stations and generating stations. Mr. Burke's primary responsibilities include coordination and negotiation of cleanup goals with NYSDEC and QA/QC review of deliverables, including work plans, investigation and closure reports, and construction specifications.

Consolidated Edison Company of New York – Appendix B Spill Sites On-Call Contract, Five Boroughs of New York City, NY – Mr. Burke serves as Project Manager for several Con Edison Appendix B spill sites. This on-call

Education

M.S., Environmental Geology
Rutgers University

B.S., Geological Sciences
Rutgers University

B.S., Environmental Science
Rutgers University

Professional Registration

Certified Hazardous Materials
Manager – CHMM No. 15998

OSHA Certification for Hazardous
Waste Site Supervisor

OSHA 29 CFR 1910.120
Certification for Hazardous Waste
Operations and Emergency
Response

NJDEP Certification for Community
Noise Enforcement

Troxler Certification for Nuclear
Densometer Training

Michael D. Burke, LEED AP

contract involves the investigation and remediation of spills of dielectric and fuel oil feeder lines throughout New York City. Detailed assessment using geophysical surveys, mapping, and drilling techniques to assess the location of utility corridors below heavily trafficked roadways and contaminant migration pathways is conducted and coordinated with various city agencies including MTA, DOL, Landmarks Preservation Commission, and NYCDOB. Langan has designed, installed, maintained and operated oil recovery systems and coordinated cleanup of dielectric fluid spills into subsurface structures including subways within and below the most heavily traveled roadways in Manhattan. Numerous product recovery systems and groundwater monitoring programs are currently being operated and continue to recover hundreds of gallons of oil impacted groundwater via cost efficient skimming and recovery methods.

Meeker Avenue Plume Trackdown Site, Brooklyn, NY – Mr. Burke is the Project manager representing a PRP at the Meeker Avenue Trackdown Site. The PRP owns 2 separate properties that were identified as sources to the chlorinated solvent plume in the Greenpoint neighborhood of Brooklyn, NY. The Site is a Class 2 Superfund Site. Mr. Burke prepared a Record Search Report and Remedial Investigation Work Plan for each site. Investigation is ongoing.

Borden Avenue Distribution Facility, Queens, NY – Mr. Burke provided services for a new 8.8-acre parcel distribution facility located at 29-01 Borden Avenue, Long Island City, Queens, New York. The development will consolidate two lots and will involve the demolition of two existing warehouses, and the construction of a new parcel distribution facility. The property adjoins the Newtown Creek Superfund Site. Environmental engineering services included Phase I and Phase II Site Assessments, NYSDEC spill investigation, remediation, and closure.

Edison Properties, West 17th Street Development Site (Former MGP Site), New York, NY – Mr. Burke is the project manager for the Site, which is in the New York State Brownfield Cleanup Program. Mr. Burke prepared a Remedial Action Work Plan and a NAPL Recovery Work Plan that were reviewed and approved by the NYSDEC. All work performed is coordinated with the NYSDEC. Mr. Burke implemented designed and a DNAPL recovery pilot study. Remediation is ongoing.

Con Edison, Governors Island Dielectric Fluid Spill, New York, NY – Mr. Burke is the project manager for this NYSDEC spill site. Dielectric fluid was release at a waterfront transformer vault over an unknown duration. Responsibilities include preparation of remedial investigation and remedial action work plans and a remedial alternatives analysis. There are several complications that are inherent to this project, including the location of the spill in a historic landmark building and weight limitations on equipment coming to and leaving from the site. Groundwater monitoring and remediation are ongoing.

Montefiore Medical Center, PCB Remediation, Bronx, NY – Mr. Burke is the project manager for the emergency response following a mineral oil release with PCB concentration greater than 500 parts per million. Responsibilities included remediation oversight and verification sampling. Remediation was performed via the Double Wash/Rinse Cleanup, as recommended by the USEPA PCB Spill Cleanup Policy. A post-remediation sample grid was developed, in accordance with the USEPA Field Manual for Grid Sampling of PCB Spill Sites. Wipe and chip samples were collected to verify cleanup.

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New York University, 4 Washington Square Village Fuel Oil Remediation, New York, NY – Mr. Burke is the project for the investigation, remediation design and remediation oversight of a 16,000 gallon #6 fuel oil release. The majority of the release has migrated underneath the building. Responsibilities included implementation of a remedial investigation, remediation system design, preparation of a NYSDEC-approved Remedial Action Work Plan and bid documents, remediation oversight, community air monitoring, and quarterly groundwater monitoring. Remedy consists of removal of 20,000 gallon USTs, soil excavation to 30 feet below grade, design and operation of a soil vapor extraction system to remove the soluble component of fuel oil before it reaches groundwater, and active product recovery. Excavation support was designed to accommodate a 30 ft excavation adjacent to a sidewalk, utility vault, and 17-story residential tower. SVE operation and groundwater monitoring are ongoing.

New York City School Construction Authority, Proposed New York City School Construction Sites, 5 Boroughs, New York City, NY – Mr. Burke is the Project Manager for an on-call contract for environmental consulting services at proposed school construction sites and school lease renewals in New York City. Responsibilities include preparation of Phase I Environmental Site Assessments, Phase II Environmental Site Investigations, remediation design, indoor air quality assessments and pre-construction waste characterization investigations. Contract is on-going through 2010.

Con Edison, East 60th Street Generating Station, New York, NY – Mr. Burke served as Project manager for a surface and subsurface mercury investigation and remediation at an active Con Edison steam generating station. Liquid mercury was identified within the basement trench network at the Station, a spill was reported to the NYSDEC and trenches were taken out of service until the source could be identified and mitigated. As a result, the investigation and subsequent report preparation were conducted on an expedited schedule. The investigation consisted of a geophysical survey, in-situ X-ray diffraction mercury surveying, mercury vapor monitoring, paint chip and wipe sampling and soil and groundwater sampling. The source of mercury was identified, delineated, and mitigated and the trench network was returned to service. Mr. Burke prepared a NYSDEC-approved Remedial Action Work Plan and construction bid documents for the project. Complete remediation of mercury-impacted solids is on-going.

82 Irving Place, New York, NY – Served as the project manager for a catastrophic fuel tank rupture within a residential building in historic Gramercy Park, Manhattan. Duties included, but were not limited to, remedial investigation utilizing limited access investigation techniques, health and safety monitoring, and preparation of a remedial action plan. After petroleum impacts were adequately delineated, he managed the remedial measures, completed in accordance with a NYSDEC-approved Remedial Action Plan. Most work was completed utilizing Level C personal protection equipment within a negative pressure enclosure. Mr. Burke served as liaison for the building co-op board, legal counsel, DEC and insurance carrier for this project.

1113 York Avenue, New York, NY – Served as the project manager for the closure of 17 underground storage tanks and management of the associated soil remediation at a former car dealership in the Lenox Hill Section of Manhattan, New York. Site activities were conducted under NYCDEP and NYSDEC Spill Prevention and Response Section's oversight. Remediation was coordinated in conjunction with building foundation construction. Duties included, but were not limited to the following: NYS

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BCP application, spill reporting, coordination of investigation and remediation activities, registration and closure of decommissioned underground storage tanks, vapor mitigation, mass excavation and disposal of approximately 25,000 tons of petroleum-impacted soil, development of an odor control and monitoring program, preparation of a NYSDEC and NYCDEP approved Spill Closure Work Plan, MTA coordination, and NYSDEC correspondence. Site work is ongoing.

Peter Cooper Village/Stuyvesant Town, New York, NY – Served as the project manager for the Phase I Environmental Site Assessment of the largest real estate transaction in U.S history. The Phase I was conducted, on an expedited schedule, in accordance with the user's standard scope of services, and in conformance with the ASTM Standard Practice for Environmental Site Assessments E1527-05 and the USEPA's All Appropriate Inquiry rule for the purpose of identifying recognized environmental conditions in connection with the subject property. Due diligence included comprehensive review of environmental databases and existing environmental reports. The subject property is a residential development, built on a former MGP site, consisting of 90 acres and 110 buildings on the east side of Manhattan, New York.

Superior Ink, New York, NY – served as the project manager providing oversight for a former commercial site (Superior Ink), which since November 2004, has been in the process of removing petroleum contaminants that were found to have leaked from an underground storage tank (previously removed). Duties included the preparation and implementation of a Waste Characterization Plan and a NYSDEC and NYCDEP-approved Remedial Action Plan, preparation of a NYS BCP application, due diligence for soil disposal, point sampling and soil remediation, confirmation of acceptable residual contamination levels for NYSDEC, remediation oversight, and SSDS and vapor mitigation design. The NYSDEC requirements for spill closure have been met and the spill has been administratively closed. A Final Engineering Report has been submitted to the NYCDEP and a Notice of Satisfaction is eminent.

Bronx Mental Health Redevelopment Project, Bronx, NY – Langan provided due diligence services for redevelopment of the existing hospital facilities that will include a new Adult Facility, Children's Facility, a Transitional Living Facility, Work Control Facility, and Campus Utilities. The project budget is around \$250 million. As project manager, Mr. Burke was responsible for Phase I services in accordance with the USEPA AA1 Rule and ASTM 1525-05 regulations. Duties included due diligence management and operations including a complete historical review of the site; environmental database review, and comprehensive review of available environmental reports. Services for this 80-acre site were conducted in accordance with DASNY requirements.

2950 Atlantic Avenue, East New York, Brooklyn, NY – Mr. Burke served as project manager in charge of overseeing the site characterization investigation at a Con Edison garage facility. Responsibilities included subsurface investigation to differentiate gasoline contamination from MGP impacts resulting from the operations of a separate responsible party. Duties included installation of 17 soil borings (later converted to permanent monitoring wells), sampling/ testing of monitoring wells contaminants, natural attenuation modeling using the USEPA BIOSCREEN Natural Attenuation Decision Support System model, sub-slab soil vapor and indoor air monitoring, quarterly groundwater monitoring and preparation of site characterization and quarterly monitoring reports to detail findings for NYSDEC.

Michael D. Burke, LEED AP

Con Edison, East 74th Street Generating Station, New York, NY – Served as the project manager for a subsurface investigation of a kerosene spill in the basement of an active Con Edison steam generating facility. Based on the findings of the investigation, Mr. Burke designed the remediation program required to close out the NYSDEC spill number, prepared a NYSDEC approved remedial action plan, and generated the construction bid package. Remediation performed within restricted access under a negative air enclosure. Basement floor drains were replaced and reinforced concrete slab restored to its original condition. Site work is ongoing.

Gowanus Village I, Brooklyn, NY – Managed the implementation of a Remedial Investigation Work Plan for a NYS BCP project sited on a 3.5 acre former coal-fired power plant and sulfur works. Duties included, but were not limited to, implementation of a remedial investigation, preparation of a RIR, and coordination with NYSDEC and NYSDOH.

Con Edison, First Avenue Properties, New York, NY – Served as the Assistant Project Manager and Environmental Site Supervisor for the demolition, remedial investigation and excavation of a Con Edison Steam Plant, Office Building and associated structures. Most remedial and investigation actions were performed in an active Con Edison steam generating station. Soil was excavated to accommodate site development for commercial and residential use and included TSCA-regulated PCB and manufactured gas plant (MGP)-impacted soil. Duties included but were not limited to the following: report preparation, supervision of field personnel, contractor oversight, implementation of enhanced receptor and soil gas surveys, operations monitoring and maintenance, oversight of cofferdam and slurry wall construction, and addressing questions and concerns from the client and sub-contractors. Responsible for adhering closely to the NYSDEC approved Work Plan and ensuring that remediation activities were completed accordingly.

Queens West Development Corp. Stage II, Long Island City, NY – Served as the Assistant Project Manager and Site Remediation Supervisor for the implementation of a large scale Remedial Investigation/Remedial Action conducted as part of the NY State Voluntary Clean-Up Program. Duties included but were not limited to the following: construction management, onsite coordination of remediation activities, scheduling of sub-contractors and field team, report preparation, supervision of onsite personnel, addressing questions and concerns of the client. Responsible for adhering closely to the approved Work Plan and ensured that remedial activities were completed accordingly. Remedial activities included: investigation and closure of four USTs and numerous reported spills, mass excavation and disposal of impacted soils, geoprobe investigations, and soil vapor sampling for the purpose of sub-slab depressurization system design, implementation of enhanced odor control and monitoring program, design and implementation of enhanced bioremediation and in situ chemical oxidation and marine spill response. Upon completion of remediation activities in each operable unit, an Interim Remedial Measures Final Report was generated and summarized all of the remedial work. Project is ongoing.

Article X Project Experience – Proposed New York State Electrical Generation Sites, Various Locations, New York State – Mr. Burke assisted in the Article X environmental review for major electric generating power plants proposed for construction in New York State. Article X projects include Keyspan Ravenswood Cogeneration Facility (In-Service), New York

Michael D. Burke, LEED AP

Power Authority Poletti Station (In-Service), Bowline Unit 3 (Certified Article X Project) and Spagnoli Road Energy Center (Certified Article X Project). Responsibilities included implementation of subsurface investigations related to the environmental assessments and preparation of geologic, seismic feasibility and cultural resources sections of the Article X applications.

Poletti Generating Station, Astoria, ny – Served as project geologist for a baseline subsurface investigation at an active NY Power Authority facility. Responsibilities included but were not limited to the following: coordination of investigation activities with drilling subcontractors, involved in daily coordination meetings, health and safety oversight, soil boring and groundwater monitoring well installation and addressing questions and concerns of the client. Following completion of investigative work, coordinated the preparation of a Preliminary Site Assessment report.

Arthur Kill Generating Station, Staten Island, ny – Served as the environmental site supervisor and health and safety officer for an investigation and remediation oversight program at an active Con Edison facility in Staten Island, NY. Work was performed during a critical response period following a large PCB spill in which there was intense federal, state and city scrutiny. Involved in daily coordination meetings, scheduling, cost control, field design modifications, and daily interaction with sub-contractors and regulatory agencies. Remedial actions included excavation, removal and dewatering of PCB contaminated sediment, in a discharge canal and treatment of resulting wastewater, and scarification of PCB-contaminated brick within the building structure.

K. Hovnanian, New Jersey Development Sites, NJ – Served as a field geologist for septic feasibility studies, preliminary geotechnical assessments and oversight of building foundation installations in numerous geologic settings in New Jersey.

William Bohrer

**Project Geologist
Geologist**



29 years in the industry

Mr. Bohrer is an experienced hydrogeologist with a diverse and extensive background in geophysics, geotechnical, hydrology, mining and petroleum, and application of scientific, physical and engineering principals to industrial processes.

Selected Projects

27 Wooster Street, New York, NY
42 West Street, Brooklyn, NY
455 West 19th Street, New York, NY
Kings Plaza Mall, Brooklyn, NY
Hudson Yards "Terra Firma", New York, NY
Hudson Yards, Platform Special Inspection, New York, NY
PSAC II, Bronx, NY
595-647 Smith Street, Brooklyn, NY
New York University, 7-13 Washington Square North Investigation
New York, NY
New York University, 4 Washington Square Village, New York, NY
125th Street and Lenox Avenue, New York, NY
Sullivan Street Development, New York, NY
Hudson Crossing II, New York, NY
New York Aquarium, Shark Tank & Animal Care Facility, Brooklyn, NY
209-219 Sullivan Street, New York, NY
261 Hudson Street, New York, NY
460 Washington Street, New York, NY
552 West 24th Street, New York, NY
Brooklyn Bridge Park Pier 1, New York, NY
International Leadership Bronx Charter School, Bronx, NY
203 East 92nd Street, New York, NY
HighLine 28-29, New York, NY
539 Smith Street Bulkhead, Brooklyn, NY
Willets Point, Corona, NY
Plume Migration and Fracture Flow Aquifer Investigation, Brunswick, MD
Plume Migration and Fracture Flow Aquifer Investigation, Fallston, MD
Emergency Response Site Investigation & Remediation,
Wappingers Falls, NY
Emergency Response Site Investigation & Remediation, Allentown, PA
Emergency Response Site Investigation & Remediation, Shamokin, PA
Bermuda International Airport, Jet Fuel Release Investigation, Bermuda
Little Missouri River Basin, Geotechnical Site Evaluation (Horizontal Drilling
Pipeline Install), ND
Seismic Susceptibility Evaluation (Class 2 Injection Wells), Litchfield, OH
Bedrock Mapping, Bradford and Sullivan Counties, PA
Soil Solidification, Carteret, NJ

Education

Post Graduate Studies in Geophysics
Cornell University

B.S., Geology
Tufts University

Professional Registration

40 Hour OSHA HazWOPER

OSHA Construction Safety & Health

OSHA Supervisory Certification
Credential (TWIC)

Transportation Worker Identification

NYS DEC- Protecting New York's
Natural Resources with Better
Construction Site Management"

Affiliations

American Association of Petroleum
Geologists
National Groundwater Association
Geological Society of America
PA Council of Professional Geologists

LANGAN

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Quantitation Limits

Quantitation Limits						
Method	Analysis	Matrix	Analyte	LOQ	MRL	Units
			Volatile Organics			
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,1-Trichloroethane	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,2,2-Tetrachloroethane	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon)	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1-Dichloroethane	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1-Dichloroethylene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,3-Trichloropropane	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,4-Trichlorobenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,4-Trimethylbenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichlorobenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichloroethane	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3,5-Trimethylbenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3-Dichlorobenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3-Dichloropropane	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,4-Dichlorobenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,4-Dioxane	50	100	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	2-Butanone	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	4-Methyl-2-pentanone	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Acetone	5.0	10	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Benzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Carbon disulfide	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Carbon tetrachloride	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chlorobenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chloroethane	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chloroform	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	cis-1,2-Dichloroethylene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Ethyl Benzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Isopropylbenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Methyl tert-butyl ether (MTBE)	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Methylene chloride	5.0	10	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Naphthalene	2.5	10	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	n-Butylbenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	n-Propylbenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	o-Xylene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p- & m- Xylenes	5.0	10	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p-Isopropyltoluene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	sec-Butylbenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	tert-Butylbenzene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Tetrachloroethylene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Toluene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	trans-1,2-Dichloroethylene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Trichloroethylene	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Vinyl Chloride	2.5	5.0	ug/kg
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Xylenes, Total	7.5	15	ug/kg
			Semi-Volatiles Organics			
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4,6-Trichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4-Dichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4-Dinitrophenol	41.7	83.3	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,6-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Chlorophenol	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Methylnaphthalene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Methylphenol	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Nitrophenol	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	3- & 4-Methylphenols	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	3-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	4-Chloroaniline	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	4-Nitrophenol	41.7	83.3	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Acenaphthene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Acenaphthylene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Aniline	83.5	167	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Anthracene	20.9	41.7	ug/kg

Quantitation Limits

EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzo(a)anthracene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzo(a)pyrene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzo(b)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzo(g,h,i)perylene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzo(k)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzoic acid	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzyl butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Bis(2-ethylhexyl)phthalate	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Chrysene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Dibenzo(a,h)anthracene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Dibenzofuran	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Diethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Dimethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Di-n-butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Di-n-octyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Fluorene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Hexachlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Indeno(1,2,3-cd)pyrene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Isophorone	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Naphthalene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Nitrobenzene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Pentachlorophenol	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenanthrene	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenol	20.9	41.7	ug/kg
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Pyrene	20.9	41.7	ug/kg
			PCBs			
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1016	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1221	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1232	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1242	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1248	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1254	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1260	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1262	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1268	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Total PCBs	0.0167	0.0167	mg/kg
			Pesticides			
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDD	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDE	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDT	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Parathion	1.32	1.32	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Aldrin	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	alpha-BHC	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	alpha-Chlordane	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	beta-BHC	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	delta-BHC	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Dieldrin	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan I	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan II	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan sulfate	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endrin	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	gamma-BHC (Lindane)	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	gamma-Chlordane	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Heptachlor	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Heptachlor epoxide	0.330	0.330	ug/kg
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Methoxychlor	0.330	0.330	ug/kg
			Herbicides			
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-T	20.0	20.0	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-TP (Silvex)	20.0	20.0	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4-D	20.0	20.0	ug/kg
			Inorganics			
EPA 6010C	Metals, NYSDEC Part 375	Soil	Arsenic	1.00	1.00	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Barium	1.00	1.00	mg/kg

Quantitation Limits

EPA 6010C	Metals, NYSDEC Part 375	Soil	Beryllium	0.100	0.100	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Cadmium	0.300	0.300	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Chromium	0.500	0.500	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Cobalt	0.500	0.500	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Copper	0.500	0.500	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Iron	2.00	2.00	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Lead	0.300	0.300	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Manganese	0.500	0.500	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Nickel	0.500	0.500	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Selenium	1.00	1.00	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Silver	0.500	0.500	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Vanadium	1.00	1.00	mg/kg
EPA 6010C	Metals, NYSDEC Part 375	Soil	Zinc	1.00	1.00	mg/kg
EPA 7473	Mercury by 7473	Soil	Mercury	0.0300	0.0300	mg/kg
EPA 9014/9010C	Cyanide, Total	Soil	Cyanide, total	0.500	0.500	mg/kg
EPA 7196A	Chromium, Hexavalent	Soil	Chromium, Hexavalent	0.350	0.500	mg/kg
Calculation	Chromium, Trivalent	Soil	Chromium, Trivalent	0.250	0.500	mg/kg
* Limits are advisory only						

Quality Control Limits for Soil Samples										
Method	Analysis	Matrix	Analyte	Surrogate %	Duplicate	MS %	MSRPD	LCS %	LCSRPD	PS
Volatile Organics										
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,1-Trichloroethane	-	-	42-145	30	71-137	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,2,2-Tetrachloroethane	-	-	16-167	56	79-129	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	-	-	11-160	31	58-146	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1-Dichloroethane	-	-	46-142	36	75-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1-Dichloroethylene	-	-	30-153	31	64-137	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,3-Trichloropropane	-	-	38-155	48	81-126	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,4-Trichlorobenzene	-	-	10-151	52	80-141	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,4-Trimethylbenzene	-	-	10-170	242	84-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichlorobenzene	-	-	10-147	52	85-122	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichloroethane	-	-	48-133	32	71-133	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3,5-Trimethylbenzene	-	-	10-150	62	82-126	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3-Dichlorobenzene	-	-	10-144	51	84-124	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3-Dichloropropane	-	-	43-142	36	83-123	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,4-Dichlorobenzene	-	-	10-160	52	84-124	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,4-Dioxane	-	-	10-191	196	10-228	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	2-Butanone	-	-	10-189	67	58-147	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	4-Methyl-2-pentanone	-	-	10-166	47	72-132	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Acetone	-	-	10-196	150	36-155	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Benzene	-	-	43-139	64	77-127	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Carbon disulfide	-	-	10-131	36	10-136	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Carbon tetrachloride	-	-	35-145	31	66-143	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chlorobenzene	-	-	21-154	32	86-120	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chloroethane	-	-	15-160	40	51-142	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chloroform	-	-	47-142	29	76-131	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	cis-1,2-Dichloroethylene	-	-	42-144	30	74-132	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Ethyl Benzene	-	-	11-158	42	84-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Isopropylbenzene	-	-	10-162	57	81-127	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Methyl tert-butyl ether (MTBE)	-	-	42-152	47	74-131	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Methylene chloride	-	-	28-151	49	57-141	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Naphthalene	-	-	10-158	95	86-141	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	n-Butylbenzene	-	-	10-162	96	80-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	n-Propylbenzene	-	-	10-155	56	74-136	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	o-Xylene	-	-	10-158	51	83-123	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p- & m- Xylenes	-	-	10-156	47	82-128	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p-Isopropyltoluene	-	-	10-147	60	85-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	sec-Butylbenzene	-	-	10-157	56	83-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	tert-Butylbenzene	-	-	10-160	79	80-127	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Tetrachloroethylene	-	-	30-167	33	80-129	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Toluene	-	-	21-160	50	85-121	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	trans-1,2-Dichloroethylene	-	-	29-153	30	72-132	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Trichloroethylene	-	-	24-169	30	84-123	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Vinyl Chloride	-	-	12-160	35	52-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Xylenes, Total	-	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichloroethane-d4	77-125	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Toluene-d8	85-120	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p-Bromofluorobenzene	76-130	-	70-130	30	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Fluorobenzene	-	-	70-130	30	70-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chlorobenzene-d5	-	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichlorobenzene-d4	-	-	-	-	-	-	-
Semi-Volatiles Organics										
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4,6-Trichlorophenol	-	-	12-138	30	27-122	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4-Dichlorophenol	-	-	16-144	30	23-133	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4-Dinitrophenol	-	-	10-132	30	10-149	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,6-Dinitrotoluene	-	-	36-124	30	30-125	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Chlorophenol	-	-	28-114	30	25-121	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Methylnaphthalene	-	-	10-143	30	16-127	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Methylphenol	-	-	10-160	30	10-146	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Nitroaniline	-	-	33-122	30	24-126	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Nitrophenol	-	-	12-127	30	17-129	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	3- & 4-Methylphenols	-	-	16-115	30	20-109	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	3-Nitroaniline	-	-	24-128	30	23-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	4-Chloroaniline	-	-	10-124	30	10-117	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	4-Nitrophenol	-	-	10-141	30	10-136	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Acenaphthene	-	-	13-133	30	17-124	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Acenaphthylene	-	-	25-125	30	16-124	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Aniline	-	-	10-112	30	10-111	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Anthracene	-	-	27-128	30	24-124	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(a)anthracene	-	-	20-147	30	25-134	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(a)pyrene	-	-	18-153	30	29-144	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(b)fluoranthene	-	-	10-163	30	20-151	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(g,h,i)perylene	-	-	10-157	30	10-153	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(k)fluoranthene	-	-	10-157	30	10-148	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzoic acid	-	-	10-130	30	10-116	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzyl butyl phthalate	-	-	10-129	30	10-132	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Bis(2-ethylhexyl)phthalate	-	-	10-138	30	10-141	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Chrysene	-	-	18-133	30	24-116	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Dibenzo(a,h)anthracene	-	-	10-146	30	17-147	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Dibenzofuran	-	-	26-134	30	23-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Diethyl phthalate	-	-	30-119	30	23-122	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Dimethyl phthalate	-	-	34-120	30	28-127	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Di-n-butyl phthalate	-	-	20-128	30	19-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Di-n-octyl phthalate	-	-	10-133	30	10-132	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Fluoranthene	-	-	10-155	30	36-125	30	-

EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Fluorene	-	-	12-150	30	16-130	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Hexachlorobenzene	-	-	16-142	30	10-129	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Indeno(1,2,3-cd)pyrene	-	-	10-155	30	10-155	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Isophorone	-	-	14-127	30	14-131	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Naphthalene	-	-	15-132	30	20-121	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Nitrobenzene	-	-	18-125	30	20-121	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Pentachlorophenol	-	-	10-160	30	10-143	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenanthrene	-	-	10-151	30	24-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenol	-	-	11-124	30	15-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Pyrene	-	-	13-148	30	24-132	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Fluorophenol	10-95	-	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenol-d5	10-107	-	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Nitrobenzene-d5	10-95	-	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	2-Fluorobiphenyl	10-97	-	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4,6-Tribromophenol	10-103	-	30-130	30	30-130	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Terphenyl-d14	19-99	-	-	-	-	-	-
PCBs										
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1016	-	-	40-140	50	40-130	25	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1221	-	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1232	-	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1242	-	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1248	-	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1254	-	-	40-140	50	40-130	25	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1260	-	-	40-140	50	40-130	25	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1262	-	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1268	-	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Total PCBs	-	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Tetrachloro-m-xylene	30-140	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Decachlorobiphenyl	30-140	-	-	-	-	-	-
Pesticides										
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDD	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDE	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDT	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Parathion	-	-	-	-	-	-	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Aldrin	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	alpha-BHC	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	alpha-Chlordane	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	beta-BHC	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	delta-BHC	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Dieldrin	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan I	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan II	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan sulfate	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endrin	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	gamma-BHC (Lindane)	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	gamma-Chlordane	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Heptachlor	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Heptachlor epoxide	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Methoxychlor	-	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Tetrachloro-m-xylene	30-140	-	-	-	-	-	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Decachlorobiphenyl	30-140	-	-	-	-	-	-
Herbicides										
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-T	-	-	30-150	35	40-140	30	-
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-TP (Silvex)	-	-	30-150	35	40-140	30	-
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4-D	-	-	30-150	35	40-140	30	-
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4-Dichlorophenylacetic acid (DCAA)	30-150	-	-	-	-	-	-
EPA 6010C	Metals, NYSDEC Part 375	Soil	Arsenic	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Barium	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Beryllium	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Cadmium	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Chromium	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Cobalt	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Copper	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Iron	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Lead	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Manganese	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Nickel	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Selenium	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Silver	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Vanadium	-	35	75-125	35	80-120		75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Zinc	-	35	75-125	35	80-120		75-125
EPA 7473	Mercury by 7473	Soil	Mercury	-	35	75-125		67.6-131		-
EPA 9014/9010C	Cyanide, Total	Soil	Cyanide, total	-	15	79.6-107		72.9-112		-
EPA 7196A	Chromium, Hexavalent	Soil	Chromium, Hexavalent	-	35	75-125		3.9-150		-
Calculation	Chromium, Trivalent	Soil	Chromium, Trivalent	-		-		-		-
* Limits are advisory only										

ATTACHMENT C

Analytical Methods/Quality Assurance Summary Table

Sampling and Analytical Methods Requirements

The following tables summarize sampling and analytical protocols that may be utilized during the investigation.

Soil

Parameter	Matrix	Preparation Method	Analytical Method*	Containers per Sample			Preservation Requirements			Holding Time
				No.	Size	Type	Temp.	Light Sensitive	Chemical	
VOCs by GC/MS	SOIL	5035A	SW-846 Method 8260C	3 vials, 1 jar for moisture	40 ml vials, any size jar	glass vials clear glass jar	2-6° C	No	MeOH/NaHSO ₄ /freeze unpreserved	14 days
SVOCs by GC/MS	SOIL	3546	SW-846 Method 8270D	1	8 oz	amber glass jar	2-6° C	Yes	NA	14 days
Trace metals by ICP-AES	SOIL	3050B	SW-846 Method 6020A	1	8 oz	clear glass jar	NA	No	NA	6 months
Mercury by Cold Vapor AAS	SOIL	7471A	SW-846 Method 7471A	1	8 oz	clear glass jar	NA	No	NA	28 days
Trace Metals by AAS and Direct Aspiration	SOIL	3050B	SW-846 Method 7000 series	1	8 oz	clear glass jar	NA	No	NA	6 months
Herbicides	SOIL	3545A/3550B	SW-846-8151A	1	8 oz	clear glass jar	2-6° C	Yes	NA	14 days
PCBs by GC	SOIL	3545A	SW-846 Method 8082A	1	8 oz	clear glass jar	2-6° C	No	NA	14 days*
PCBs by GC (Extraction by Soxhlet)	SOIL	3545A	SW-846 Method 808A	1	8 oz	clear glass jar	2-6° C	No	NA	14 days
Chlorinated Pesticides by GC	SOIL	3545A	SW-846 Method 8081B	1	8 oz	clear glass jar	2-6° C	No	NA	14 days

The US EPA has revised holding times for PCB to one year in the latest revision of EPA SW-846.

Method and SOP Reference Tables

The following table presents all of the analytical methods, York Analytical Laboratories Laboratories Standard Operating Procedures (SOPs), sample preparation methods, and sample preparation SOPs for all of the parameters listed. A copy of each of the laboratory SOPs referenced below is included in Appendix.

Analytical Method Reference									
SOP Ref.	Analytical Method	Document Title	Rev. No.	Date	SOP Ref.	Document Title	Date	Revision Number	SOP Reference Number
1A	SW-846 Method 8260B	"Volatile Organics by Method 8260, SW-846"	3.0	July 2006	1B	"Analysis of Target Volatile Organics by GC/MS"	04/29/10	2.1	GCM SVOC01170
2A	SW-846 Method 8270C	Semivolatile Organics by Method 8270C, SW-846 by (GC/MS)"	2.0	July 2006	2B	"Analysis of Target Semi-Volatile Organics (BNAs) by GC/MS"	04/30/10	2.1	GCM SVOC01170
3A	SW-846 Method 6010B	Determination of Trace Metals By SW-846 Method 6010 Inductively Coupled Plasma-Atomic Emission Spectrometry"	2.0	July 2006	4B	"Analysis of Environmental Sample Digestates for Metals using Axial ICP by EPA SW-846 6010B and 200.7"	09/11/07	1.3	ICP031195
5A	SW-846 Method 6020A	Determination of Trace Metals By SW-846 Method 6020 Inductively Coupled Plasma-Mass Spectrometry"	2.0	July 2006	5B	"Analysis of Trace Metals in Environmental Samples by EPA Inductively Coupled Plasma/Mass Spec. According to EPA SW-846 Method 6020 and EPA 200.8"	11/25/08	1.2	ICPMS 6020 080106
6A	SW-846 Method 7470/7471	Determination of Mercury By SW-846 Methods 7470/7471 Cold Vapor Atomic Absorption Spectroscopy"	2.0	July 2006	6B	"Digestion and Analysis of Aqueous, Soil and Sludge for Mercury by Cold Vapor Technique (CV) EPA SW-846-7470, 7471, and EPA 245.1"	05/17/10	1.4	Hg 120998
7A	Method 200.7	"Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Emission Spectrometry"	4.4	1994	7B	Included in Method 6010B SOP	NA	NA	NA

Analytical Method Reference									
SOP Ref.	Analytical Method	Document Title	Rev. No.	Date	SOP Ref.	Document Title	Date	Revision Number	SOP Reference Number
10A	SW-846 Method 8082	Polychlorinated Biphenyls by Method 8082, SW-846"	2.0	July 2006	10B	"Analysis of PCBs in Environmental Extracts – Water, Soil, Oil, Air Media, and TCLP Extracts"	04/27/10	1.4	GCPCB011799
11A	SW-846 Method 8081A	Pesticides by Method 8081, SW-846"	2.0	July 2006	11B	"Analysis of Target Pesticides (Chlorinated) by GC/ECD"	04/29/10	1.3	GCPEST011799
12A	SW-846 Method 8151A	Chlorinated Herbicides by SW-846 Method 8151"	2.0	July 2006	12B	"Analysis of Target Herbicides by GC/ECD Using EPA SW-846 8151A"	05/13/10	1.3	GCHERB011999

Laboratory Equipment Calibration and Corrective Action

York Analytical Laboratories, Inc.

Copies of the relevant York SOPs have been provided in the Appendix.

Method	Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.
8260B	GC/MS	Initial calibration - 5 levels- one \leq quantitation limit	Prior to sample analysis	Response Factor (RF) $>$ 0.05 and %RSD $<$ 15%	Service instrument.	1A
8260B	GC/MS	Continuing calibration - mid-level standard	Once every 12 hours prior to sample analysis	RF %D $<$ 30% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	1A
8270C	GC/MS	Initial calibration - 5 levels- one \leq quantitation limit	Prior to sample analysis	Response Factor (RF) $>$ 0.05 and %RSD $<$ 15%	Service instrument.	2A
8270C	GC/MS	Continuing calibration - mid-level standard	Once every 12 hours prior to sample analysis	RF %D $<$ 30% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	2A
6010	ICP-AES	Initial calibration - per instrument manufacturer's specifications - 1 level and a blank (Low-level calibration standard at quantitation limit must be analyzed if not included in initial calibration.)	Prior to sample analysis	Per manufacturer's specifications and method requirements	Run new calibration curve and/or service instrument.	4A

Method	Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.
6010	ICP-AES	Continuing calibration - midlevel standard	Every 10 samples and at end of the analytical run	90-110%	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	4A
6020	ICP/MS	Initial calibration	Daily	≤ 0.995	Recalibrate and reanalyze	5A
6020	ICP/MS	Continuing calibration - midlevel standard	Every 10 samples and at end of the analytical run	90-110%	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	5A
7470/ 7471	CVAA	Initial calibration - 5 levels and a blank (one level must be at quantitation limit)	Prior to sample analysis.	$r > 0.995$	Run new calibration curve and/or service instrument.	6A
7470/ 7471	CVAA	Continuing calibration - mid-level standard	Every 10 samples and at the end of the analytical run.	80-120%	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	6A
8082	GC/ECD	Continuing calibration - mid-level standard	1 standard per 20 samples or every 12 hours, whichever is more frequent.	CF %D < 15% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	10A
8081	GC/ECD	Initial calibration - 5 levels - one \leq quantitation limit	Prior to sample analysis.	Calibration Factor CF %RSD	Run new calibration curve and/or service instrument.	11A

Method	Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.
				<20% or r >0.99		
8081	GC/ECD	Continuing calibration - mid-level standard	1 standard per 20 samples or every 12 hours, whichever is more frequent.	CF %D < 15% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	11A

TO-15	GC/MS	Initial calibration minimum 5 standards 0.05/0.10 to 20 ppbv	As needed	≤30% RSD Allow 2 excursions	If the daily calibration technical acceptance criteria are not met, inspect the system for problems. it will be necessary to rerun the daily calibration sample.	16A
TO-15	GC/MS	Continuing calibration - mid-level standard, LCS and mid-level QC	Every 24 hours duplicate	70-130% D for compounds on compendium list; 50-150% for others	Recalibrate and report non-conforming compounds in case narrative	16A

Sample Handling and Custody Requirements

At the laboratory, the samples will be relinquished to the Sample Custodian with the signing of the COC, and fill out the sample receipt check list form. The samples will be inventoried and visually inspected for damage. Each sample is assigned a unique laboratory sample number. Samples are logged into the LIMS system. The login includes the lab number, client, date, matrix, preservation, parameters, and laboratory batch ID. This information along with the login date and time, submitter ID, laboratory due date and priority, date sampled, date received, receiver, and any other appropriate laboratory information is then input into the Laboratory Information Management System (LIMS). A form is generated by LIMS and the original COC is attached. Samples are transferred for preservation if necessary and refrigeration until analysis. The appropriate analyst or supervisor then performs analysis. After analysis is complete, water samples are held for 30 days and then samples are transferred to disposal; soil samples are held for 30 days, and then sent to storage for an additional 60 days in case further testing is requested. Samples are appropriately characterized and disposed in accordance with Federal, State, and Local regulations.

Analytical Sensitivity and Project Criteria

York Analytical Laboratories, Inc.

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
VOC							
1,1,1,2-Tetrachloroethane	Aqueous	ug/l	5	0.5	0.077	≤ 25%	70-130%
1,1,1-Trichloroethane	Aqueous	ug/l	5	0.5	0.054	≤ 25%	70-130%
1,1,2,2-Tetrachloroethane	Aqueous	ug/l	5	0.5	0.176	≤ 25%	70-130%
1,1,2-Trichloro-1,2,2-Trifluoroethane	Aqueous	ug/l	5	0.5	0.106	≤ 25%	70-130%
1,1,2-Trichloroethane	Aqueous	ug/l	5	0.5	0.078	≤ 25%	70-130%
1,1-Dichloroethane	Aqueous	ug/l	5	0.5	0.091	≤ 25%	70-130%
1,1-Dichloroethylene	Aqueous	ug/l	5	0.5	0.101	≤ 25%	70-130%
1,1-Dichloropropene	Aqueous	ug/l	5	0.5	0.101	≤ 25%	70-130%
1,2,3-Trichlorobenzene	Aqueous	ug/l	5	1.0	0.201	≤ 25%	70-130%
1,2,3-Trichloropropane	Aqueous	ug/l	5	0.5	0.206	≤ 25%	70-130%
1,2,4-Trichlorobenzene	Aqueous	ug/l	5	1.0	0.11	≤ 25%	70-130%
1,2,4-Trimethylbenzene	Aqueous	ug/l	5	0.5	0.064	≤ 25%	70-130%
1,2-Dibromo-3-Chloropropane	Aqueous	ug/l	5	1.0	0.477	≤ 25%	70-130%
1,2-Dibromoethane	Aqueous	ug/l	5	0.5	0.144	≤ 25%	70-130%
1,2-Dichlorobenzene	Aqueous	ug/l	5	0.5	0.058	≤ 25%	70-130%
1,2-Dichloroethane	Aqueous	ug/l	5	0.5	0.088	≤ 25%	70-130%
1,2-Dichloropropane	Aqueous	ug/l	5	0.5	0.201	≤ 25%	70-130%
1,3,5-Trimethylbenzene	Aqueous	ug/l	5	0.5	0.06	≤ 25%	70-130%
1,3-Dichlorobenzene	Aqueous	ug/l	5	0.5	0.059	≤ 25%	70-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
1,3-Dichloropropane	Aqueous	ug/l	0.5	0.5	0.083	≤ 25%	70-130%
1,4-Dichlorobenzene	Aqueous	ug/l	5	0.5	0.107	≤ 25%	70-130%
1,4-Dioxane	Aqueous	ug/l	200	100	4.574	≤ 50%	40-130%
2,2-Dichloropropane	Aqueous	ug/l	5	0.5	0.13	≤ 25%	40-130%
2-Butanone (MEK)	Aqueous	ug/l	10	2	0.414	≤ 25%	40-160%
2-Chlorotoluene	Aqueous	ug/l	5	0.5	0.047	≤ 25%	70-130%
2-Hexanone	Aqueous	ug/l	10	2	0.656	≤ 25%	70-160%
4-Chlorotoluene	Aqueous	ug/l	5	0.5	0.045	≤ 25%	70-130%
Acetone	Aqueous	ug/l	10	5	0.518	≤ 25%	70-160%
Acrylonitrile	Aqueous	ug/l	5	2	0.512	≤ 25%	70-130%
Benzene	Aqueous	ug/l	5	0.5	0.045	≤ 25%	70-130%
Bromobenzene	Aqueous	ug/l	5	0.5	0.102	≤ 25%	70-130%
Bromochloromethane	Aqueous	ug/l	5	0.5	0.099	≤ 25%	70-130%
Bromodichloromethane	Aqueous	ug/l	5	0.5	0.075	≤ 25%	70-130%
Bromoform	Aqueous	ug/l	5	0.5	0.25	≤ 25%	70-130%
Bromomethane	Aqueous	ug/l	5	1	0.384	≤ 25%	40-160%
Carbon Disulfide	Aqueous	ug/l	5	0.5	0.05	≤ 25%	70-130%
Carbon Tetrachloride	Aqueous	ug/l	5	0.5	0.093	≤ 25%	70-130%
Chlorobenzene	Aqueous	ug/l	5	0.5	0.049	≤ 25%	70-130%
Chlorodibromomethane	Aqueous	ug/l	5	0.5	0.121	≤ 25%	70-130%
Chloroethane	Aqueous	ug/l	5	1	0.33	≤ 25%	70-130%
Chloroform	Aqueous	ug/l	5	0.5	0.044	≤ 25%	70-130%
Chloromethane	Aqueous	ug/l	5	0.5	0.126	≤ 25%	40-160%
cis-1,2-Dichloroethylene	Aqueous	ug/l	5	0.5	0.034	≤ 25%	70-130%
cis-1,3-Dichloropropene	Aqueous	ug/l	5	0.5	0.072	≤ 25%	70-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Dibromomethane	Aqueous	ug/l	5	0.5	0.078	≤ 25%	70-130%
Dichlorodifluoromethane	Aqueous	ug/l	5	0.5	0.038	≤ 25%	40-160%
Diethyl Ether	Aqueous	ug/l	5	1	0.098	≤ 25%	70-130%
Diisopropyl Ether	Aqueous	ug/l	5	0.5	0.032	≤ 25%	70-130%
Ethyl Benzene	Aqueous	ug/l	5	0.5	0.05	≤ 25%	70-130%
Hexachlorobutadiene	Aqueous	ug/l	5	0.5	0.26	≤ 25%	70-130%
Isopropylbenzene	Aqueous	ug/l	5	0.5	0.058	≤ 25%	70-130%
m + p Xylene	Aqueous	ug/l	10	1	0.063	≤ 25%	70-130%
Methylene Chloride	Aqueous	ug/l	10	1.0	0.226	≤ 25%	70-130%
MIBK	Aqueous	ug/l	10	2	0.224	≤ 25%	70-160%
MTBE	Aqueous	ug/l	5	0.5	0.042	≤ 25%	70-130%
Naphthalene	Aqueous	ug/l	10	2.0	0.214	≤ 25%	40-130%
n-Butylbenzene	Aqueous	ug/l	5	0.5	0.045	≤ 25%	70-130%
n-Propylbenzene	Aqueous	ug/l	5	0.5	0.045	≤ 25%	70-130%
o-Xylene	Aqueous	ug/l	5	0.5	0.052	≤ 25%	70-130%
p-Isopropyltoluene	Aqueous	ug/l	5	0.5	0.035	≤ 25%	70-130%
sec-Butylbenzene	Aqueous	ug/l	5	0.5	0.028	≤ 25%	70-130%
Styrene	Aqueous	ug/l	5	0.5	0.059	≤ 25%	70-130%
tert-Amylmethyl Ether	Aqueous	ug/l	5	0.5	0.107	≤ 25%	70-130%
tert-Butyl Alcohol	Aqueous	ug/l	80	8	3.468	≤ 25%	40-160%
tert-Butylbenzene	Aqueous	ug/l	5	0.5	0.045	≤ 25%	70-130%
tert-Butylethyl Ether	Aqueous	ug/l	5	0.5	0.073	≤ 25%	70-160%
Tetrachloroethylene	Aqueous	ug/l	5	0.5	0.139	≤ 25%	70-160%
Tetrahydrofuran	Aqueous	ug/l	20	5	0.998	≤ 25%	70-130%
Toluene	Aqueous	ug/l	5	0.5	0.036	≤ 25%	70-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
trans-1,2-Dichloroethylene	Aqueous	ug/l	5	0.5	0.069	≤ 25%	70-130%
trans-1,3-Dichloropropene	Aqueous	ug/l	5	0.5	0.123	≤ 25%	70-130%
trans-1,4-Dichloro-2-Butene	Aqueous	ug/l	10	2	0.774	≤ 25%	70-130%
Trichloroethylene	Aqueous	ug/l	5	0.5	0.119	≤ 25%	70-130%
Trichlorofluoromethane	Aqueous	ug/l	5	0.5	0.073	≤ 25%	70-130%
Vinyl Chloride	Aqueous	ug/l	5	0.5	0.158	≤ 25%	40-160%
1,1,1,2-Tetrachloroethane	Soil/Sediment	mg/kg	0.005		0.00028	≤ 25%	70-130%
1,1,1-Trichloroethane	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	70-130%
1,1,2,2-Tetrachloroethane	Soil/Sediment	mg/kg	0.005		0.00037	≤ 25%	70-130%
1,1,2-Trichloro-1,2,2-Trifluoroethane	Soil/Sediment	mg/kg	0.005		0.0006	≤ 25%	70-130%
1,1,2-Trichloroethane	Soil/Sediment	mg/kg	0.005		0.00032	≤ 25%	70-130%
1,1-Dichloroethane	Soil/Sediment	mg/kg	0.005		0.00028	≤ 25%	70-130%
1,1-Dichloroethylene	Soil/Sediment	mg/kg	0.005		0.00039	≤ 25%	70-130%
1,1-Dichloropropene	Soil/Sediment	mg/kg	0.005		0.00033	≤ 25%	70-130%
1,2,3-Trichlorobenzene	Soil/Sediment	mg/kg	0.005		0.00026	≤ 25%	70-130%
1,2,3-Trichloropropane	Soil/Sediment	mg/kg	0.005		0.0008	≤ 25%	70-130%
1,2,4-Trichlorobenzene	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	40-130%
1,2,4-Trimethylbenzene	Soil/Sediment	mg/kg	0.005		0.0003	≤ 25%	70-130%
1,2-Dibromo-3-Chloropropane	Soil/Sediment	mg/kg	0.005		0.00056	≤ 25%	70-130%
1,2-Dibromoethane	Soil/Sediment	mg/kg	0.005		0.0004	≤ 25%	70-130%
1,2-Dichlorobenzene	Soil/Sediment	mg/kg	0.005		0.00027	≤ 25%	70-130%
1,2-Dichloroethane	Soil/Sediment	mg/kg	0.005		0.00037	≤ 25%	70-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
1,2-Dichloropropane	Soil/Sediment	mg/kg	0.005		0.00037	≤ 25%	70-130%
1,3,5-Trimethylbenzene	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	70-130%
1,3-Dichlorobenzene	Soil/Sediment	mg/kg	0.005		0.00031	≤ 25%	70-130%
1,3-Dichloropropane	Soil/Sediment	mg/kg	0.005		0.00034	≤ 25%	70-130%
1,4-Dichlorobenzene	Soil/Sediment	mg/kg	0.005		0.00025	≤ 25%	70-130%
1,4-Dioxane	Soil/Sediment	mg/kg	0.100		0.01574	≤ 50%	40-160%
2,2-Dichloropropane	Soil/Sediment	mg/kg	0.005		0.0003	≤ 25%	70-130%
2-Butanone (MEK)	Soil/Sediment	mg/kg	0.010		0.00709	≤ 50%	70-160%
2-Chlorotoluene	Soil/Sediment	mg/kg	0.005		0.00034	≤ 25%	70-130%
2-Hexanone	Soil/Sediment	mg/kg	0.010		0.00613	≤ 50%	70-160%
4-Chlorotoluene	Soil/Sediment	mg/kg	0.005		0.00032	≤ 25%	70-130%
Acetone	Soil/Sediment	mg/kg	0.020		0.01384	≤ 50%	70-160%
Acrylonitrile	Soil/Sediment	mg/kg	0.010		0.00506	≤ 25%	70-160%
Benzene	Soil/Sediment	mg/kg	0.005		0.0003	≤ 25%	70-130%
Bromobenzene	Soil/Sediment	mg/kg	0.005		0.00035	≤ 25%	70-130%
Bromochloromethane	Soil/Sediment	mg/kg	0.005		0.00055	≤ 25%	70-130%
Bromodichloromethane	Soil/Sediment	mg/kg	0.005		0.00038	≤ 25%	70-130%
Bromoform	Soil/Sediment	mg/kg	0.005		0.00044	≤ 25%	70-130%
Bromomethane	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	40-130%
Carbon Disulfide	Soil/Sediment	mg/kg	0.005		0.00042	≤ 25%	70-130%
Carbon Tetrachloride	Soil/Sediment	mg/kg	0.005		0.00031	≤ 25%	70-130%
Chlorobenzene	Soil/Sediment	mg/kg	0.005		0.00033	≤ 25%	70-130%
Chlorodibromomethane	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	70-130%
Chloroethane	Soil/Sediment	mg/kg	0.005		0.00042	≤ 25%	40-160%
Chloroform	Soil/Sediment	mg/kg	0.005		0.00026	≤ 25%	70-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Chloromethane	Soil/Sediment	mg/kg	0.005		0.00032	≤ 25%	70-130%
cis-1,2-Dichloroethylene	Soil/Sediment	mg/kg	0.005		0.00022	≤ 25%	70-130%
cis-1,3-Dichloropropene	Soil/Sediment	mg/kg	0.005		0.00038	≤ 25%	70-130%
Dibromomethane	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	70-130%
Dichlorodifluoromethane	Soil/Sediment	mg/kg	0.005		0.00038	≤ 25%	40-160%
Diethyl Ether	Soil/Sediment	mg/kg	0.020		0.00042	≤ 25%	70-130%
Diisopropyl Ether	Soil/Sediment	mg/kg	0.005		0.00045	≤ 25%	70-130%
Ethyl Benzene	Soil/Sediment	mg/kg	0.005		0.00032	≤ 25%	70-130%
Hexachlorobutadiene	Soil/Sediment	mg/kg	0.005		0.00038	≤ 25%	70-130%
Isopropylbenzene	Soil/Sediment	mg/kg	0.005		0.00038	≤ 25%	70-130%
m + p Xylene	Soil/Sediment	mg/kg	0.010		0.00072	≤ 25%	70-130%
Methylene Chloride	Soil/Sediment	mg/kg	0.010		0.00064	≤ 25%	40-160%
MIBK	Soil/Sediment	mg/kg	0.010		0.00587	≤ 25%	70-160%
MTBE	Soil/Sediment	mg/kg	0.005		0.00044	≤ 25%	70-130%
Naphthalene	Soil/Sediment	mg/kg	0.010		0.00033	≤ 25%	40-130%
n-Butylbenzene	Soil/Sediment	mg/kg	0.005		0.00032	≤ 25%	70-130%
n-Propylbenzene	Soil/Sediment	mg/kg	0.005		0.00028	≤ 25%	70-130%
o-Xylene	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	70-130%
p-Isopropyltoluene	Soil/Sediment	mg/kg	0.005		0.00033	≤ 25%	70-130%
sec-Butylbenzene	Soil/Sediment	mg/kg	0.005		0.00033	≤ 25%	70-130%
Styrene	Soil/Sediment	mg/kg	0.005		0.00032	≤ 25%	70-130%
tert-Amylmethyl Ether	Soil/Sediment	mg/kg	0.005		0.00048	≤ 25%	70-130%
tert-Butyl Alcohol	Soil/Sediment	mg/kg	0.080		0.00734	≤ 25%	40-130%
tert-Butylbenzene	Soil/Sediment	mg/kg	0.005		0.00034	≤ 25%	70-160%
tert-Butylethyl Ether	Soil/Sediment	mg/kg	0.005		0.00045	≤ 25%	70-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Tetrachloroethylene	Soil/Sediment	mg/kg	0.005		0.00046	≤ 25%	70-130%
Tetrahydrofuran	Soil/Sediment	mg/kg	0.020		0.00151	≤ 25%	70-130%
Toluene	Soil/Sediment	mg/kg	0.005		0.00036	≤ 25%	70-130%
trans-1,2-Dichloroethylene	Soil/Sediment	mg/kg	0.005		0.00028	≤ 25%	70-130%
trans-1,3-Dichloropropene	Soil/Sediment	mg/kg	0.005		0.00038	≤ 25%	70-130%
trans-1,4-Dichloro-2-Butene	Soil/Sediment	mg/kg	0.010		0.00049	≤ 25%	70-130%
Trichloroethylene	Soil/Sediment	mg/kg	0.005		0.00033	≤ 25%	70-130%
Trichlorofluoromethane	Soil/Sediment	mg/kg	0.005		0.00047	≤ 25%	70-130%
Vinyl Chloride	Soil/Sediment	mg/kg	0.005		0.00035	≤ 25%	40-130%
SVOC			*RL's based on low level option: Sodium bisulfate, water, frozen or Encore preserved samples and 100% Solid analysis, does not take into account percent solid of soil/sediment sample				
1,2,4,5-Tetrachlorobenzene	Aqueous	ug/l	10		4.5576	≤ 20%	40-140%
1,2,4-Trichlorobenzene	Aqueous	ug/l	5		3.878	≤ 20%	40-140%
1,2-Dichlorobenzene	Aqueous	ug/l	5		4.226	≤ 20%	40-140%
1,2-Diphenylhydrazine (as Azobenzene)	Aqueous	ug/l	10		2.121	≤ 20%	40-140%
1,3-Dichlorobenzene	Aqueous	ug/l	5		4.188	≤ 20%	40-140%
1,4-Dichlorobenzene	Aqueous	ug/l	5		4.049	≤ 20%	40-140%
2,4,5-Trichlorophenol	Aqueous	ug/l	10		3.441	≤ 20%	30-130%
2,4,6-Trichlorophenol	Aqueous	ug/l	10		1.764	≤ 50%	30-130%
2,4-Dichlorophenol	Aqueous	ug/l	10		2.762	≤ 20%	30-130%
2,4-Dimethylphenol	Aqueous	ug/l	40		1.908	≤ 20%	30-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
2,4-Dinitrophenol	Aqueous	ug/l	20		4.435	≤ 50%	30-130%
2,4-Dinitrotoluene	Aqueous	ug/l	10		2.391	≤ 20%	40-140%
2,6-Dinitrotoluene	Aqueous	ug/l	10		2.315	≤ 20%	40-140%
2-Chloronaphthalene	Aqueous	ug/l	10		4.104	≤ 20%	40-140%
2-Chlorophenol	Aqueous	ug/l	10		3.279	≤ 20%	30-130%
2-Methylnaphthalene	Aqueous	ug/l	5*		3.597	≤ 20%	40-140%
2-Nitroaniline	Aqueous	ug/l	10		2.423	≤ 20%	40-140%
2-Nitrophenol	Aqueous	ug/l	10		3.852	≤ 20%	30-130%
3,3-Dichlorobenzidine	Aqueous	ug/l	10		3.162	≤ 20%	40-140%
3-Nitroaniline	Aqueous	ug/l	10		4.055	≤ 20%	40-140%
4,6-Dinitro-2-methylphenol	Aqueous	ug/l	10		3.122	≤ 50%	30-130%
4-Bromophenyl phenyl ether	Aqueous	ug/l	10		3.013	≤ 20%	40-140%
4-Chloro-3-methylphenol	Aqueous	ug/l	20		2.462	≤ 20%	30-130%
4-Chloroaniline	Aqueous	ug/l	20		1.54	≤ 20%	40-140%
4-Chlorophenylphenyl ether	Aqueous	ug/l	10		3.399	≤ 20%	40-140%
4-Nitroaniline	Aqueous	ug/l	10		6.943	≤ 20%	40-140%
4-Nitrophenol	Aqueous	ug/l	20		0.165	≤ 50%	10-130%
Acenaphthene	Aqueous	ug/l	5*		3.297	≤ 20%	40-140%
Acenaphthylene	Aqueous	ug/l	5*		3.097	≤ 20%	40-140%
Acetophenone	Aqueous	ug/l	10		3.35	≤ 20%	40-140%
Aniline	Aqueous	ug/l	5		1.978	≤ 50%	40-140%
Anthracene	Aqueous	ug/l	5*		2.094	≤ 20%	40-140%
Benzo(a)anthracene	Aqueous	ug/l	5*		1.946	≤ 20%	40-140%
Benzo(a)pyrene	Aqueous	ug/l	5*		1.659	≤ 20%	40-140%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Benzo(b)fluoranthene	Aqueous	ug/l	5*		1.035	≤ 20%	40-140%
Benzo(g,h,i)perylene	Aqueous	ug/l	5*		5.245	≤ 20%	40-140%
Benzo(k)fluoranthene	Aqueous	ug/l	5*		2.172	≤ 20%	40-140%
Benzoic Acid	Aqueous	ug/l	10		1.586	≤ 50%	10-130%
Bis(2-chloroethoxy)methane	Aqueous	ug/l	10		2.672	≤ 20%	40-140%
Bis(2-chloroethyl)ether	Aqueous	ug/l	10		3.465	≤ 20%	40-140%
Bis(2-chloroisopropyl)ether	Aqueous	ug/l	10		3.478	≤ 20%	40-140%
Bis(2-ethylhexyl)phthalate	Aqueous	ug/l	10*		3.161	≤ 20%	40-140%
Butylbenzylphthalate	Aqueous	ug/l	10		1.777	≤ 20%	40-140%
Carbazole	Aqueous	ug/l	5		1.692	≤ 20%	40-140%
Chrysene	Aqueous	ug/l	5*		1.899	≤ 20%	40-140%
Dibenz(a,h)anthracene	Aqueous	ug/l	5*		4.248	≤ 20%	40-140%
Dibenzofuran	Aqueous	ug/l	5*		2.947	≤ 20%	40-140%
Diethylphthalate	Aqueous	ug/l	10		2.257	≤ 20%	40-140%
Dimethylphthalate	Aqueous	ug/l	10		2.143	≤ 50%	40-140%
Di-n-butylphthalate	Aqueous	ug/l	5		2.435	≤ 20%	40-140%
Di-n-octylphthalate	Aqueous	ug/l	5		2.927	≤ 20%	40-140%
Fluoranthene	Aqueous	ug/l	5*		2.012	≤ 20%	40-140%
Fluorene	Aqueous	ug/l	5*		2.877	≤ 20%	40-140%
Hexachlorobenzene	Aqueous	ug/l	10*		2.464	≤ 20%	40-140%
Hexachlorobutadiene	Aqueous	ug/l	10		3.357	≤ 20%	40-140%
Hexachlorocyclopentadiene	Aqueous	ug/l	20		3.002	≤ 50%	30-140%
Hexachloroethane	Aqueous	ug/l	10		3.973	≤ 50%	40-140%
Indeno(1,2,3-cd)pyrene	Aqueous	ug/l	5*		3.649	≤ 20%	40-140%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Isophorone	Aqueous	ug/l	10		2.268	≤ 20%	40-140%
m & p-Cresol(s)	Aqueous	ug/l	20		2.242	≤ 20%	30-130%
Naphthalene	Aqueous	ug/l	5*		3.804	≤ 20%	40-140%
Nitrobenzene	Aqueous	ug/l	10		2.778	≤ 20%	40-140%
N-Nitroso-di-n-propylamine	Aqueous	ug/l	10		3.285	≤ 20%	40-140%
N-Nitrosodiphenylamine	Aqueous	ug/l	10		2.646	≤ 20%	40-140%
o-cresol	Aqueous	ug/l	10		3.077	≤ 20%	30-130%
Pentachloronitribenzene	Aqueous	ug/l	10		5.433	≤ 20%	40-140%
Pentachlorophenol	Aqueous	ug/l	10*		1.176	≤ 50%	30-130%
Phenanthrene	Aqueous	ug/l	5		2.191	≤ 20%	40-140%
Phenol	Aqueous	ug/l	10		2.434	≤ 20%	20-130%
Pyrene	Aqueous	ug/l	5*		1.842	≤ 20%	40-140%
Pyridine	Aqueous	ug/l	5*		3.281	≤ 50%	10-140%
SVOC			*Reporting limit (0.05-0.2)can be achieved using SIM-EPA Method 8270 for PAH				
1,2,4,5-Tetrachlorobenzene	Soil/Sediment	mg/kg	0.200		0.086	≤ 30%	40-140%
1,2,4-Trichlorobenzene	Soil/Sediment	mg/kg	0.200		0.104	≤ 30%	40-140%
1,2-Dichlorobenzene	Soil/Sediment	mg/kg	0.200		0.107	≤ 30%	40-140%
1,2-Diphenylhydrazine (as Azobenzene)	Soil/Sediment	mg/kg	0.200		0.106	≤ 30%	40-140%
1,3-Dichlorobenzene	Soil/Sediment	mg/kg	0.200		0.11	≤ 30%	40-140%
1,4-Dichlorobenzene	Soil/Sediment	mg/kg	0.200		0.109	≤ 30%	40-140%
2,4,5-Trichlorophenol	Soil/Sediment	mg/kg	0.200		0.116	≤ 30%	30-130%
2,4,6-Trichlorophenol	Soil/Sediment	mg/kg	0.200		0.069	≤ 30%	30-130%
2,4-Dichlorophenol	Soil/Sediment	mg/kg	0.200		0.094	≤ 30%	30-130%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
2,4-Dimethylphenol	Soil/Sediment	mg/kg	0.200		0.08	≤ 30%	30-130%
2,4-Dinitrophenol	Soil/Sediment	mg/kg	0.400		0.075	≤ 30%	30-130%
2,4-Dinitrotoluene	Soil/Sediment	mg/kg	0.200		0.163	≤ 30%	40-140%
2,6-Dinitrotoluene	Soil/Sediment	mg/kg	0.200		0.12	≤ 30%	40-140%
2-Chloronaphthalene	Soil/Sediment	mg/kg	0.200		0.115	≤ 30%	40-140%
2-Chlorophenol	Soil/Sediment	mg/kg	0.200		0.107	≤ 30%	30-130%
2-Methylnaphthalene	Soil/Sediment	mg/kg	0.200		0.099	≤ 30%	40-140%
2-Nitroaniline	Soil/Sediment	mg/kg	0.200		0.177	≤ 30%	40-140%
2-Nitrophenol	Soil/Sediment	mg/kg	0.200		0.12	≤ 30%	30-130%
3,3'-Dichlorobenzidine	Soil/Sediment	mg/kg	0.200		0.163	≤ 50%	20-140%
3-Nitroaniline	Soil/Sediment	mg/kg	0.200		0.139	≤ 30%	30-140%
4,6-Dinitro-2-methylphenol	Soil/Sediment	mg/kg	0.200		0.158	≤ 30%	30-130%
4-Bromophenyl phenyl ether	Soil/Sediment	mg/kg	0.200		0.095	≤ 30%	40-140%
4-Chloro-3-methylphenol	Soil/Sediment	mg/kg	0.200		0.097	≤ 30%	30-130%
4-Chloroaniline	Soil/Sediment	mg/kg	0.200		0.136	≤ 30%	10-140%
4-Chlorophenylphenyl ether	Soil/Sediment	mg/kg	0.200		0.096	≤ 30%	40-140%
4-Nitroaniline	Soil/Sediment	mg/kg	0.200		0.147	≤ 30%	40-140%
4-Nitrophenol	Soil/Sediment	mg/kg	0.200		0.141	≤ 50%	30-130%
Acenaphthene	Soil/Sediment	mg/kg	0.200		0.092	≤ 30%	40-140%
Acenaphthylene	Soil/Sediment	mg/kg	0.200		0.086	≤ 30%	40-140%
Acetophenone	Soil/Sediment	mg/kg	0.400		0.122	≤ 30%	40-140%
Aniline	Soil/Sediment	mg/kg	0.200		0.171	≤ 50%	10-140%
Anthracene	Soil/Sediment	mg/kg	0.200		0.103	≤ 30%	40-140%
Benzo(a)anthracene	Soil/Sediment	mg/kg	0.200		0.104	≤ 30%	40-140%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Benzo(a)pyrene	Soil/Sediment	mg/kg	0.200		0.103	≤ 30%	40-140%
Benzo(b)fluoranthene	Soil/Sediment	mg/kg	0.200		0.096	≤ 30%	40-140%
Benzo(g,h,i)perylene	Soil/Sediment	mg/kg	0.200		0.105	≤ 30%	40-140%
Benzo(k)fluoranthene	Soil/Sediment	mg/kg	0.200		0.11	≤ 30%	40-140%
Benzoic Acid	Soil/Sediment	mg/kg	0.400		0.061	≤ 50%	30-130%
Bis(2-chloroethoxy)methane	Soil/Sediment	mg/kg	0.200		0.099	≤ 30%	40-140%
Bis(2-chloroethyl)ether	Soil/Sediment	mg/kg	0.200		0.106	≤ 30%	40-140%
Bis(2-chloroisopropyl)ether	Soil/Sediment	mg/kg	0.200		0.148	≤ 30%	40-140%
Bis(2-ethylhexyl)phthalate	Soil/Sediment	mg/kg	0.200		0.093	≤ 30%	40-140%
Butylbenzylphthalate	Soil/Sediment	mg/kg	0.200		0.09	≤ 30%	40-140%
Carbazole	Soil/Sediment	mg/kg	0.200		0.094	≤ 30%	40-140%
Chrysene	Soil/Sediment	mg/kg	0.200		0.105	≤ 30%	40-140%
Dibenz(a,h)anthracene	Soil/Sediment	mg/kg	0.200		0.107	≤ 30%	40-140%
Dibenzofuran	Soil/Sediment	mg/kg	0.200		0.093	≤ 30%	40-140%
Diethylphthalate	Soil/Sediment	mg/kg	0.200		0.107	≤ 30%	40-140%
Dimethylphthalate	Soil/Sediment	mg/kg	0.200		0.094	≤ 30%	40-140%
Di-n-butylphthalate	Soil/Sediment	mg/kg	0.200		0.118	≤ 30%	40-140%
Di-n-octylphthalate	Soil/Sediment	mg/kg	0.200		0.085	≤ 30%	40-140%
Fluoranthene	Soil/Sediment	mg/kg	0.200		0.113	≤ 30%	40-140%
Fluorene	Soil/Sediment	mg/kg	0.200		0.099	≤ 30%	40-140%
Hexachlorobenzene	Soil/Sediment	mg/kg	0.200		0.106	≤ 30%	40-140%
Hexachlorobutadiene	Soil/Sediment	mg/kg	0.200		0.103	≤ 30%	40-140%
Hexachlorocyclopentadiene	Soil/Sediment	mg/kg	0.200		0.085	≤ 30%	40-140%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Hexachloroethane	Soil/Sediment	mg/kg	0.200		0.108	≤ 30%	40-140%
Indeno(1,2,3-cd)pyrene	Soil/Sediment	mg/kg	0.200		0.105	≤ 30%	40-140%
Isophorone	Soil/Sediment	mg/kg	0.200		0.097	≤ 30%	40-140%
m & p-cresol(s)	Soil/Sediment	mg/kg	0.200		0.097	≤ 30%	30-130%
Naphthalene	Soil/Sediment	mg/kg	0.200		0.1	≤ 30%	40-140%
Nitrobenzene	Soil/Sediment	mg/kg	0.200		0.109	≤ 30%	40-140%
N-Nitroso-di-n-propylamine	Soil/Sediment	mg/kg	0.200		0.12	≤ 30%	40-140%
N-Nitrosodiphenylamine	Soil/Sediment	mg/kg	0.200		0.111	≤ 30%	40-140%
o-cresol	Soil/Sediment	mg/kg	0.200		0.113	≤ 30%	30-130%
Pentachloronitrobenzene	Soil/Sediment	mg/kg	0.400		0.125	≤ 30%	40-140%
Pentachlorophenol	Soil/Sediment	mg/kg	0.400		0.116	≤ 30%	30-130%
Phenanthrene	Soil/Sediment	mg/kg	0.200		0.09	≤ 30%	40-140%
Phenol	Soil/Sediment	mg/kg	0.200		0.11	≤ 30%	30-130%
Pyrene	Soil/Sediment	mg/kg	0.200		0.086	≤ 30%	40-140%
Pyridine	Soil/Sediment	mg/kg	0.200		0.084	≤ 50%	30-140%
			*RL's based on 100% Solid analysis, does not take into account % solid of soil/sediment sample				
METALS							
Antimony	Aqueous	mg/l	0.005		0.002	±20%	80-120%
Arsenic	Aqueous	mg/l	0.010		0.001	±20%	80-120%
Barium	Aqueous	mg/l	0.010		0.004	±20%	80-120%
Beryllium	Aqueous	mg/l	0.001		0.0009	±20%	80-120%
Cadmium	Aqueous	mg/l	0.005		0.001	±20%	80-120%

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Chromium	Aqueous	mg/l	0.005		0.0009	±20%	80-120%
Copper	Aqueous	mg/l	0.005		0.002	±20%	80-120%
Lead	Aqueous	mg/l	0.003		0.001	±20%	80-120%
Nickel	Aqueous	mg/l	0.005		0.0008	±20%	80-120%
Selenium	Aqueous	mg/l	0.010		0.002	±20%	80-120%
Silver	Aqueous	mg/l	0.005		0.001	±20%	80-120%
Thallium	Aqueous	mg/l	0.010		0.002	±20%	80-120%
Vanadium	Aqueous	mg/l	0.010		0.001	±20%	80-120%
Zinc	Aqueous	mg/l	0.020		0.009	±20%	80-120%
Antimony	Soil/Sediment	mg/Kg	0.3		0.140	±35%	30 to 207%*
Arsenic	Soil/Sediment	mg/Kg	0.5		0.190	±35%	80-120%*
Barium	Soil/Sediment	mg/Kg	0.5		0.240	±35%	81-119%*
Beryllium	Soil/Sediment	mg/Kg	0.010		0.008	±35%	84-116%*
Cadmium	Soil/Sediment	mg/Kg	0.5		0.130	±35%	83-117%*
Chromium	Soil/Sediment	mg/Kg	0.5		0.080	±35%	82-118%*
Copper	Soil/Sediment	mg/Kg	0.5		0.140	±35%	83-117%*
Lead	Soil/Sediment	mg/Kg	0.5		0.100	±35%	82-118%*
Nickel	Soil/Sediment	mg/Kg	0.5		0.070	±35%	80-120%*
Selenium	Soil/Sediment	mg/Kg	0.5		0.211	±35%	77-123%*
Silver	Soil/Sediment	mg/Kg	0.5		0.090	±35%	66-133%*
Thallium	Soil/Sediment	mg/Kg	0.5		0.190	±35%	82-120%*
Vanadium	Soil/Sediment	mg/Kg	0.5		0.080	±35%	80-120%*
Zinc	Soil/Sediment	mg/Kg	0.5		0.070	±35%	81-119%*

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
			*RL's based on 100% Solid analysis, does not take into account % solid of soil/sediment sample				*Vendor control limits
Mercury	Soil/Sediment	mg/kg	0.100		0.0970	±35%	80-120%*
Mercury	Aqueous	ug/l	0.0002		0.000039	±20%	80-120%
METALS by ICP/MS							
Antimony	Aqueous	ug/l	0.2		0.130	±20%	80-120%
Arsenic	Aqueous	ug/l	0.2		0.160	±20%	80-120%
Barium	Aqueous	ug/l	1.0		0.233	±20%	80-120%
Beryllium	Aqueous	ug/l	0.050		0.030	±20%	80-120%
Cadmium	Aqueous	ug/l	0.050		0.049	±20%	80-120%
Chromium	Aqueous	ug/l	0.050		0.037	±20%	80-120%
Cobalt	Aqueous	ug/l	1.0		0.201	±20%	80-120%
Copper	Aqueous	ug/l	0.10		0.05	±20%	80-120%
Lead	Aqueous	ug/l	0.050		0.020	±20%	80-120%
Manganese	Aqueous	ug/l	1.0		0.112	±20%	80-120%
Molybdenum	Aqueous	ug/l	1.0		0.196	±20%	80-120%
Nickel	Aqueous	ug/l	1.0		0.331	±20%	80-120%
Selenium	Aqueous	ug/l	0.100		0.040	±20%	80-120%
Silver	Aqueous	ug/l	0.100		0.070	±20%	80-120%
Thallium	Aqueous	ug/l	0.100		0.020	±20%	80-120%
Vanadium	Aqueous	ug/l	1.00		0.065	±20%	80-120%
Zinc	Aqueous	ug/l	1.00		0.320	±20%	80-120%
Total PCBs - Aqueous							

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
PCB-1016	Aqueous	ug/l	0.05	0.0363	≤ 50%	40-140%	
PCB-1221	Aqueous	ug/l	0.05	0.0363	≤ 50%	40-140%	
PCB-1232	Aqueous	ug/l	0.05	0.0363	≤ 50%	40-140%	
PCB-1242	Aqueous	ug/l	0.05	0.0363	≤ 50%	40-140%	
PCB-1248	Aqueous	ug/l	0.05	0.0363	≤ 50%	40-140%	
PCB-1254	Aqueous	ug/l	0.05	0.0422	≤ 50%	40-140%	
PCB-1260	Aqueous	ug/l	0.05	0.0422	≤ 50%	40-140%	
PCB-1262	Aqueous	ug/l	0.05	*	≤ 50%	40-140%	
PCB-1268	Aqueous	ug/l	0.05	*	≤ 50%	40-140%	
Total PCBs - Soil/Sediment							
PCB-1016	Soil/Sediment	mg/kg	0.0170	0.00790	≤ 50%	40-140%	
PCB-1221	Soil/Sediment	mg/kg	0.0170	0.00790	≤ 50%	40-140%	
PCB-1232	Soil/Sediment	mg/kg	0.0170	0.00790	≤ 50%	40-140%	
PCB-1242	Soil/Sediment	mg/kg	0.0170	0.00790	≤ 50%	40-140%	
PCB-1248	Soil/Sediment	mg/kg	0.0170	0.00790	≤ 50%	40-140%	
PCB-1254	Soil/Sediment	mg/kg	0.0170	0.0068	≤ 50%	40-140%	
PCB-1260	Soil/Sediment	mg/kg	0.0170	0.0068	≤ 50%	40-140%	
PCB-1262	Soil/Sediment	mg/kg	0.0170	*	≤ 50%	40-140%	
PCB-1268	Soil/Sediment	mg/kg	0.0170	*	≤ 50%	40-140%	
PESTICIDES							
4,4-DDD	Aqueous	ug/l	0.001	0.0095	≤ 30%	40-140%	
4,4-DDE	Aqueous	ug/l	0.001	0.0009	≤ 30%	40-140%	
4,4-DDT	Aqueous	ug/l	0.001	0.00084	≤ 30%	40-140%	
Aldrin	Aqueous	ug/l	0.001	0.00087	≤ 30%	40-140%	
alpha-BHC	Aqueous	ug/l	0.001	0.00096	≤ 30%	40-140%	

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
beta-BHC	Aqueous	ug/l	0.001	0.00079	≤ 30%	40-140%	
Chlordane	Aqueous	ug/l	0.040	0.040	≤ 30%	40-140%	
delta-BHC	Aqueous	ug/l	0.001	0.00066	≤ 30%	40-140%	
Dieldrin	Aqueous	ug/l	0.001	0.00071	≤ 30%	40-140%	
Endosulfan I	Aqueous	ug/l	0.001	0.00079	≤ 30%	40-140%	
Endosulfan II	Aqueous	ug/l	0.001	0.00084	≤ 30%	40-140%	
Endosulfan Sulfate	Aqueous	ug/l	0.001	0.00095	≤ 30%	40-140%	
Endrin	Aqueous	ug/l	0.010	0.00094	≤ 30%	40-140%	
Endrin Ketone	Aqueous	ug/l	0.001	0.00091	≤ 30%	40-140%	
gamma-BHC (Lindane)	Aqueous	ug/l	0.010	0.0096	≤ 30%	40-140%	
Heptachlor	Aqueous	ug/l	0.010	0.0095	≤ 30%	40-140%	
Heptachlor Epoxide	Aqueous	ug/l	0.010	0.0075	≤ 30%	40-140%	
Hexachlorobenzene	Aqueous	ug/l	0.05	0.0190	≤ 30%	40-140%	
Methoxychlor	Aqueous	ug/l	0.05	0.0196	≤ 30%	40-140%	
Toxaphene	Aqueous	ug/l	0.5	0.089	≤ 30%	40-140%	
4,4-DDD	Soil/Sediment	ug/kg	0.330	0.147	≤ 30%	40-140%	
4,4-DDE	Soil/Sediment	ug/kg	0.330	0.189	≤ 30%	40-140%	
4,4-DDT	Soil/Sediment	ug/kg	0.330	0.148	≤ 30%	40-140%	
Alachlor	Soil/Sediment	ug/kg	0.330	0.223	≤ 30%	40-140%	
Aldrin	Soil/Sediment	ug/kg	0.330	0.211	≤ 30%	40-140%	
alpha-BHC	Soil/Sediment	ug/kg	0.330	0.249	≤ 30%	40-140%	
beta-BHC	Soil/Sediment	ug/kg	0.330	0.208	≤ 30%	40-140%	
Chlordane	Soil/Sediment	ug/kg	1.320	1.22	≤ 30%	40-140%	
delta-BHC	Soil/Sediment	ug/kg	0.330	0.208	≤ 30%	40-140%	
Dieldrin	Soil/Sediment	ug/kg	0.330	0.195	≤ 30%	40-140%	

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Endosulfan I	Soil/Sediment	ug/kg	0.330	0.160	≤ 30%	40-140%	
Endosulfan II	Soil/Sediment	ug/kg	0.330	0.202	≤ 30%	40-140%	
Endosulfan Sulfate	Soil/Sediment	ug/kg	0.330	0.169	≤ 30%	40-140%	
Endrin	Soil/Sediment	ug/kg	0.330	0.200	≤ 30%	40-140%	
Endrin Aldehyde	Soil/Sediment	ug/kg	0.330	0.222	≤ 30%	40-140%	
Endrin Ketone	Soil/Sediment	ug/kg	0.330	0.145	≤ 30%	40-140%	
gamma-BHC (Lindane)	Soil/Sediment	ug/kg	0.330	0.229	≤ 30%	40-140%	
Heptachlor	Soil/Sediment	ug/kg	0.330	0.263	≤ 30%	40-140%	
Heptachlor Epoxide	Soil/Sediment	ug/kg	0.330	0.145	≤ 30%	40-140%	
Hexachlorobenzene	Soil/Sediment	ug/kg	0.330	0.199	≤ 30%	40-140%	
Methoxychlor	Soil/Sediment	ug/kg	1.650	0.851	≤ 30%	40-140%	
Toxaphene	Soil/Sediment	ug/kg	0.033	0.027	≤ 30%	40-140%	
1,1,1,2-Tetrachloroethane	Air	ppmv	0.0005	0.00023	≤ 25%	70-130%	
1,1,1-Trichloroethane	Air	ppmv	0.0005	0.00026	≤ 25%	70-130%	
1,1,2,2-Tetrachloroethane	Air	ppmv	0.0005	0.00034	≤ 25%	70-130%	
1,1,2-Trichloroethane	Air	ppmv	0.0005	0.00028	≤ 25%	70-130%	
1,1,2-Trichlorotrifluoroethane (Freon 113)	Air	ppmv	0.0005	0.00025	≤ 25%	70-130%	
1,1-Dichloroethane	Air	ppmv	0.0005	0.00024	≤ 25%	70-130%	
1,1-Dichloroethene	Air	ppmv	0.0005	0.00017	≤ 25%	70-130%	
1,2,4-Trichlorobenzene	Air	ppmv	0.0005	0.00016	≤ 25%	70-130%	

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
1,2,4-Trimethylbenzene	Air	ppmv	0.0005	0.00028	≤ 25%	70-130%	
1,2-Dibromoethane (EDB)	Air	ppmv	0.0005	0.00029	≤ 25%	70-130%	
1,2-Dichlorobenzene	Air	ppmv	0.0005	0.00020	≤ 25%	70-130%	
1,2-Dichloroethane	Air	ppmv	0.0005	0.00018	≤ 25%	70-130%	
1,2-Dichloropropane	Air	ppmv	0.0005	0.00037	≤ 25%	70-130%	
1,2-Dichlorotetraflouroethane (Freon 114)	Air	ppmv	0.0005	0.00027	≤ 25%	70-130%	
1,3,5-Trimethylbenzene	Air	ppmv	0.0005	0.00023	≤ 25%	70-130%	
1,3-Butadiene	Air	ppmv	0.0005	0.00042	≤ 25%	70-130%	
1,3-Dichlorobenzene	Air	ppmv	0.0005	0.00023	≤ 25%	70-130%	
1,3-Dichloropropane	Air	ppmv	0.0005	0.00027	≤ 25%	70-130%	
1,4-Dichlorobenzene	Air	ppmv	0.0005	0.00034	≤ 25%	70-130%	
2-Butanone (MEK)	Air	ppmv	0.0005	0.00024	≤ 25%	70-130%	
2-Hexanone (MBK)	Air	ppmv	0.0010	0.00051	≤ 25%	50-150%	
4-Ethyltoluene	Air	ppmv	0.0005	0.00047	≤ 25%	50-150%	
4-Isopropyltoluene	Air	ppmv	0.0005	0.00039	≤ 25%	70-130%	
4-Methyl-2-pentanone (MIBK)	Air	ppmv	0.0010	0.00050	≤ 25%	70-130%	
Acetone	Air	ppmv	0.0005	0.00021	≤ 25%	50-150%	
Acrylonitrile	Air	ppmv	0.0005	0.00035	≤ 25%	70-130%	
Benzene	Air	ppmv	0.0005	0.00037	≤ 25%	70-130%	
Benzyl Chloride	Air	ppmv	0.0005	0.00044	≤ 25%	70-130%	

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Bromodichloromethane	Air	ppmv	0.0005	0.00018	≤ 25%	70-130%	
Bromoform	Air	ppmv	0.0005	0.00022	≤ 25%	70-130%	
Bromomethane	Air	ppmv	0.0005	0.00025	≤ 25%	70-130%	
Carbon Disulfide	Air	ppmv	0.0005	0.00011	≤ 25%	70-130%	
Carbon Tetrachloride	Air	ppmv	0.00005	0.000019	≤ 25%	70-130%	
Chlorobenzene	Air	ppmv	0.0005	0.00033	≤ 25%	70-130%	
Chloroethane	Air	ppmv	0.0005	0.00046	≤ 25%	70-130%	
Chloroform	Air	ppmv	0.0005	0.00021	≤ 25%	70-130%	
Chloromethane	Air	ppmv	0.0005	0.00029	≤ 25%	70-130%	
cis-1,2-Dichloroethene	Air	ppmv	0.0005	0.00025	≤ 25%	70-130%	
cis-1,3-Dichloropropene	Air	ppmv	0.0005	0.00026	≤ 25%	70-130%	
Cyclohexane	Air	ppmv	0.0005	0.00018	≤ 25%	50-150%	
Dibromochloromethane	Air	ppmv	0.0005	0.00018	≤ 25%	70-130%	
Dichlorodifluoromethane (Freon 12)	Air	ppmv	0.0005	0.00029	≤ 25%	70-130%	
Ethanol	Air	ppmv	0.0020	0.00110	≤ 25%	50-150%	
Ethyl Acetate	Air	ppmv	0.0005	0.00022	≤ 25%	50-150%	
Ethylbenzene	Air	ppmv	0.0005	0.00030	≤ 25%	70-130%	
Hexachlorobutadiene	Air	ppmv	0.0005	0.00028	≤ 25%	70-130%	
Hexane	Air	ppmv	0.0005	0.00019	≤ 25%	70-130%	
Isopropyl Alcohol	Air	ppmv	0.0010	0.00082	≤ 25%	50-150%	
Isopropylbenzene (Cumene)	Air	ppmv	0.0005	0.00030	≤ 25%	70-130%	
m/p-Xylene	Air	ppmv	0.0010	0.00079	≤ 25%	70-130%	

Analyte	Matrix	Units	Regular Reporting Limit	Low Level option For VOA Water	MDL	Precision	Accuracy
Methylene Chloride	Air	ppmv	0.0005	0.00031	≤ 25%	70-130%	
Methyl-tert-butyl ether (MTBE)	Air	ppmv	0.0005	0.00025	≤ 25%	70-130%	
n-Butylbenzene	Air	ppmv	0.0005	0.00041	≤ 25%	70-130%	
n-Heptane	Air	ppmv	0.0005	0.00020	≤ 25%	50-150%	
o-Xylene	Air	ppmv	0.0005	0.00035	≤ 25%	70-130%	
Propene	Air	ppmv	0.0005	0.00029	≤ 25%	50-150%	
Sec-Butylbenzene	Air	ppmv	0.0005	0.00031	≤ 25%	70-130%	
Styrene	Air	ppmv	0.0005	0.00029	≤ 25%	70-130%	
Tetrachloroethylene (Perc)	Air	ppmv	0.00005	0.000021	≤ 25%	70-130%	
Tetrahydrofuran	Air	ppmv	0.0005	0.00041	≤ 25%	50-150%	
Toluene	Air	ppmv	0.0005	0.00027	≤ 25%	70-130%	
trans-1,2-Dichloroethene	Air	ppmv	0.0005	0.00038	≤ 25%	70-130%	
trans-1,3-Dichloropropene	Air	ppmv	0.0005	0.00015	≤ 25%	70-130%	
Trichloroethylene (TCE)	Air	ppmv	0.0005	0.00024	≤ 25%	70-130%	
Trichlorofluoromethane (Freon 11)	Air	ppmv	0.0005	0.00025	≤ 25%	70-130%	
Vinyl Acetate	Air	ppmv	0.0005	0.00013	≤ 25%	70-130%	
Vinyl Chloride	Air	ppmv	0.0005	0.00033	≤ 25%	70-130%	

NA = Not Applicable NE = Not Established

*York Analytical Laboratories, Inc. Method Detection Limits (MDLs) are determined annually and updates may be available.

The Reporting Limits (RL) are based upon the lowest calibration standard used for calibration.

Methanol multiplier: York takes 0.1 ml to 10.0 ml for a 100x dilution of the methanol-preserved soil VOC samples.

Prepared by York Analytical Laboratories, Inc. 01/24/2011.

Reporting Limit (RL) for individual compounds maybe elevated due to poor calibration performance at the RL. RL's may also be elevated for individual samples due to matrix interferences. MDL's vary instrument to instrument. The enclosed list represents typical limits for methods.

Laboratory Quality Control Requirements

York Analytical Laboratories, Inc.

QC Sample	Frequency	Acceptance Criteria	Corrective Action
VOA Reagent/Method Blank	Batch	<RL Except for methylene chloride and acetone <25 ppb	Locate source of contamination & correct. Re-analyze MB
Reagent/Method Blank, other	Batch	<RL	Locate source of contamination & correct. Re-analyze MB. Re- extract samples if MB is contami- nated
Duplicate	5% of Batch	≤30%	Re-analyze and narrate
Laboratory Con- trol Sample (LCS)	5% of Batch	Per method	Recalculate the percent recoveries. Locate & correct problem, re- extract/re-analyze associated sam- ples
Matrix Spike, if requested	5% of Batch	Per method	Compare to LCS recoveries. Nar- rate any non-conformances
Other: Surrogate Spike	Per Sample	Per method	Re-extract per SOP

The following deliverables will be provided by the laboratory:

1. Client's Name
2. Project Number
3. Laboratory Sample ID
4. Client Sample ID
5. Collection Date
6. Sample Matrix
7. Analyses
8. Analytical Results
9. Reporting Limits (MDL and RL)
10. Reporting Units
11. Dilution Factor
12. Date Analyzed
13. Method Blank Results (if QA report requested)
14. Surrogate Recoveries and Acceptance Limits (if QA report requested)
15. Matrix Spike/Matrix Spike Duplicate Results and Acceptance Limits (if QA report requested)
16. Spike/ Duplicate Results and Acceptance Limits (if QA report requested)
17. Laboratory Control Sample Results and Acceptance Limits (if QA report requested)
18. Project Narrative which contains all non-conformances if RCP or Category B-like deliverables requested

The following will be maintained by the laboratory:

- All raw data including chromatograms
- Copies of Instrument Logbooks
- Analytical Benchsheets
- Other pertinent data

York will provide analytical reports in a pdf format sent via e-mail and electronic data deliverables (Excel or other agreed upon format).

APPENDIX

YORK STANDARD OPERATING PROCEDURES (SOPS)

ATTACHMENT D

Sample Nomenclature

SAMPLE NOMENCLATURE

The sample nomenclature outlined below provides consistency between sample events and projects but, most importantly, establish unique sample IDs that will avoid confusion months or years after the sample has been collected. Furthermore, unique sample IDs are required for any data submitted to the NYSDEC in EDD format or being uploaded to an EQulS database.

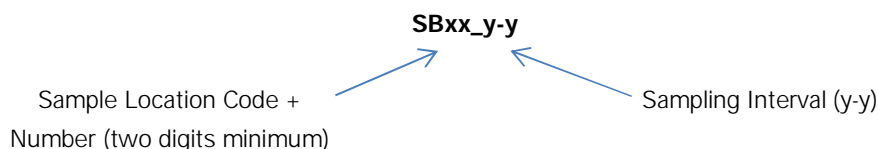
1.0 INVESTIGATION LOCATION CODES

SB	Soil Boring	SV	Soil Vapor Point
WC	Waste Characterization Boring	IA	Indoor Air
TP	Test Pit	AA	Ambient Air
EPSW	Endpoint Location (Sidewall)	SVE	Vapor Extraction Well
EPB	Endpoint Location (Bottom)	DS	Drum
MW	Monitoring Well	IDW	Investigation Derived Waste
TMW	Temporary Monitoring Well	SL	Sludge
SW	Surface Water	FP	Free Product

2.0 SAMPLE NOMENCLATURE

Each sample at a site must have a unique value.

- Soil/Sediment Samples:**

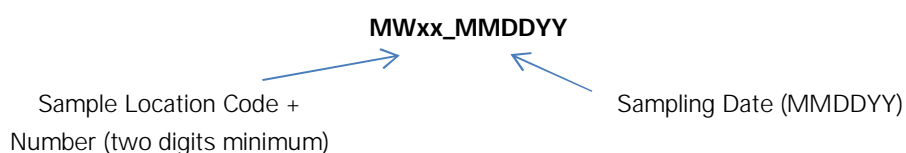


Sample Type	Sample Location Code	Sampling Depth or Interval (feet bgs or approx. elevation)	Sample Name
Phase II/Remedial Investigation			
Grab Soil Sample	SB01	2 to 4	SB01_2-4
	SB02	4	SB02_4
Waste Characterization			
Grab Soil Sample	WC01	2 to 4	WC01_2-4
	WC02	4	WC02_4
Composite Soil Sample from one or more locations	COMP01 or COMP02 + COMP03	0 to 10 (Fill)	COMP01_0-10

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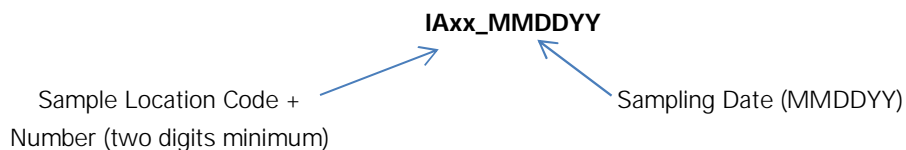
Sample Type	Sample Location Code	Sampling Depth or Interval (feet bgs or approx. elevation)	Sample Name
Endpoint Sampling			
Grab Soil Sample	EPSW01_N	5	EPSW01_N_5
	EPSW01_S	5	EPSW01_S_5
	EPSW01_E	5	EPSW01_E_5
	EPSW01_W	5	EPSW01_W_5
	EPB01	6	EPB01_6

- Groundwater/Surface Water Samples:**



Sample Type	Sample Location Code	Sampling Date	Sample Name
Groundwater Sample	MW01	02/21/2013	MW01_022113

- Air/Soil Vapor Samples:**



Sample Type	Sample Location Code	Date	Sample Name
Air Sample	IA01	02/21/2013	IA01_022113
Soil Vapor Sample	SV01	02/21/2013	SV01_022113
Vapor Extraction Well Sample	SVE01 (INLET/MIDPOINT/OUTLET)	02/21/2013	SVE01_IN_022113 SVE01_MID_022113 SVE01_OUT_022113

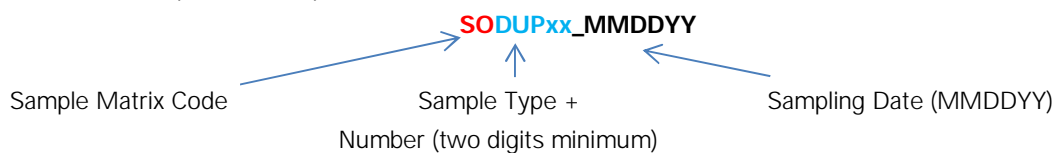
- QA/QC Samples:**

Sample Matrix Codes

SO	Soil	AS	Air
SE	Sediment	SV	Soil Vapor
GW	Groundwater	SL	Sludge
SW	Surface Water	FP	Free Product

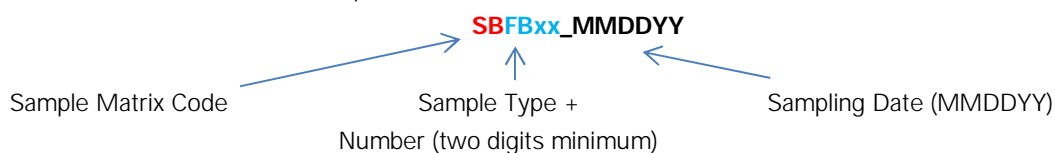
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- o Duplicates Samples



Sample Type	Parent Sample Code	Date	Sample Name
Groundwater Duplicate Sample (DUP)	MW01_022113	02/21/2013	GWDUP01_022113
Soil boring Duplicate Sample (DUP)	SBP01_022113	02/21/2013	SODUP01_022113
Grab Waste Characterization	WC01	02/21/2013	WCDUP01_022113
Composite Waste Characterization	COMP01	02/21/2013	COMPDUP01_022113

- o Field Blanks and Trip Blanks



Sample Type	Date	Sample Name
Groundwater Field Blank (FB)	02/21/2013	GWFB01_022113
Groundwater Trip Blank (TB)	02/21/2013	GWTB01_022113
Soil Field Blank	02/21/2013	SOFB01_022113
Soil Trip Blank	02/21/2013	SOTB01_022113

- o Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Parent Sample Name_MS or MSD

Sample Type	Sample Location	Parent Sample Name	Sample Name
Matrix Spike Soil (MS)	SB01	SB01_2-4	SB01_2-4_MS
Matrix Spike Soil Duplicate (MSD)	SB01	SB01_2-4	SB01_2-4_MSD
Matrix Spike GW (MS)	MW01	MW01	MW01_MS
Matrix Spike GW Duplicate (MSD)	MW01	MW01	MW01_MSD

3.0 NOTES

1. The sample location code should not exceed 20 characters and the sample name should not exceed 40 characters.
2. Sample location code (**SB01, MW01, etc.**) is a sequential number (starting with 01) and should be a minimum of two digits.
3. Sample Interval (**SB01_0-5**) is separated from the sample location code with an underscore, and the top and bottom interval with a dash. Soil and sediment sample intervals should always be in

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- feet. Soil and sediment sample intervals should contain no "/" or "()" or unit.
4. Sample date (MW01_022113) is separated from the sample location code with an underscore and should be provided in MMDDYY format [the date should contain no "/" or "-"].
 5. If groundwater samples are collected from multiple intervals within one well, you may assign a letter designation (in lower case) to the well ID to differentiate between intervals (i.e., MW01a_022113, MW01b_022113, and MW01c_022113). The letter "a" would indicate the shallowest interval and "c" the deepest. The actual depth intervals should be documented in the project field book or field sheets and the letter designations should be used consistently between sampling events.
 6. According to USEPA's Contract Laboratory Program (CLP) Guidance for Field Samplers (January 2011), field duplicate samples should remain "blind" to the laboratory (i.e., they should have separate CLP Sample numbers). Assign two separate (unique) CLP sample numbers (i.e., one number to the field sample and one to the duplicate). Submit blind to the laboratory. (<http://www.epa.gov/superfund/programs/clp/download/sampler/CLPSamp-01-2011.pdf>)