
SITE MANAGEMENT PLAN

For

**1676 THIRD AVENUE
New York, New York**

Prepared For:

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LANGAN

CERTIFICATION

I, Joel B. Landes, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



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LIST OF ACRONYMS

Acronym	Definition
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
EI	Elevation
FER	Final Engineering Report
FWRIA	Fish and Wildlife Remedial Impact Analysis
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
mg/Kg	Milligrams per kilogram
MTA	Metropolitan Transit Authority
NYCDOB	New York City Department of Buildings
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
OSHA	Occupational Safety and Health Administration
PAOC	Potential Area of Concern
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RIR	Remedial Investigation Report
RSCOs	Recommended Soil Cleanup Objectives
SCG	Standards, Criteria, and Guidelines
SCO	Soil Cleanup Objective
SCS	Site Characterization Study
SHSO	Site Health and Safety Officer
SMP	Site Management Plan
SOD	Soil Oxidant Demand
SOP	Site Operations Plan
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 Introduction

This Site Management Plan (SMP) is required as an element of the remedial program at 1676 Third Avenue (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreement (BCA) Index # C231079-10-12, Site # C231079, which was executed on November 27, 2012.

1.1.1 General

Bevin Associates, LLC entered into a BCA with the NYSDEC to remediate a 930-square-foot property located in New York, New York. This BCA required the Remedial Party, Bevin Associates, LLC, to investigate and remediate contaminated media at the Site. The Site location and boundaries are provided as Figures 1 and 2. The boundaries of the Site are more fully described in Appendix B – Metes and Bounds.

After completion of the remedial work described in the Remedial Action Work Plan (RAWP), some contamination was left in the subsurface at the Site, which is hereafter referred to as "remaining contamination." This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. (Langan) on behalf of Bevin Associates, LLC, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the Site.

1.1.2 Purpose

Engineering Controls have been incorporated into the Site remedy to control exposure to remaining contamination during the use of the Site and to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC and recorded with the New York City Register's office will require compliance with this SMP and all ECs and ICs placed on the Site. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the Environmental

Easement for contamination that remains at the Site. This plan has been approved by NYSDEC and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the Site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports to NYSDEC.

To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual for complex systems).

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the environmental easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA Index #C231079-10-12, Site # C231079 for the Site, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 Site Background

1.2.1 Site Location and Description

The Site is located in the City of New York, New York County and is identified as Block 1522 and Lot 40 on the New York City Tax Map. The Site is approximately 930 square feet or 0.02 acres and is located on the city block bordered by 94th Street to the north, 93rd Street to the south, Third Avenue to the east, and Lexington Avenue to the west (see Figures 1 and 2). The boundaries of the Site are more fully described in Appendix B – Metes and Bounds.

The Site is improved with a new five-story townhouse that was constructed concurrently with implementation of the RAWP.

1.2.2 Site History

The Site was historically used as a gasoline station with underground storage tanks (USTs) between the 1930s and early 1990s at which time the seven on-site tanks were pumped out and removed. Excavation at the Site for development of the aforementioned townhouse began in October 2011. Petroleum contaminated soil was encountered during excavation and a spill was reported. Subsequent excavation revealed a 215-gallon tank located in the northwestern corner of the Site. There was no contamination in the surrounding soil. The Site was remediated in accordance with the RAWP, which is documented in the Final Engineering Report (FER).

1.2.3 Geologic Conditions

The generalized stratigraphy underlying the Site is composed of:

- Urban fill consisting of gray silt and clay with brick fragments in the upper ten feet of soil (below sidewalk grade surface [bgs]);
- Fine sand, trace fine gravel, from depths of 10 feet to 20 ft bgs;
- Weathered schistose bedrock from a depth of 20 ft bgs.

Groundwater underlying the Site ranged from approximately 11.09 to 12.45 ft bgs (el 44.71 ft to el 46.16 ft) and flows from west to east. The basement subgrade of the development at 10 to 12 ft bgs is located within native sand and is approximately 1 to 2 feet above the groundwater table. A groundwater flow map is provided as Figure 3.

1.3 Summary of Remedial Investigation Findings

A Remedial Investigation (RI) was performed to characterize the nature and extent of contamination at the Site. The results of the RI are described in detail in the following reports:

- Phase I ESA Report, dated April 2007, prepared by Dvirka and Bartilucci Consulting Engineers (D&B);
- Phase II ESI Report, dated July 2, 2007, prepared by D&B;
- Soil Sample Analysis Report (SAR), dated February 20, 2012, prepared by Environmental Maintenance Contractors (EMC);
- Soil & Groundwater Sample Analysis Report, dated April 24, 2012, prepared by EMC; and
- Remedial Investigation Report (RIR), dated December 2012, prepared by Langan.

Table 1 provides a summary of the methodology, rationale, and the respective laboratory analytical parameters for the investigations completed by D&B and EMC. Boring, sample, and monitoring well locations from the three investigations are shown on Figure 2.

A total of four borings were advanced on Site, one of which was converted into a groundwater monitoring well, and a total of nine soil samples (including five post excavation endpoint samples) and one groundwater sample were collected for laboratory analysis from the Site. Three soil borings were completed off-site on the adjacent sidewalk and were converted to groundwater monitoring wells. Three soil samples and three groundwater samples were collected for laboratory analysis from the off-site locations. The December 2012 RIR contains a full discussion of the data.

Generally, the RI identified the following contaminants(s) of concern in soil and groundwater at the Site:

• Ethylbenzene	• 1,2,4-Trimethylbenzene
• Toluene	• Xylene (mixed)
• 1,3,5-Trimethylbenzene	• Naphthalene
• n-Propylbenzene	• Sec-Butylbenzene
• Benzene	• Isopropylbenzene
• n-Butylbenzene	• p-Isopropyltoluene

Soil

Unrestricted Use Soil Cleanup Objectives (UUSCO) exceedances for samples collected during the remedial investigations are shown on Figure 4. Soil samples were collected from shallow fill material and/or from the groundwater interface. Site soil and groundwater have been impacted by a petroleum (gasoline) release related to former use as a gasoline filling station, as evidenced by analytical data exceedances and observation of petroleum staining and odor. The majority of petroleum-impacted material on the Site was removed during excavation for the development basement to a depth of approximately 10 to 12 ft bgs. Residual on-site soil impacts are estimated to extend from basement grade to approximately 15 ft bgs. UUSCO

exceedances of volatile organic compounds (VOCs) that are typically associated with gasoline were detected, including toluene (6.2 parts per million [ppm]), ethylbenzene (11 ppm), xylenes (64 ppm), 1,2,4-trimethylbenzene (53 ppm), 1,3,5-trimethylbenzene (17 ppm) and n-propylbenzene (7.5 ppm). Only one of these VOCs (1,2,4-trimethylbenzene) was present at concentrations exceeding the Restricted Residential (RR) SCOs. Soil samples collected at deeper intervals 16-18 and 20-22 ft bgs exhibited no UU SCO exceedances.

Groundwater

The Groundwater sample location and exceedances are presented in Figure 5. Elevated concentrations of VOCs associated with gasoline, including 1,2,4-trimethylbenzene (150 parts per billion [ppb]), 1,3,5-trimethylbenzene (52 ppb), ethylbenzene (270 ppb), isopropylbenzene (40 ppb), n-butylbenzene (35 ppb), n-propylbenzene (120 ppb), toluene (47 ppb), and total xylenes (320 ppb) were detected at concentrations above groundwater standards. One SVOC (naphthalene at 49 ppb) was detected at a concentration exceeding its groundwater standard.

Soil Vapor

No soil vapor data was collected during the Remedial Investigation phase; however, for the purposes of designing the remedy, soil vapor was assumed to be impacted by the same VOCs identified in the Site soil and groundwater.

Underground Storage Tanks

A geophysical survey was performed in 2007 that did not identify USTs on the Site. NYSDEC records indicated that seven USTs were present up until early 1990, at which time the tanks were pumped out and removed. The tanks were administratively closed in September 1996. Excavation at the Site for development of the aforementioned townhouse revealed a 215-gallon tank located in the northwestern corner of the Site. This tank was added to the PBS registration.

1.4 Summary of Remedial Actions

The Site was remediated in accordance with the following NYSDEC-approved documents: March 12, 2013 Remedial Action Work Plan (RAWP) (revised on May 8, 2013); a June 13, 2013 Technical Memorandum (revised July 30, 2013); and a September 25, 2013 Letter Modification of the Technical Memorandum. The remedy is documented in the FER.

The following is a summary of the remedial actions performed at the Site:

1. Excavation and off-site disposal of contaminant source areas as practical, including soil below the existing basement grade (within the foundation walls) to the groundwater table where VOCs associated with petroleum contamination exceed the Protection of Groundwater SCOs (PGSCOs)

2. In-situ treatment of VOC-impacted soil and groundwater with the application of a chemical oxidant, sodium persulfate, using open excavation applications, direct push temporary injection points, and permanent groundwater monitoring wells.
3. Collection and analysis of endpoint documentation soil samples
4. Backfilling of remedial excavation areas to development grade with clean fill (meeting the lower of Unrestricted Residential Use SCOs and PGSCOs) or virgin, native imported crushed stone
5. Construction and maintenance of a composite cover system consisting of a concrete building slab that spans the entire footprint of the Site to prevent human exposure to remaining contaminated soil remaining at the Site
6. Execution and recording of an Environmental Easement to restrict land use and prevent future exposure to any contamination remaining at the Site
7. Development and implementation of a SMP for long term management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting

Remedial activities were completed at the Site on October 7, 2013.

1.4.1 Removal of Contaminated Materials from the Site

Soil exceeding the PGWSCOs was excavated (within the foundation walls) and disposed off-site. The maximum depth of excavation ranged from approximately 1.7 to approximately 2.8 feet below basement grade, which was the approximate average depth of groundwater. Material was removed to the extent practical and, in order to protect the stability of the building, appropriate benching and sloping was performed off building foundation components. A list of the SCOs for this Site is provided in Table 2. A figure showing areas where excavation was performed is provided as Figure 6. A total of 18.98 tons of petroleum-impacted soil was excavated from the Site and disposed at Clean Earth of Carteret, Inc. (CEC) located in Carteret, New Jersey.

1.4.2 Site-Related Treatment Systems

In-situ Chemical Oxidation (ISCO) was utilized to treat petroleum-related VOCs in soil and groundwater with the application of a chemical oxidant; sodium persulfate. Prior to field implementation of ISCO, bench-scale testing, including tests for total soil oxidant demand (SOD) and a dosage treatability determination, was performed to support treatment design. The alkaline activation of the persulfate was completed by adding aqueous sodium hydroxide (NaOH) to the persulfate prior to application. The ISCO applications for the Site included the following tasks:

- First ISCO Application Event: In-situ treatment of VOC-impacted soil groundwater using chemical oxidation, performed concurrently with the remedial excavation;
- Second ISCO Application Event: In-situ treatment of VOC-impacted soil and groundwater using chemical oxidation through the use of direct-push temporary injection points; and
- Third ISCO Application Event: In-situ treatment of VOC-impacted soil and groundwater using chemical oxidation through the use of the three former off-site groundwater wells (MW-1 through MW-3).

The reagents for alkaline-activated persulfate include sodium persulfate powder and 25 to 50% NaOH buffer solution. NaOH was used to raise the groundwater pH to at least 10.5, which is the pH level that is required to activate persulfate. A SOD test using the Site soil and groundwater was conducted to obtain a site-specific reagent dosage of 4.3 grams of sodium persulfate per kilogram of soil. Based on the SOD test results and the size of the treatment areas, total reagent demands were calculated and are shown in the following table. The ISCO applications were implemented between August 8 and October 7, 2013 by PAL and Langan.

ISCO Reagent Demands			
Reagent	First Application Demand (lbs)	Second Application Demand (lbs)	Third Application Demand (lbs)
Persulfate powder	830	2,070	2,924
25% Sodium Hydroxide Solution	1,400	3,500	-
50% Sodium Hydroxide Solution	-	-	2,500

In the event that monitoring data indicates that additional ISCO treatment is required, a plan will be submitted to NYSDEC for approval. This plan will provide the details and schedule for performing work necessary for potential additional remediation/treatment. The additional treatment may consist of injecting persulfate and NaOH buffer solution into the subsurface via temporary DPT injection points within the sidewalk adjacent to the Site. Potential future DPT injection points are shown on Figure 10. The ISCO injections will target the five-foot interval from approximately 12 to 17 ft bgs.

1.4.3 Post-Remediation Groundwater Sampling

To monitor the effectiveness of the remedy, two new monitoring wells (MW-4 and MW-5) were installed within the Site sidewalk along the down-gradient side of the site. The location of the two off-site monitoring wells is shown on Figure 10. Boring logs and groundwater monitoring well construction logs are provided as Appendix I. A detailed description of the post-remediation groundwater sampling is provided in the FER.

One groundwater sample was collected from each well and analyzed for VOCs via EPA Method 8260. Figure 11 shows sample locations and analytical results of such samples, and provides a comparison to pre-remediation sampling data. The comparison shows significant reduction of VOCs in groundwater. A groundwater monitoring program, as set forth in Section 3.5 of this SMP, will be implemented to document the effectiveness of the ISCO remedy.

1.4.4 Remaining Contamination

Per the RAWP and NYSDEC DER policy, endpoint documentation soil sample collection was completed from the bottom of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area. Based on these criteria, two base endpoint samples and six sidewall samples, plus required QA/QC samples, were collected. Table 3 and Figure 7 summarize the endpoint soil sample results and include comparison to the PGSCOs.

Based on the sampling results, material with concentrations of VOCs exceeding the PGSCOs was left in place at the Site. Since contaminated soil remains beneath the Site after completion of the Remedial Action, Institutional and Engineering Controls are required to protect human health and the environment. The long-term management of these Engineering and Institutional Controls (ECs/ICs) are described in the following sections.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 Introduction

2.1.1 General

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

2.1.2 Purpose

This plan provides:

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

2.2 Engineering Controls

2.2.1 Engineering Control Systems

2.2.1.1 Cover System

Exposure to remaining contamination in soil/fill at the Site is prevented by a cover system comprised of a minimum six-inch thick concrete basement slab that covers the entire footprint of the Site. As an additional protective measure, but not as a required element of the remedy, a soil vapor mitigation system was built into the concrete basement slab. The system includes a sub-slab vapor barrier membrane and an active sub-membrane depressurization system.

The Excavation Work Plan that appears in Appendix A outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection and maintenance of this cover are provided in the Monitoring Plan included in Section 4 of this SMP.

2.2.1.2 ISCO Treatment

In the event that monitoring data indicates that additional remediation/ISCO treatment is required, a corrective measures plan will be submitted to NYSDEC for approval. This plan will provide the details and schedule for performing work necessary for additional remediation and/or treatment. The additional treatment may consist of injecting persulfate and NaOH buffer solution into the subsurface via three temporary DPT injection points within the sidewalk adjacent to the Site. Potential DPT injection points are shown on Figure 10. The ISCO injections would target the five-foot interval from approximately 12 to 17 ft bgs.

To complete each injection, an injector head would be attached to a hollow drilling rod. The head and drilling rod will be driven to injection depth and when positioned at the desired depth, ISCO solution would be pumped with a hydraulic pump into the subsurface. After the desired quantity of solution is injected into the desired depth, the injector would be raised approximately one foot, and additional solution injected. The injector head and drill rods would be removed from the point upon completion of each injection, and boring holes would be backfilled with clean fill (meeting the lower of Unrestricted Residential Use SCOs and PGSCOs) or virgin, native imported crushed stone.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered complete when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.6 of NYSDEC DER-10.

2.2.2.1 Composite Cover System

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

2.2.2.2 ISCO Treatment

Should additional groundwater treatment be recommended, the treatment will be performed based upon prior written approval granted by the NYSDEC. In the event that monitoring data

indicates that the ISCO treatment is no longer required, a proposal to discontinue the ISCO treatment will be submitted by the property owner to the NYSDEC and NYSDOH.

2.3 Institutional Controls

A series of ICs are required by the Decision Document and the RAWP to: (1) implement, maintain and monitor EC systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the remaining contamination; and, (3) limit the use and development of the Site to restricted residential use only. Adherence to these ICs is required by the Environmental Easement and will be implemented under this SMP. The ICs are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All ECs must be operated and maintained as specified in this SMP;
- A composite cover system consisting of the concrete building slab must be inspected, certified and maintained as required in the SMP;
- Compliance groundwater monitoring wells must be inspected, certified, operated and maintained as required in this SMP;
- All ECs on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;
- On-site and off-site environmental monitoring devices must be protected and replaced as necessary to ensure the devices function in the manner specified in this SMP; and
- Engineering Controls may not be discontinued without an amendment or the extinguishment of the Environmental Easement.

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The Site has a series of ICs in the form of Site restrictions. Adherence to these ICs is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- The Site owner or remedial party is required to complete and submit to NYSDEC a periodic certification of IC/ECs in accordance with Part 375-1.8 (h)(3);

- The property may only be used for restricted residential, commercial or industrial uses as defined by Part 375-1.8(g), provided that the long-term IC/ECs included in this SMP are employed;
- The property may not be used for a higher level of use, such as unrestricted residential or other unrestricted use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater at the Site as a source of potable or process water is prohibited without necessary water quality treatment as determined by the NYSDOH or County/City DOH;
- Vegetable gardens and farming on the property are prohibited; and
- The Site owner or remedial party will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

2.3.1 Excavation Work Plan

The Site has been remediated for restricted residential use. Any future intrusive work that will penetrate the cover system, or encounter or disturb the remaining contamination, including any modifications or repairs to the existing cover system will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix A to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in the Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the Site (see Appendix D). Based on future changes to state and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and resubmitted with the notification provided in Section A-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The Site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for: 1) the safe performance of all intrusive work; 2) the structural integrity of excavations; 3) proper disposal of excavation spoils and dewatering fluids; 4) control of runoff from open excavations into remaining contamination; and 5) structures that may be affected by excavations. The Site owner will ensure that Site development activities will not interfere with, or otherwise impair or compromise the engineering controls described in this SMP.

2.3.2 Soil Vapor Intrusion Evaluation

The Decision Document required that all future buildings constructed on the site be evaluated for the potential for soil vapor intrusion (SVI). The developer has elected to install a sub-membrane depressurization (SMD) system in the building which is currently under construction, thereby obviating the requirement for SVI evaluation in that building.

Prior to the construction of any future enclosed structures on the Site, an SVI evaluation will be performed to determine whether any mitigation measures are necessary to eliminate potential exposure to vapors in the proposed structure. Alternatively, an SVI mitigation system may be installed as an element of the building foundation without first conducting an investigation. This mitigation system will include a vapor barrier and passive sub-slab depressurization system that is capable of being converted to an active system.

Prior to conducting an SVI investigation or installing a mitigation system, a work plan will be developed and submitted to the NYSDEC and NYSDOH for approval. This work plan will be developed in accordance with the most recent NYSDOH "Guidance for Evaluating Vapor Intrusion in the State of New York". Measures to be employed to mitigate potential vapor intrusion will be evaluated, selected, designed, installed, and maintained based on the SVI evaluation, the NYSDOH guidance, and construction details of the proposed structure.

Preliminary (unvalidated) SVI sampling data will be forwarded to the NYSDEC and NYSDOH for initial review and interpretation. Upon validation, the final data will be transmitted to the agencies, along with a recommendation for follow-up action, such as mitigation. If any indoor air test results exceed NYSDOH guidelines, relevant NYSDOH fact sheets will be provided to all tenants and occupants of the property within 15 days of receipt of validated data.

SVI sampling results, evaluations, and follow-up actions will also be summarized in the subsequent Periodic Review Report.

2.4 Inspections and Notifications

2.4.1 Inspections

Inspections of all remedial components installed at the Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted at the frequency defined in Section 5.3. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If Site records are complete and up to date; and
- Changes, or needed changes, to the remedial or monitoring system.

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted within five days of the event to verify the effectiveness of the EC/ICs implemented at the Site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the Brownfield Cleanup Agreement (BCA), 6NYCRR Part 375, and/or Environmental Conservation Law.
- 7-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or engineering control that reduces or has the potential to reduce the effectiveness of an EC and likewise any action to be taken to mitigate the damage or defect.

- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

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

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

2.5 Contingency Plan

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions. Fire or explosion and environmental release are not likely to occur in relation to the EC/ICs implemented at the Site, but are included in this contingency plan. A more thorough emergency/contingency plan can be found in the HASP for the Site (Appendix D).

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance, the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to the Program Manager or Project Manager or the Field Safety Officer (FSO). These emergency contact lists must be maintained in an easily accessible location at the Site.

Table 4: Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480

	(3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Table 5: Langan Contact Numbers*

Program Manager:	Joel Landes, P.E. (212) 479-5404
Project Manager:	Jason Hayes, P.E. (212) 479-5427
Health & Safety Officer (HSO):	Tony Moffa (215) 756-2523
Field Safety Officer (FSO):	Ryan Wohlstrom (cell) (203) 464-2731
NYSDEC Project Manager:	Shaun Bollers (718) 482-4096
Owner Representative:	Elias S. Kefalidis (212) 758-7373

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

2.5.2 Map and Directions to Nearest Health Facility

Site Location: 1676 Third Avenue, New York, NY

Nearest Hospital Name: Lenox Hill Hospital

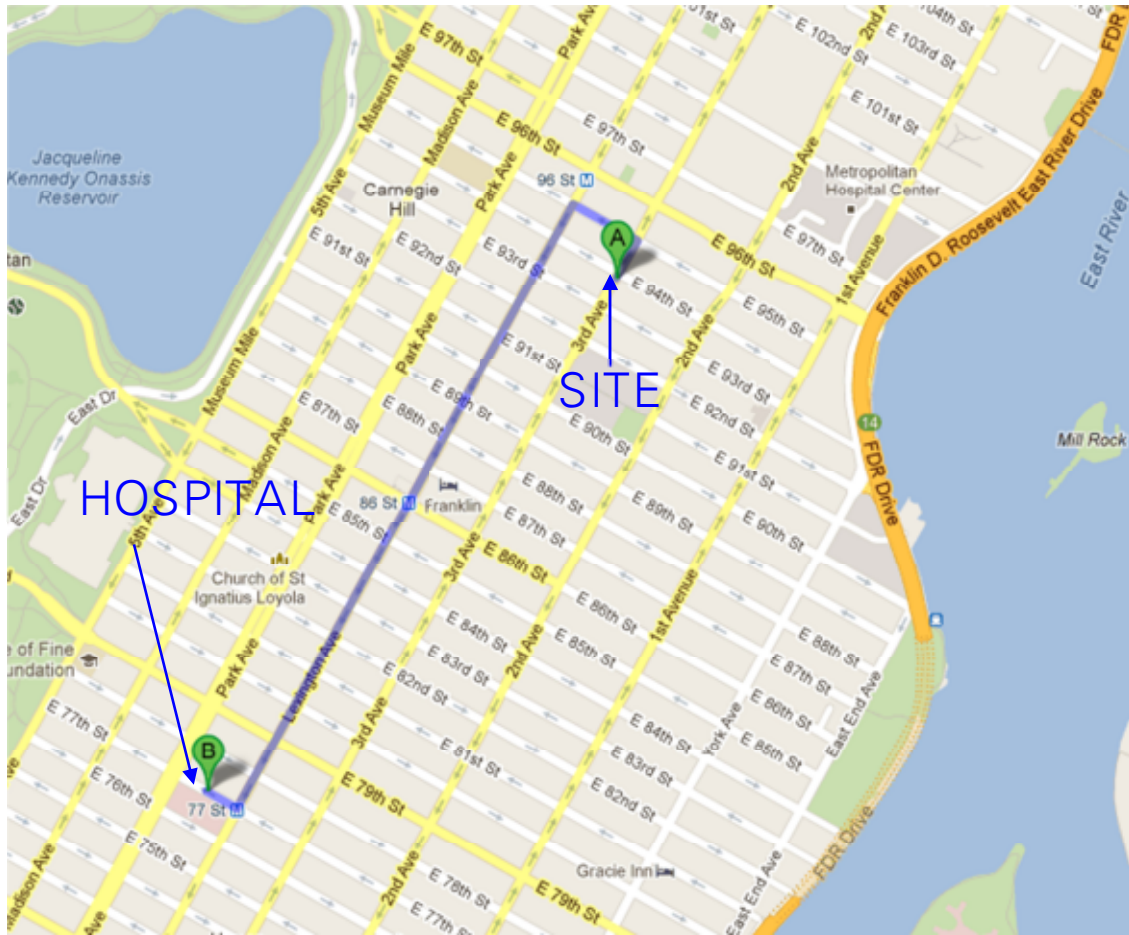
Hospital Location: 130 East 77th Street, New York, NY

Hospital Telephone: (212) 434-3030

Directions to the Hospital (Total Est. Time: 5 minutes Total Est. Distance: 1.1 miles)

- 1: Head northeast on Third Ave toward East 94th Street.
- 2: Turn left onto East 94th Street.
- 3: Turn left onto Lexington Avenue.
- 4: Turn right onto East 77th Street.
- 5: Destination will be on left

Map Showing Route from the Site to the Hospital



2.5.3 Response Procedures

For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed. An exclusion zone around the spill area should be established depending on the size of the spill. The following steps should be taken by the Emergency Coordinator:

- Determine the nature, identity and amounts of major spill components;
- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosive-proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- Make sure all unnecessary persons are removed from the spill area;
- Take action to stop or minimize the spill; such as shutting down equipment,
- Notify appropriate response teams and authorities;
- Use proper PPE in handling of the spill;
- If possible, try to stop the leak with appropriate material;
- Remove all surrounding materials that can react or compound with the spill; and
- Ensure spilled material, containment material and PPE are contained for proper disposal.

In order to mobilize the manpower, resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority should be established. The local fire department will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The fire department will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers. If an emergency occurs, including but not limited to fire, explosion or significant release of fuel, all heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at an evacuation meeting point.

The emergency responders will give directions for implementing whatever actions are necessary. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the Site safety meeting, will take over these duties until local police and fire fighters arrive.

2.5.3.1 Emergency Contacts/Notification System

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 4). The list will also be posted prominently at the Site and made readily available to all personnel at all times.

2.5.3.2 Procedures for Spills

Control or stop the spread of minor chemical spills contamination utilizing the appropriate materials (i.e., absorbents, etc.) if possible. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For all petroleum or hazardous chemical spills immediately notify the appropriate response groups including the NYSDEC Spill Response hotline (within 2 hours of discovery).

2.5.3.3 Evacuation Plans

In the event evacuation of the Site is necessary (e.g., fire, explosion, etc.), personnel will evacuate using evacuation routes posted in all on-site buildings.

2.5.3.4 Contingency Plan Amendments

As changes in Site conditions and operations may take place over time, some information in this contingency plan may need to be updated to reflect these changes. The contingency plan will be updated on an as-needed basis. Any updates to the contingency plan will be kept with this Monitoring Plan and will be maintained at the Site.

3.0 SITE MONITORING PLAN

3.1 Introduction

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site, the composite cover system, and all affected Site media identified below. Monitoring of other ECs is described in Chapter 4, Operation, Monitoring and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of groundwater;
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards;
- Assessing achievement of the remedial performance criteria;
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

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

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements;
- Reporting requirements;
- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Quarterly groundwater monitoring will be conducted for two years unless otherwise specified by NYSDEC. The frequency thereafter will be determined by NYSDEC. When analytical results demonstrate a satisfactory downward trend in groundwater VOC concentrations, a

recommendation will be made to the NYSDEC to discontinue groundwater monitoring or reduce the frequency of groundwater monitoring events. The monitoring program is summarized in Table 6 and outlined in detail in Sections 3.2 and 3.3 below.

Table 6: Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Matrix	Analysis
Groundwater Monitoring	Quarterly sampling for two years.	Groundwater	VOCs (EPA Method 8260)
Composite Cover System	Annual	Soil	Visual inspection of all cover system components

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

3.2 Composite Cover System Monitoring

A composite cover system comprised of a concrete building slab serves as a protective barrier minimizing the risk of exposure to residual contamination left in place under the Site. The components of the composite cover system are illustrated in Figure 9 and Appendix J. Inspection of the composite cover system by a professional engineer or a qualified environmental professional under the direction of a professional engineer on a regular schedule at a minimum of once a year and following any severe weather or other conditions that could affect the cover. During these inspections, an inspection form will be completed (Appendix F). The inspection requires sufficient information to certify the integrity of all elements of the cover system described above and should document any composite cover disturbance activities. Any damage to the composite cover identified during the inspection will be repaired in kind.

3.3 Groundwater Monitoring Program

Following completion of remedy, quarterly groundwater monitoring from the two existing off-site wells (MW-4 and MW-5) will be implemented to document the effectiveness of the remedy. Groundwater will be sampled quarterly for a minimum of two years following the initial ISCO treatment. The location of the two off-site monitoring wells is shown on Figure 10. The samples will be submitted to a NYSDOH ELAP-accredited laboratory for analysis of the VOCs via EPA method 8260. A Groundwater Monitoring Report, indicating whether sample analysis shows any downward trend in groundwater concentrations, will be provided to NYSDEC following each monitoring event and in the annual Periodic Review Report (PRR). The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC. Deliverables for the groundwater

monitoring program are specified in Section 3.6. Boring logs and groundwater monitoring well construction logs are provided as Appendix I.

3.3.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix E. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

3.3.1.1 Well Gauging

Prior to sampling, the static water level will be measured at each respective well to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated water level indicator. Water levels will be recorded and converted to elevations relative to the Borough of Manhattan Datum (BMD) for groundwater contouring purposes. The depth to the bottom of the well will also be recorded.

3.3.1.2 Groundwater Purging and Sampling

The monitoring wells will be purged of three well volumes and sampled in general accordance with the United States Environmental Protection Agency (USEPA) low-flow (minimal drawdown) groundwater sampling procedures. Groundwater samples will be collected after chemical and physical field parameters (i.e., pH, temperature, electroconductivity, dissolved oxygen, oxidation reduction potential (ORP), and turbidity) have stabilized to within 10% variability between consecutive measurements. ISCO-specific groundwater parameters (ORP, pH, and dissolved oxygen) will be measured to monitor ISCO influenced parameters

One groundwater sample will be collected from each well into laboratory-supplied containers using new, dedicated polyethylene tubing. The groundwater samples will be collected into laboratory-supplied sample containers, labeled, placed in a cooler, packed on ice (to maintain a temperature of 4°C) and shipped to the laboratory under standard chain of custody protocol for analysis.

3.3.1.3 Laboratory Analysis

All laboratory analyses of groundwater samples will be conducted by a NYSDOH ELAP-approved laboratory certified for analyses using the most recent ASP. All sampling procedures will be completed in accordance with the requirements of the Field Sampling Plan (FSP) (Appendix H) and the Quality Assurance Project Plan (QAPP) (Appendix G). Category B deliverables will be obtained from the lab and results will be reviewed by a third party data validator. A Data Usability Summary Report (DUSR) for all data will be included with the PRR,

and all data will be submitted to the NYSDEC in the appropriate Electronic Data Deliverable format. Groundwater samples will be analyzed for VOCs via EPA method 8260.

3.3.2 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan) if an event renders the wells unusable. Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.4 Site-Wide Inspection

Site-wide inspections will be performed at the frequency defined in Section 5.3. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed (Appendix F). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and
- Confirm that Site records are up to date.

3.5 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the QAPP prepared for the Site (Appendix G). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement
- Sampling Program
 - o Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
 - o Sample holding times will be in accordance with the NYSDEC ASP requirements.
 - o Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody
- Calibration Procedures
 - o All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
 - o The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures
- Preparation of a DUSR, which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.
- Internal QC and Checks
- QA Performance and System Audits
- Preventative Maintenance Procedures and Schedules
- Corrective Action Measures

3.6 Monitoring Reporting Requirements

Forms and any other information generated during regular monitoring events and inspections will be kept on file at the Site. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. A letter report will also be submitted to the NYSDEC subsequent to each sampling event. The report, and letter, will include, at a minimum:

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

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized in Table 7 below.

Table 7: Schedule of Monitoring/Inspection Reports

Monitoring Program	Reporting Frequency*
Groundwater Monitoring	Quarterly
Composite Cover System Inspections	Annual

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

4.0 OPERATION AND MAINTENANCE PLAN

4.1 Introduction

This Operation and Maintenance Plan describes the conditional measures to be implemented at the Site in the event that groundwater monitoring data indicates that additional ISCO treatment is required. This Operation and Maintenance Plan includes the steps necessary to allow individuals unfamiliar with the site to implement an ISCO application in the Site sidewalk.

Information on non-mechanical Engineering Controls (i.e. soil cover system) is provided in Section 3 - Engineering and Institutional Control Plan. A copy of this Operation and Maintenance Plan, along with the complete SMP, will be kept at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of the SMP.

4.2 Engineering Control System Operation and Maintenance

The Site remedy does not rely on any mechanical systems, such as depressurization systems or air sparge/ soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

This Operation and Maintenance Plan describes a conditional measure that may be implemented at the Site in the event that groundwater monitoring data indicates that additional ISCO treatment is required. The additional treatment would consist of injecting persulfate and NaOH buffer solution into the subsurface via three temporary DPT injection points within the sidewalk adjacent to the Site. Proposed DPT injection points are shown on Figure 10. The ISCO injections would target the five-foot interval from approximately 12 to 17 ft bgs.

To complete each injection, an injector head would be attached to a hollow drilling rod. The head and drilling rod would be driven to injection depth and when positioned at the desired depth, ISCO solution would be pumped with a hydraulic pump into the subsurface. After the desired quantity of solution is injected into the desired depth, the injector would be raised approximately one foot, and additional solution injected. The injector head and drill rods would be removed from the point upon completion of each injection, and boring holes would be backfilled with clean fill (meeting the lower of Unrestricted Residential Use SCOs and PGSCOs) or virgin, native imported crushed stone.

4.3 Groundwater Monitoring Well Maintenance

If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan) if an event renders the wells

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

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC Commissioner Policy (CP-43) on "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 Site Inspections

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 and Section 5.3. Inspections will also be conducted whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

An inspection of the Composite Cover System will be completed during the site-wide inspection, and will be documented on the site-wide inspection form (see Appendix F). This form is subject to NYSDEC revision. All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and Site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- The Site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 Certification of Engineering and Institutional Controls

After the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare the following certification:

For each IC/EC identified for the Site, I certify that all of the following statements are true:

- The inspection of the Site to confirm the effectiveness of the IC/ECs required by the remedial program was performed under my direction;
- The IC and/or EC employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;

- Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;
- Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- Use of the Site is compliant with the environmental easement;
- The EC systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices;
- No new information has come to my attention, including groundwater monitoring data from wells located at the Site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid;
- Every five years the following certification will be added: The assumptions made in the qualitative exposure assessment remain valid;
- The information presented in this report is accurate and complete; and
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Joel Landes, P.E. of Langan, have been authorized and designated by the Site owner to sign this certification for the Site.

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

5.3 Periodic Review Report

Beginning eighteen months after the Certificate of Completion is issued, a Periodic Review Report will be submitted to the Department every year for the first three years, and once every five years thereafter. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix B (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all EC/ICs required by the remedy for the Site;

- Results of the required annual Site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the Site during the reporting period in electronic format;
- For any periods during which groundwater monitoring is conducted, the report will include data summary tables and graphical representations of contaminants of concern, which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A Site evaluation, which includes the following:
 - o Compliance of the remedy with the requirements of the site-specific RAWP and Decision Document;
 - o Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
 - o Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
 - o The overall performance and effectiveness of the remedy.

The Periodic Review Report will be submitted, in hard-copy format, to the NYSDEC Region 2 Office located at 41-40 21st Street, Long Island City, New York, and in electronic format to NYSDEC Central Office, Region 2 Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 Corrective Measures Plan

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

TABLES

Table 1
Remedial Investigation Sample Summary
1676 Third Avenue
New York, New York
Langan Project No.: 170206301
Brownfield Cleanup Program No.: C231079

Sample Location No.	Sample ID	Sample Date	Matrix	Sample Type	Sample Depth (feet bgs)	Analysis	Rationale
ON-SITE SOIL SAMPLES							
B1	B1	5/11/2007	Soil	Grab	4 to 6	VOCx, SVOCx, and Metals	Evaluate potential RECs identified by the Phase I ESA
B2	B2	5/11/2007	Soil	Grab	9 to 11	VOCx, SVOCx, and Metals	Evaluate potential RECs identified by the Phase I ESA
B3	B3	5/11/2007	Soil	Grab	9 to 11	VOCx, SVOCx, and Metals	Evaluate potential RECs identified by the Phase I ESA
BS-1	BS-1	2/8/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Evaluate the nature and extent of soil impacts on-Site subsequent the basement excavation
BS-2	BS-2	2/8/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Evaluate the nature and extent of soil impacts on-Site subsequent the basement excavation
BS-3	BS-3	2/8/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Evaluate the nature and extent of soil impacts on-Site subsequent the basement excavation
BS-4	BS-4	2/8/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Evaluate the nature and extent of soil impacts on-Site subsequent the basement excavation
BS-5	BS-5	2/8/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Evaluate the nature and extent of soil impacts on-Site subsequent the basement excavation
BS-6	BS-6	2/8/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Evaluate the nature and extent of soil impacts on-Site subsequent the basement excavation
SB-B	SBH-B	3/21/2012	Soil	Grab	16 to 18	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
	SBC-B	3/21/2012	Soil	Grab	20 to 22	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
OFF-SITE SOIL SAMPLES							
SB-1	SBC-1	3/26/2012	Soil	Grab	0 to 2	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
	SBH-1	3/26/2012	Soil	Grab	8 to 10	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
	SBD-1	3/26/2012	Soil	Grab	12 to 14	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
SB-2	SBC-2	3/26/2012	Soil	Grab	0 to 2	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
	SBH-2	3/26/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
	SBD-2	3/26/2012	Soil	Grab	14 to 15	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
SB-3	SBH-3	3/27/2012	Soil	Grab	8 to 10	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
	SBD-3	3/27/2012	Soil	Grab	10 to 12	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
	SBC-3	3/27/2012	Soil	Grab	14 to 15	VOCs and SVOCs	Determine the nature and extent of on- and off-Site impacts due to historical gasoline station.
ON-SITE GROUNDWATER SAMPLE							
MW-B	MW-B	4/11/2012	Groundwater	Grab	NA	VOCs and SVOCs	Determine presence and extent of groundwater impacts on-Site
OFF-SITE GROUNDWATER SAMPLES							
MW-1	MW-1	4/11/2012	Groundwater	Grab	NA	VOCs and SVOCs	Determine presence and extent of groundwater impacts off-Site
MW-2	MW-2	4/11/2012	Groundwater	Grab	NA	VOCs and SVOCs	Determine presence and extent of groundwater impacts off-Site
MW-3	MW-3	4/11/2012	Groundwater	Grab	NA	VOCs and SVOCs	Determine presence and extent of groundwater impacts off-Site

Notes:

1. NA = Not Applicable
2. bgs = Below grade surface
3. VOCs = Volatile organic compounds
4. SVOCs = Semivolatile organic compounds

Table 2
Soil Cleanup Objectives for the Site and Criteria for Imported Soil
1676 Third Avenue
New York, New York
Langan Project No.: 170206301
Brownfield Cleanup Program No.: C231079

Analyte	Unrestricted Use SCOs	Protection of Groundwater SCOs
SVOCS (mg/kg)		
Acenaphthene	20	98
Acenaphthylene	100	107
Anthracene	100	1,000
Benz(a)anthracene	1	1
Benzo(a)pyrene	1	22
Benzo(b)fluoranthene	1	1.7
Benzo(g,h,i)perylene	100	1,000
Benzo(k)fluoranthene	0.8	1.7
Chrysene	1	1
Dibenz(a,h)anthracene	0.33	1,000
Fluoranthene	100	1,000
Fluorene	30	386
Indeno(1,2,3-cd)pyrene	0.5	8.2
m-Cresol	0.33	0.33
Naphthalene	12	12
o-Cresol	0.33	0.33
p-Cresol	0.33	0.33
Pentachlorophenol	0	0.8
Phenanthrene	100	1,000
Phenol	0.33	0.33
Pyrene	100	1,000
Metals (mg/kg)		
Arsenic	13	16
Barium	350	820
Beryllium	7.2	47
Cadmium	2.5	7.5
Chromium, hexavalent	1	19
Chromium, trivalent	30	~
Copper	50	1720
Total Cyanide	27	40
Lead	63	450
Manganese	1600	2000
Total Mercury	0.18	0.73
Nickel	30	130
Selenium	3.9	4
Silver	2	8.3
Zinc	109	2480

Notes:

Backfilling of remedial excavation areas to development grade with clean fill (meeting the lower of Unrestricted Residential Use SCOs and Protection of Groundwater SCOs) or virgin, native imported crushed stone.

SCO: Soil Cleanup Objective

SVOC: semi-volatile organic compound

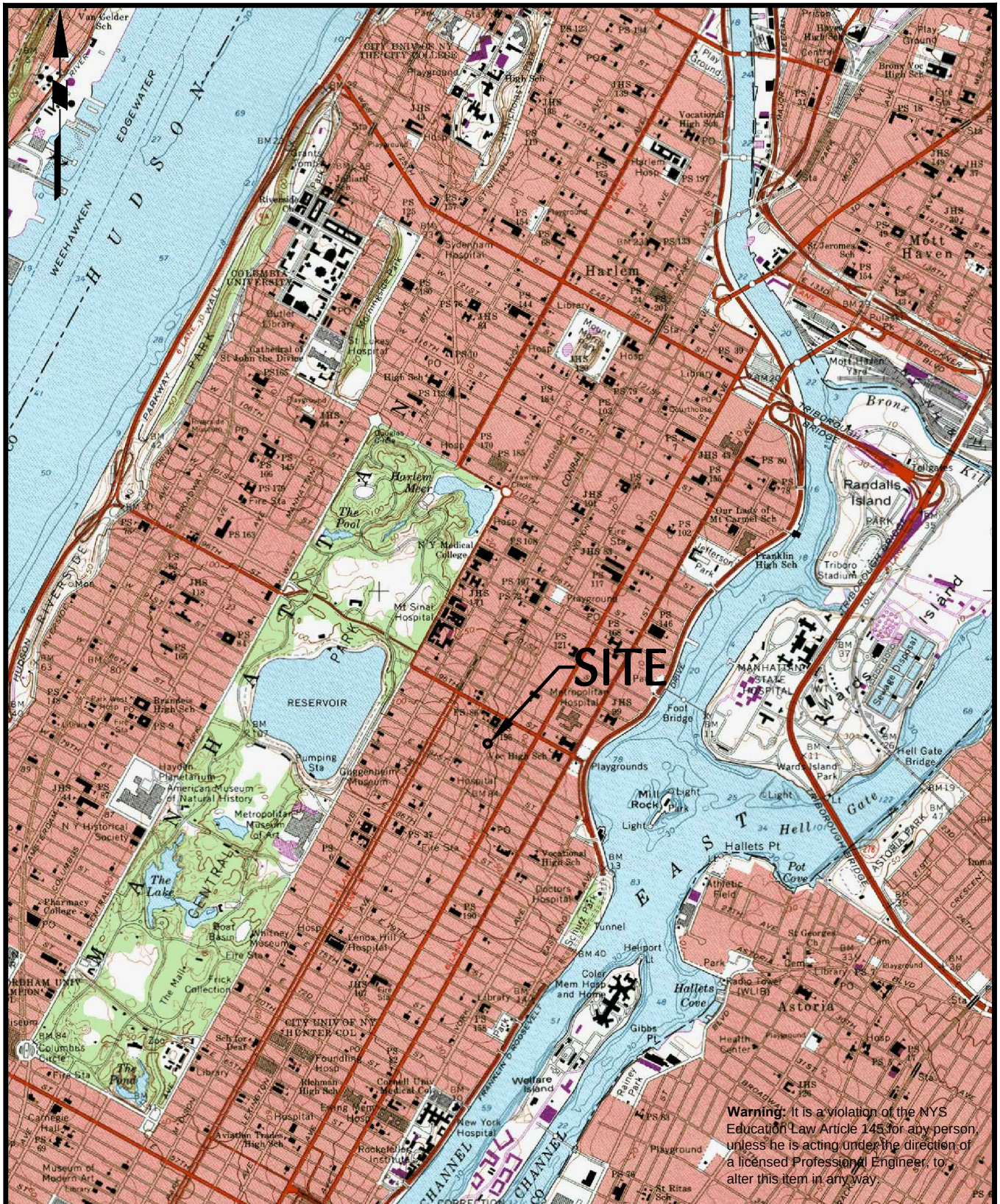
VOC: volatile organic compound

PCB: polychlorinated biphenyl

mg/kg: milligram per kilogram

Analyte	Unrestricted Use SCOs	Protection of Groundwater SCOs
VOCS (mg/kg)		
1,1,1-Trichloroethane	0.68	0.68
1,1-Dichloroethane	0.27	0.27
1,1-Dichloroethene	0.33	0.33
1,2-Dichlorobenzene	1.1	1.1
1,2-Dichloroethane	0.02	0.02
cis -1,2-Dichloroethene	0.25	0.25
trans-1,2-Dichloroethene	0.19	0.19
1,3-Dichlorobenzene	2.4	2.4
1,4-Dichlorobenzene	1.8	1.8
1,4-Dioxane	0.1	0.1
Acetone	0.05	0.05
Benzene	0.06	0.06
n-Butylbenzene	12	12
Carbon tetrachloride	0.76	0.76
Chlorobenzene	1.1	1.1
Chloroform	0.37	0.37
Ethylbenzene	1	1
Hexachlorobenzene	0.33	3.2
Methyl ethyl ketone	0.12	0.12
Methyl tert-butyl ether	0.93	0.93
Methylene chloride	0.05	0.05
n - Propylbenzene	3.9	3.9
sec-Butylbenzene	11	11
tert-Butylbenzene	5.9	5.9
Tetrachloroethene	1.3	1.3
Toluene	0.7	0.7
Trichloroethene	0.47	0.47
1,2,4-Trimethylbenzene	3.6	3.6
1,3,5-Trimethylbenzene	8.4	8.4
Vinyl chloride	0.02	0.02
Xylene (mixed)	0.26	1.6
PCBs/Pesticides (mg/kg)		
2,4,5-TP Acid (Silvex)	3.8	3.8
4,4'-DDE	0.0033	17
4,4'-DDT	0.0033	136
4,4'-DDD	0.0033	14
Aldrin	0.005	0.19
alpha-BHC	0.02	0.02
beta-BHC	0.036	0.09
Chlordane (alpha)	0.094	2.9
delta-BHC	0.04	0.25
Dibenzofuran	7	210
Dieldrin	0.005	0.1
Endosulfan I	2.4	102
Endosulfan II	2.4	102
Endosulfan sulfate	2.4	1,000
Endrin	0.014	0.06
Heptachlor	0.042	0.38
Lindane	0.1	0.1
Polychlorinated biphenyls	0.1	3.2

FIGURES



SOURCE: PORTION OF USGS CENTRAL PARK QUADRANGLE MAP, 1995

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www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA
NEVADA VIRGINIA CALIFORNIA

NJ Certificate of Authorization No: 24GA27996400

1676 THIRD AVENUE
SITE LOCATION MAP

NEW YORK

NEW YORK

Project No.

Date

Scale

Dwg. No.

170206301

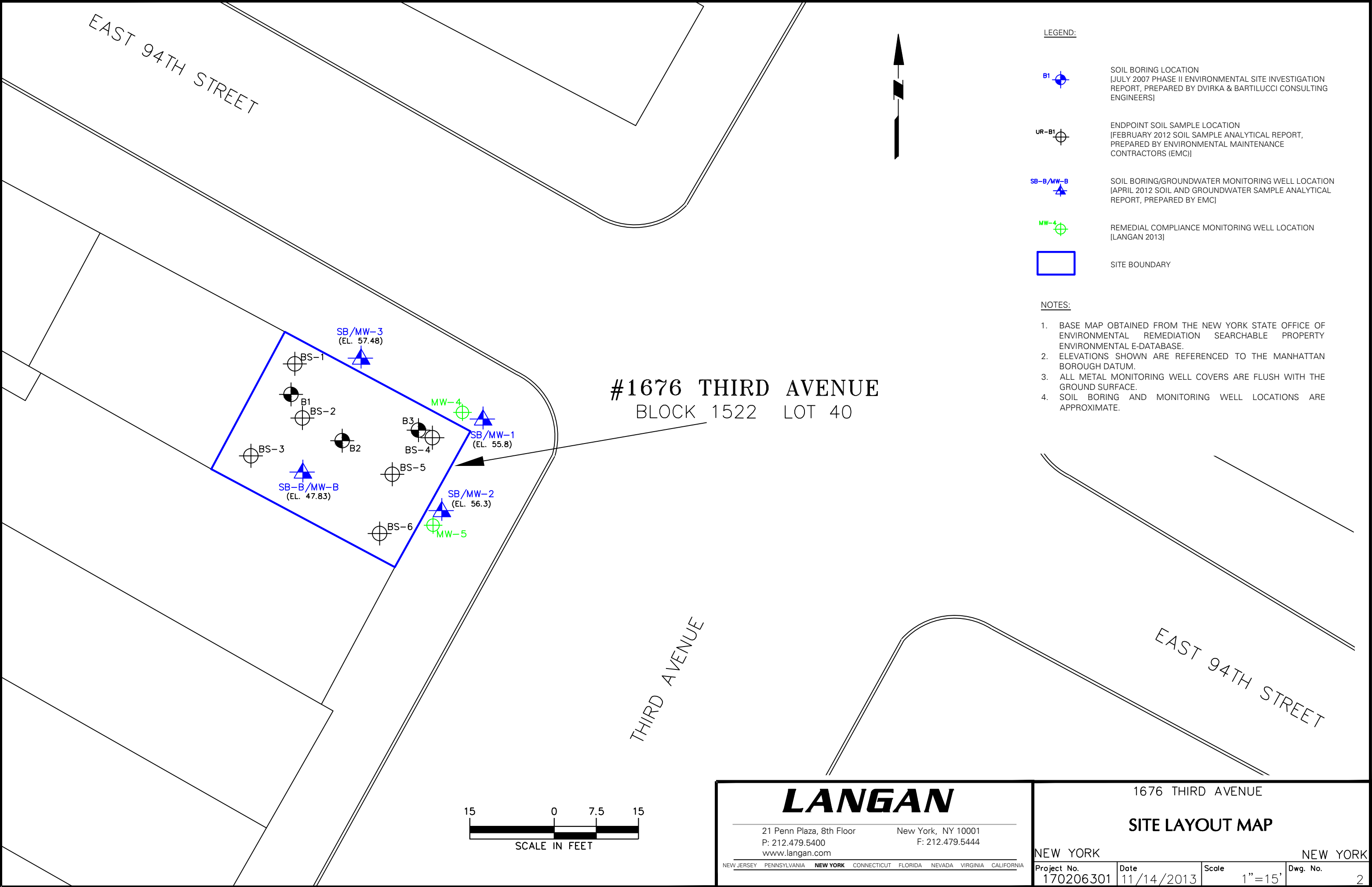
8/12/13

1"=2000'

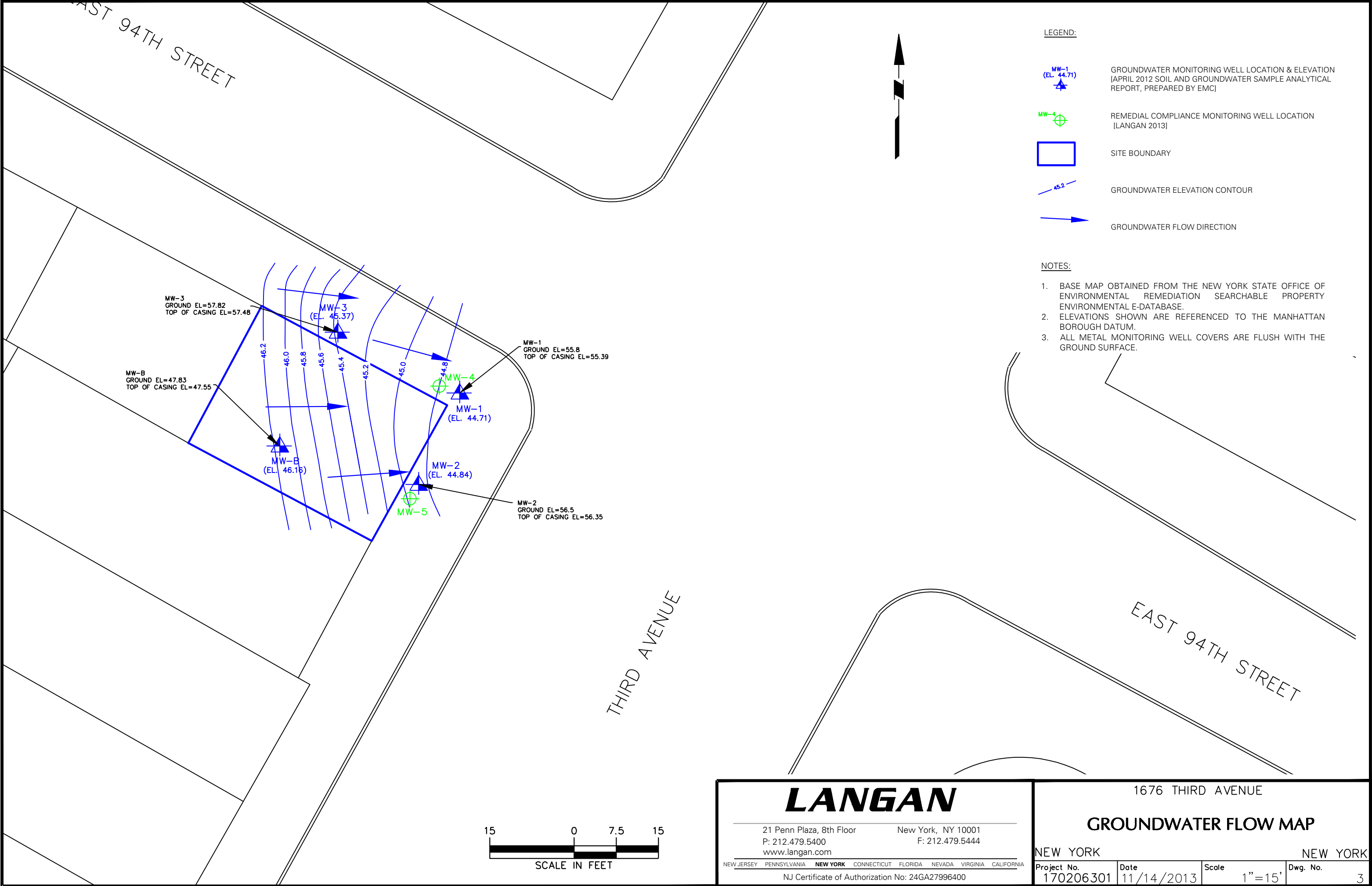
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Filename: \\Langan.com\data\NY\data3\170206301\Cadd Data - 170206301\RI\Figure 1 - Site Location Map.dwg Date: 8/9/2013 Time: 16:03 User: rwohstrom Style Table: Langan.stb Layout: SLW

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NJ Certificate of Authorization No: 24GA27996400

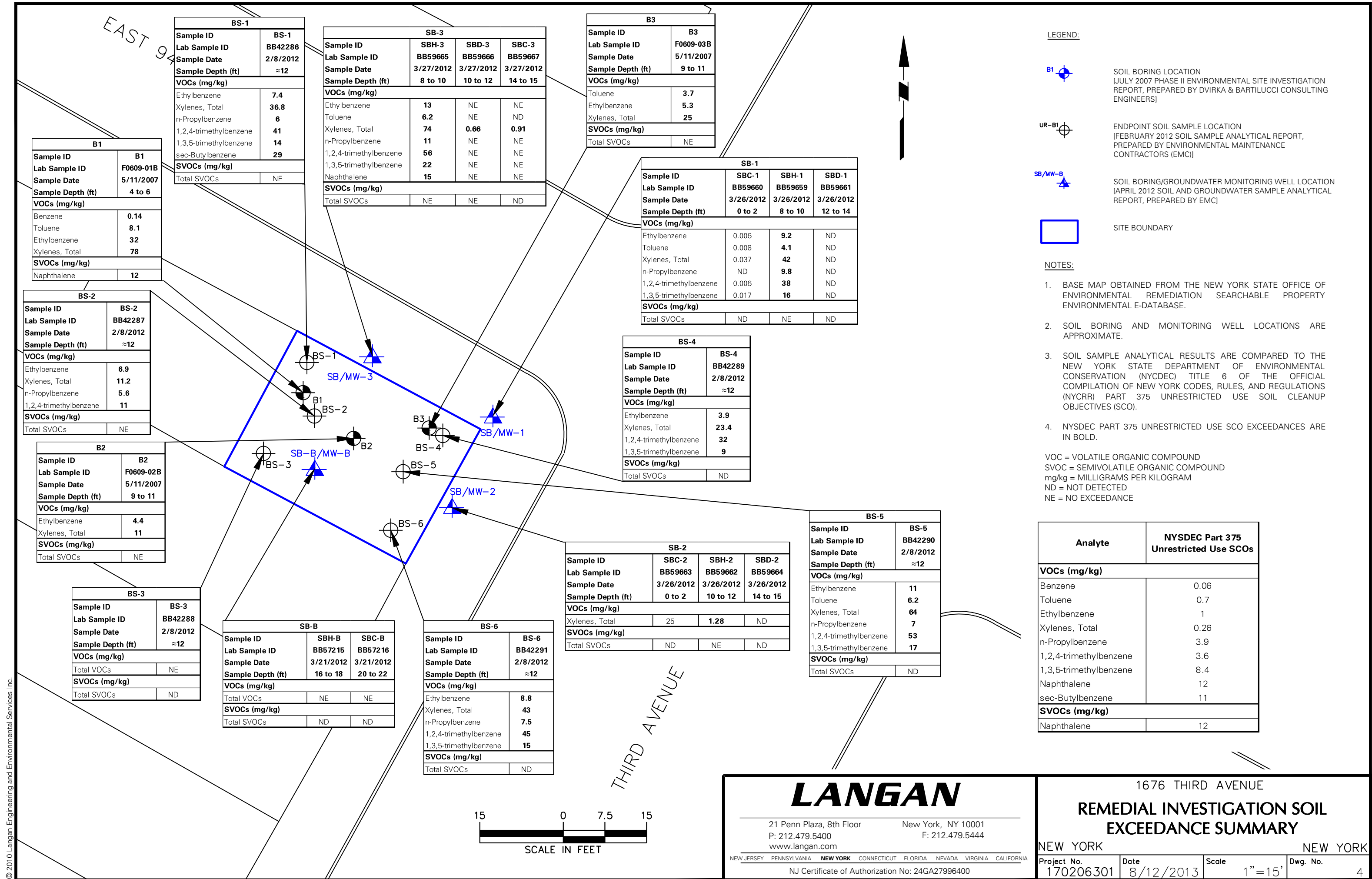
1676 THIRD AVENUE

GROUNDWATER FLOW MAP

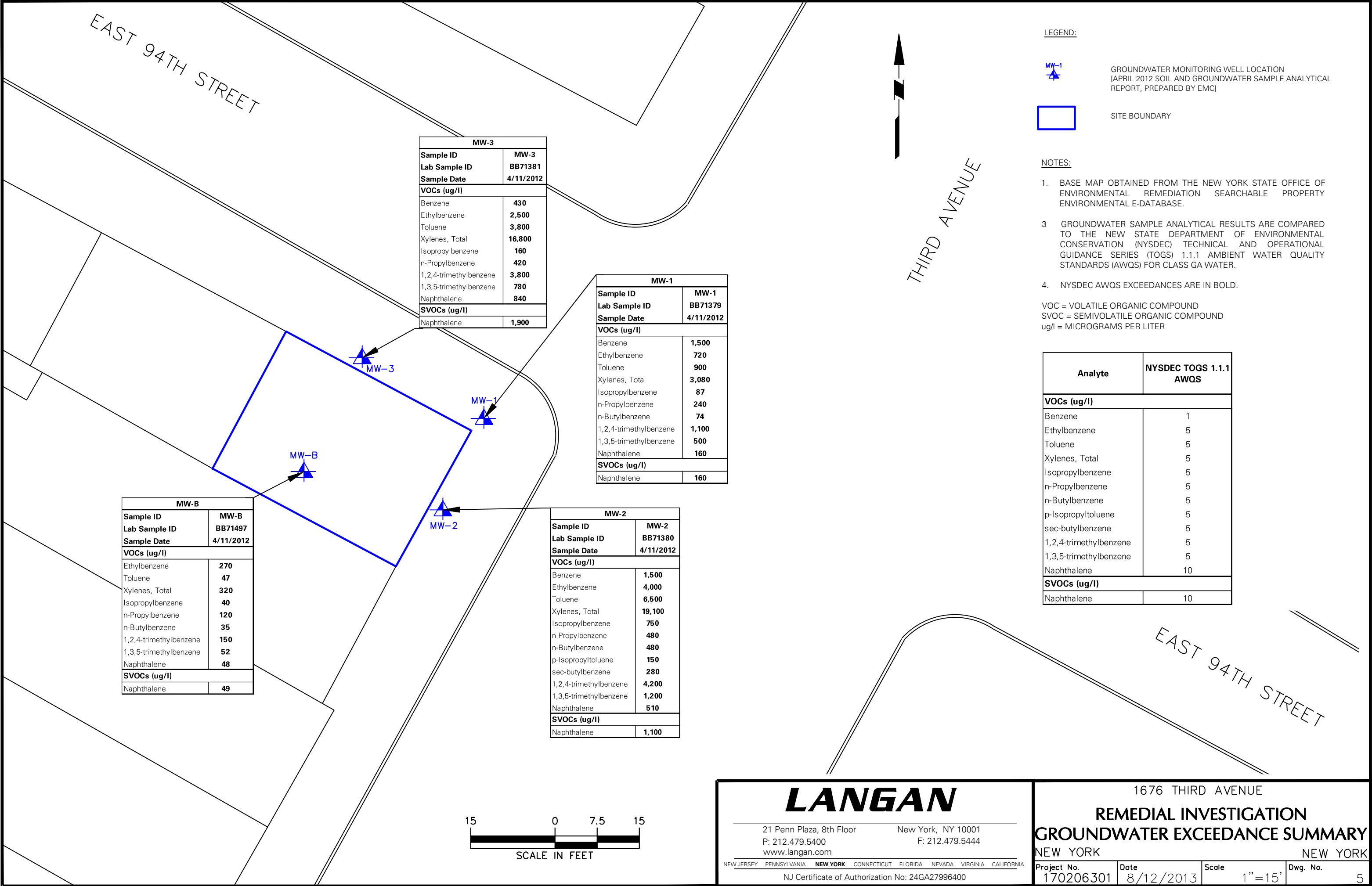
NEW YORK

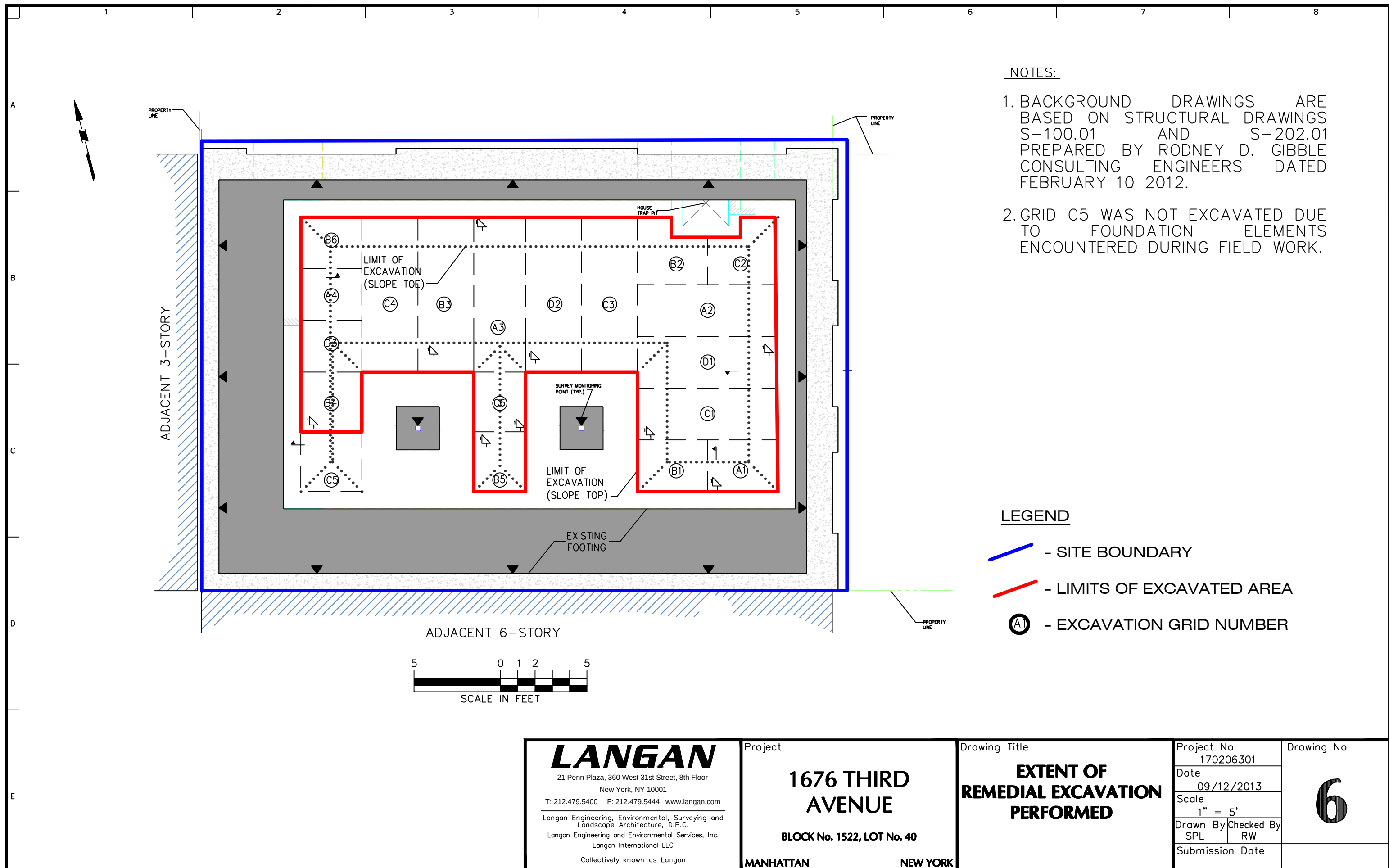
NEW YORK

Project No.	Date	Scale	Dwg. No.
170206301	11/14/2013	1"=15'	3



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NOTES:

1. BACKGROUND DRAWINGS ARE BASED ON STRUCTURAL DRAWINGS S-100.01 AND S-202.01 PREPARED BY RODNEY D. GIBBLE CONSULTING ENGINEERS DATED FEBRUARY 10 2012.
2. GRID C5 WAS NOT EXCAVATED DUE TO FOUNDATION ELEMENTS ENCOUNTERED DURING FIELD WORK.

LEGEND

-  - SITE BOUNDARY
-  - LIMITS OF EXCAVATED AREA
-  - EXCAVATION GRID NUMBER

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Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan International LLC
Collectively known as Langan

Project

**1676 THIRD
AVENUE**

BLOCK No. 1522, LOT No. 40

MANHATTAN

NEW YORK

Drawing Title

**EXTENT OF
REMEDIAL EXCAVATION
PERFORMED**

Project No.
170206301

Date
09/12/2013

Scale
1" = 5'

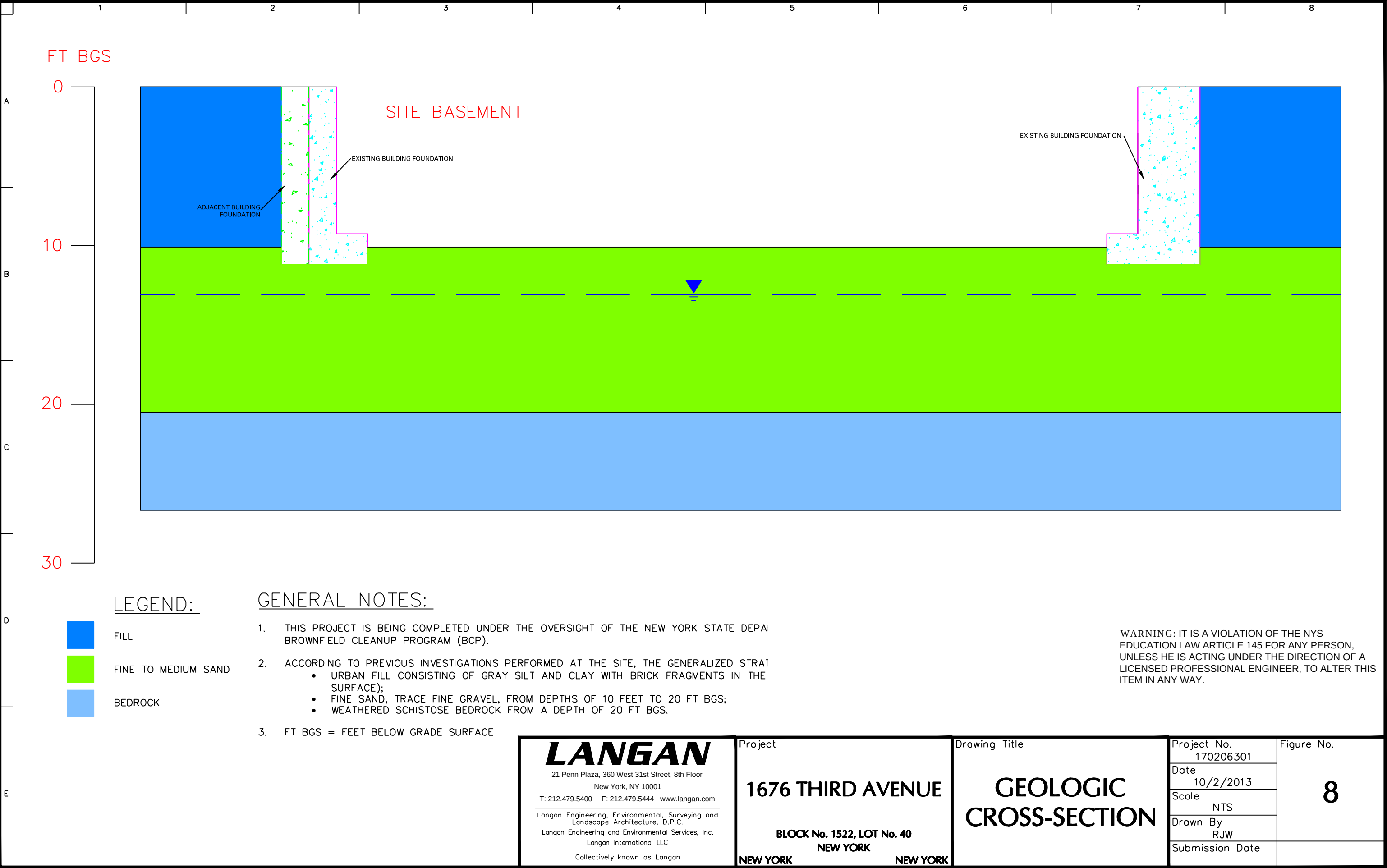
Drawn By
SPL

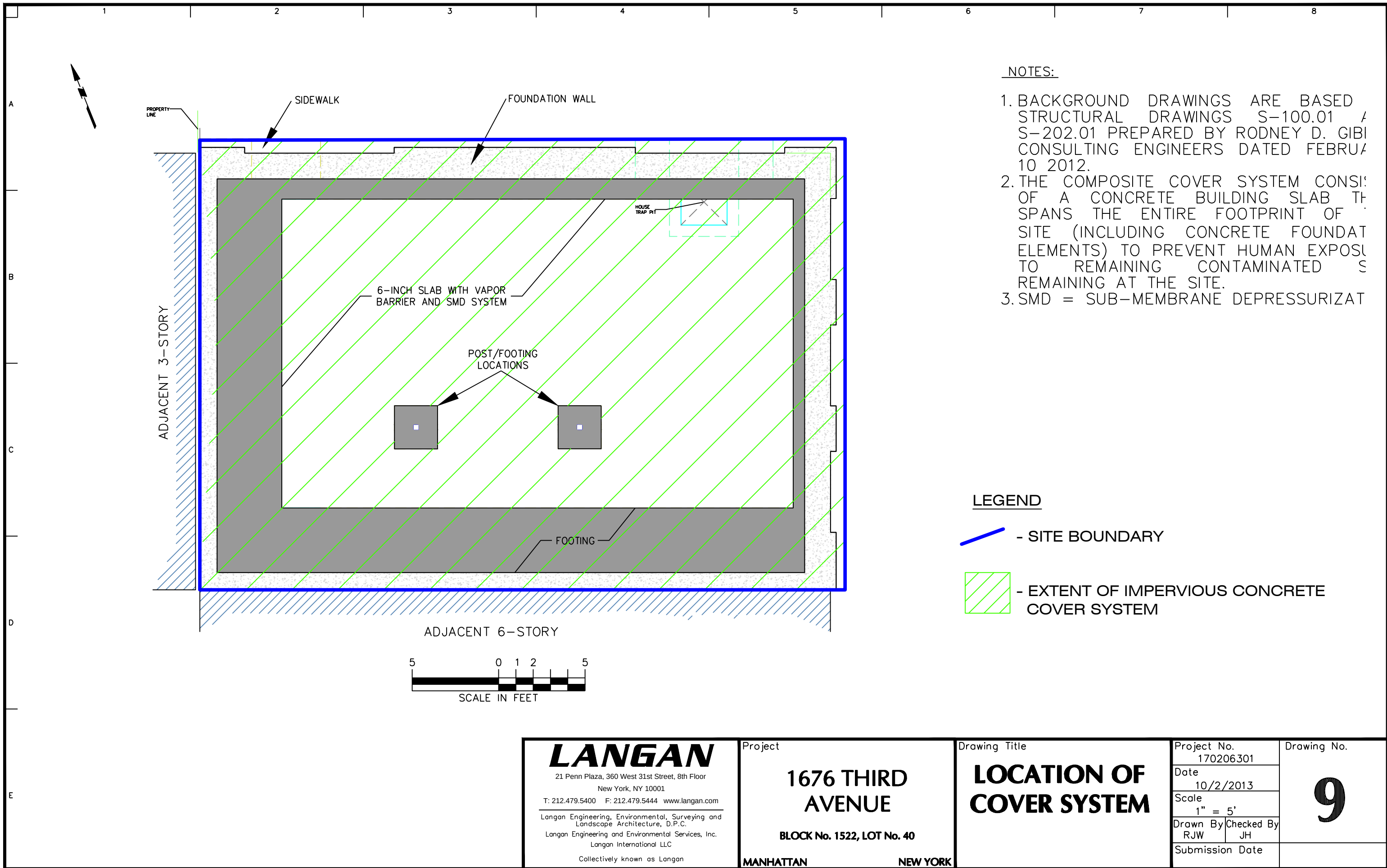
Checked By
RW

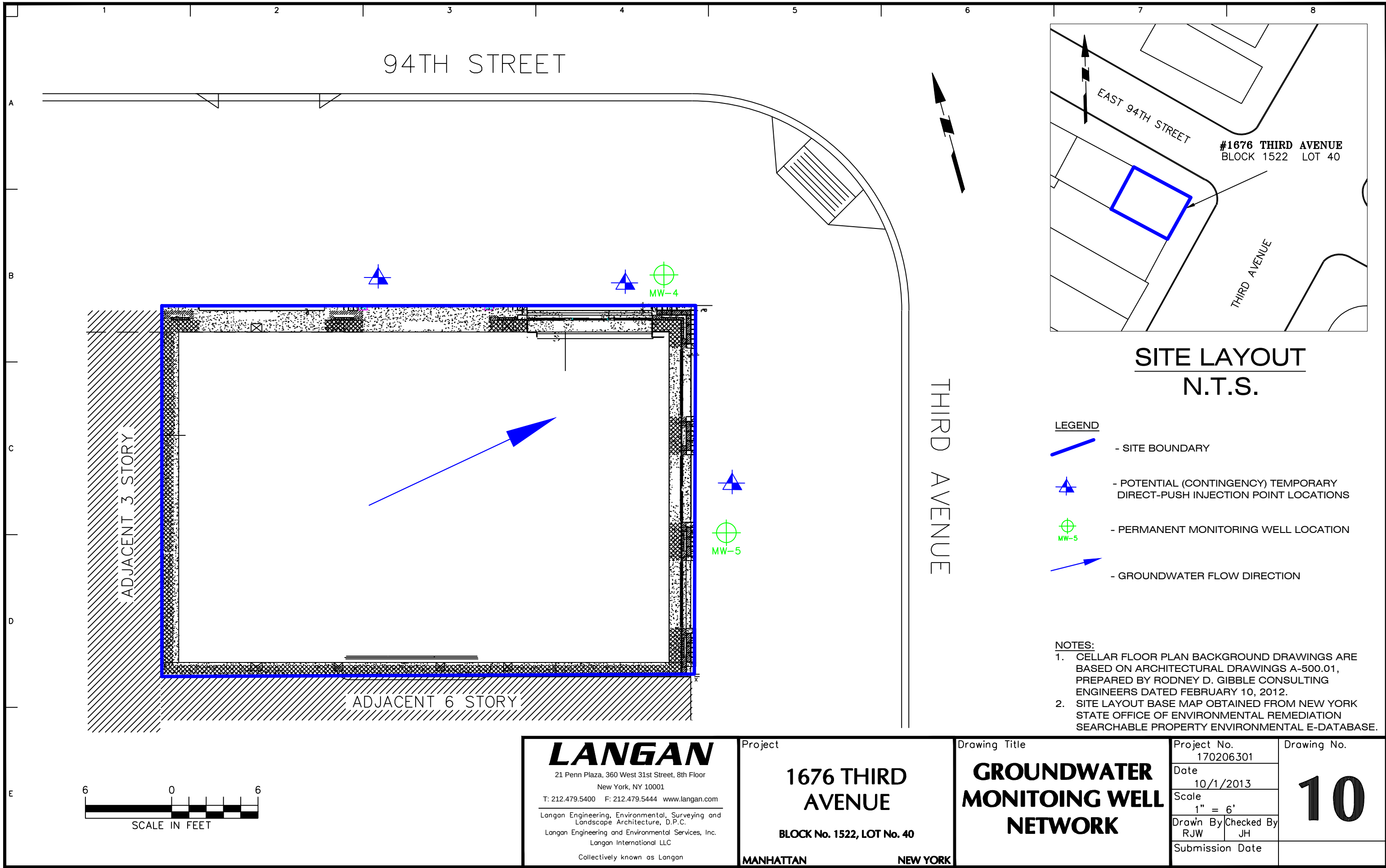
Submission Date

Drawing No.

6



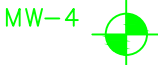




94TH STREET

SAMPLE NAME	Pre-Remediation	MW-4-20131111
SAMPLING DATE	04/11/2012	11/11/2013
LAB SAMPLE ID	Sampling Event	L1322903-01
Volatile Organic Compounds (ug/L)		
Benzene	1500	500
Toluene	6500	1200
Ethylbenzene	4000	1200
p/m-Xylene	13000	2800
o-Xylene	6100	980
Acetone	ND	2000
2-Butanone	ND	710
Isopropylbenzene	750	38 J
Naphthalene	840	220
n-Propylbenzene	480	86 J
1,3,5-Trimethylbenzene	1200	150
1,2,4-Trimethylbenzene	4200	570
Total Xylenes	19100	3780

SAMPLE NAME	Pre-Remediation	MW-5-20131111
SAMPLING DATE	04/11/2012	11/11/2013
LAB SAMPLE ID	Sampling Event	L1322903-02
Volatile Organic Compounds (ug/L)		
Benzene	1500	7.2
Toluene	6500	14
Ethylbenzene	4000	400
Chloroethane	ND	4.6 J
p/m-Xylene	13000	360
o-Xylene	6100	17
Acetone	ND	88
n-Butylbenzene	480	7.3 J
sec-Butylbenzene	ND	5.2 J
Isopropylbenzene	750	39
Naphthalene	840	54
n-Propylbenzene	480	88
1,3,5-Trimethylbenzene	1200	40
1,2,4-Trimethylbenzene	4200	300
Total Xylenes	19100	377



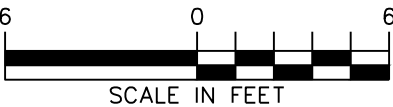
NOTES:

- CELLAR FLOOR PLAN BACKGROUND DRAWINGS ARE BASED ON ARCHITECTURAL DRAWINGS A-500.01, PREPARED BY RODNEY D. GIBBLE CONSULTING ENGINEERS DATED FEBRUARY 10, 2012.
- GROUNDWATER SAMPLE RESULTS EXCEEDING NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TECHNICAL & OPERATIONAL GUIDANCE SERIES (TOGS) 1.1.1 AMBIENT WATER QUALITY STANDARDS (AWQS) AND GUIDANCE VALUES ARE SHOWN
- ND = NOT DETECTED
- J - ESTIMATED VAULE. THE TARGET ANALYTE CONCENTRATION IS BELOW THE QUANTITATION LIMIT (RL), BUT ABOVE THE METHOD DETECTION LIMIT (MDL) OR ESTIMATED DETECTION.
- ug/L = MICROGRAMS PER LITER.
- ~ = CRITERIA DOES NOT CURRENTLY EXIST.
- PRE-REMEDIATION 04/11/2012 SAMPLING EVENT DATA REPRESENTS THE MAXIMUM CONCENTRATION FOR EACH ANALYTE THAT WAS OBSERVED IN GROUNDWATER PRIOR TO REMEDIAL ACTIVITIES.

Analyte	NYSDEC TOGS 1.1.1 AWQS
VOCs (ug/l)	
Benzene	1
Ethylbenzene	5
Toluene	5
Xylenes, Total	5
Isopropylbenzene	5
n-Propylbenzene	5
n-Butylbenzene	5
p-Isopropyltoluene	5
sec-butylbenzene	5
1,2,4-trimethylbenzene	5
1,3,5-trimethylbenzene	5
Naphthalene	10
SVOCs (ug/l)	
Naphthalene	10

LEGEND

- SITE BOUNDARY
- MONITORING WELL LOCATION
- GROUNDWATER FLOW DIRECTION



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Collectively known as Langan

Project

**1676 THIRD
AVENUE**

BLOCK No. 1522, LOT No. 40

MANHATTAN

NEW YORK

Drawing Title

**PRE- AND
POST-REMEDIATION
GROUNDWATER
QUALITY**

Project No.
170206301

Date
11/14/2013

Scale
1" = 6'

Drawn By
RJW

Checked By
JH

Submission Date

Drawing No.

11

APPENDICES

APPENDIX A

Excavation Work Plan

APPENDIX A – EXCAVATION WORK PLAN

A-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the Department. Currently, this notification will be made to:

Regional Remediation Engineer
NYSDEC
Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the cover system, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this EWP,
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- The contractor's Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) will be updated and re-submitted, in electronic format, if it differs from the HASP provided in Appendix D of this document,
- Identification of disposal facilities for potential waste streams,
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

A-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed

regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

A-3 STOCKPILE METHODS

It is anticipated that soil stockpiling and soil and sediment erosion controls will not be required. Future work would occur within a 930-square-foot basement making stockpiling and migration of soil and sediment off-site unlikely.

A-4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

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

A truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete.

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

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

A-5 MATERIALS TRANSPORT OFF-SITE

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

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

All trucks will be washed prior to leaving the site. Truck wash waters will be collected and disposed of off-site in accordance with appropriate local, State, and Federal regulations.

Truck traffic would be routed on the most direct course using major thoroughfares where possible and flaggers would be used to protect pedestrians at site entrances and exits. Truck routes will take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport; [(g) community input [where necessary]]

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

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

A-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

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

waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

A-7 MATERIALS REUSE ON-SITE

Materials reuse on-site will not be permitted.

A-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

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

A-9 COVER SYSTEM RESTORATION

After the completion of any invasive activities, the cover system will be restored in a manner that complies with the RAWP and decision document. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), discussed in section 1.4.4, this will constitute a modification of the cover element of the remedy and the upper surface of the Remaining Contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

A-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. The qualified environmental personnel will collect representative samples at a frequency consistent with CP-51 / Soil Cleanup Guidance (Table 4). The samples would be analyzed for Part 375 VOCs (EPA Method 8260), SVOCs (EPA Method 8270), pesticides/PCBs (EPA Method 8082/8081) and metals by an NYSDOH ELAP-certified laboratory.

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, all imported soils will meet Unrestricted Use Soil Cleanup Objectives (SCOs), as listed in 6NYCRR 375-6.8(a). Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

A-11 CONTINGENCY PLAN

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

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

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5 of the SMP.

A-12 DUST, ODOR, AND VAPOR CONTROL/MONITORING PLAN

This dust, odor, and organic vapor control and monitoring plan (DOOVCM Plan) was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan (CAMP) and OSHA standards for construction (29 CFR 1926). Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust will be required for all ground intrusive activities such as site remediation operations and handling activities. Two stationary air-monitoring stations will be

set up at Site perimeters (one upwind and one downwind) during intrusive Site work for continuous monitoring. Each station will include a PID and a DustTrak aerosol monitor or equivalent. A portable PID will be used to monitor the work zone and for periodic monitoring for VOCs during activities such as soil sampling. Action levels for the protection of the community and visitors are set forth in the CAMP are included in the HASP.

Work practices to minimize odors and vapors will be used during all intrusive activities. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include the use of chemical odorants in spray or misting systems and the use of staff to monitor odors in surrounding neighborhoods.

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

APPENDIX B

Metes and Bounds

APPENDIX B – METES AND BOUNDS

ALL that certain plot, piece or parcel of land, situate, lying and being in the 12'h Ward of the City of New York, bounded and described as follows:

- 1) BEGINNING at the corner formed by the intersection of the northwesterly line of 3'd Avenue with the southwesterly line of 94th Street;
- 2) THENCE Southwesterly along the northwesterly line of 3'd Avenue, 25 feet 4-V. inches;
- 3) THENCE Northwesterly parallel with 94th Street, 36 feet 8 inches;
- 4) THENCE Northeasterly parallel with 3'd Avenue, 25 feet 4-V. inches to the southwesterly side of 94th Street;
- 5) THENCE Southeasterly along the southwesterly side of 94th Street 36 feet 8 inches to the point or place of BEGINNING.

APPENDIX C

Environmental Easement

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

THIS INDENTURE made this 16 day of September, 2013 between Owner(s) Bevin Associates LLC, having an office at 155 East 56th Street, 6th Floor, County of New York, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

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

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

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

WHEREAS, Grantor, is the owner of real property located at the address of 1676 Third Avenue in the City of Manhattan, County of New York and State of New York, known and designated on the tax map of the County Clerk of New York as tax map parcel numbers: Section 5 Block 122 Lot 40, being the same as that property conveyed to Grantor by deed dated December 22, 2006 and recorded in the City Register of the City of New York in Instrument No. 2007010400857001. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.021 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 28, 2013 prepared by Land Surveyors, P.C., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

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

[10/12]

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

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C231079-10-12, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

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

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

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

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

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

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

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

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

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

[10/12]

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

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

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

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

B. The Controlled Property shall not be used for raising livestock or producing animal products for human consumption, and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

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

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

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

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

This property is subject to an Environmental Easement held

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

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

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

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

(2) the institutional controls and/or engineering controls employed at such site:
(i) are in-place;
(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

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

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

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

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

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

(7) the information presented is accurate and complete.

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

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

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

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

5. Enforcement

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

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

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

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

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

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

Parties shall address correspondence to: Site Number: C231079
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to: Site Control Section
Division of Environmental Remediation
NYSDEC

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

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

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

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

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

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

Bevin Associates LLC:

By: _____



Print Name: _____

Elias Kefaulidis

Title: _____

Manager

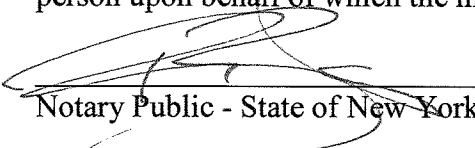
Date: _____

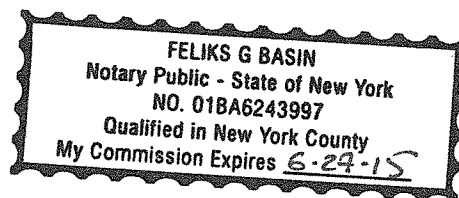
9/16/13

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the 16 day of Sept, in the year 2013, before me, the undersigned, personally appeared Elias Kefalidis, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.


Notary Public - State of New York



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

By:

Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the _____ day of _____, in the year 20__, before me, the undersigned, personally appeared Robert Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Notary Public - State of New York

SCHEDULE "A" PROPERTY DESCRIPTION

ALL that certain plot, piece or parcel of land, situate, lying and being in the 12'h Ward of the City of New York, bounded and described as follows:

BEGINNING at the corner formed by the intersection of the northwesterly line of 3'd Avenue with the southwesterly line of 94th Street;

THENCE Southwesterly along the northwesterly line of 3'd Avenue, 25 feet 4-V. inches;

THENCE Northwesterly parallel with 94th Street, 36 feet 8 inches;

THENCE Northeasterly parallel with 3'd Avenue, 25 feet 4-V. inches to the southwesterly side of 94th Street;

THENCE Southeasterly along the southwesterly side of 94th Street 36 feet 8 inches to the point or place of BEGINNING.

APPENDIX D

Health and Safety Plan

HEALTH AND SAFETY PLAN

for

**1676 THIRD AVENUE
New York, New York**

NYSDEC BCP Site No. C231079

Prepared For:

**Bevin Associates, LLC
c/o KLM Construction
155 East 56th Street, 6th Floor
New York, New York 10022**

Prepared By:

**Langan Engineering & Environmental Services, Inc. PC
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001
NJ Certificate of Authorization No: 24GA27996400**

**Joel B. Landes
Professional Engineer License No. 076348-1**

**August 2013
170206301**

LANGAN

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SECTION 1 HEALTH AND SAFETY PLAN (HASP) 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 2.

FIGURE 1-HOSPITAL ROUTE PLAN (Lenox Hill Hospital)

Site Location: 1676 Third Avenue,
New York, NY

Hospital Location: 130 East 77th Street, New York, NY 10065
Emergency Room (212) 434-3030



Route to Hospital

From 1676 Third Avenue New York, New York to Lenox Hill Hospital, located at 130 East 77th Street, New York, New York.

1: Head **northeast** on **Third Ave** toward **East 94th Street**.

2: Turn left onto **East 94th Street**.

3: Turn left onto **Lexington Avenue**.

4: Turn right onto **East 77th Street**.

5: Destination will be on left

Total Est. Time: 5 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.

Emergency Contacts

Phone Number

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

Medical Emergency

Ambulance Service:	911
Hospital Name:	Lennox Hill Hospital
Hospital Phone Number:	(212) 434-3030
Hospital Address:	130 East 77 th Street New York, New York 10075
Route to Hospital:	See Page 3 and 4
Travel Time From Site:	5 minutes

Langan Contacts

Principal/Associate:	Joel Landes, P.E.	(212) 479-5404
Project Manager:	Jason Hayes, P.E.	(212) 479-5427
Langan Health & Safety Officer:	Tony Moffa	(215) 756-2523
Field Safety Officer	Paul McMahon (cell)	(914) 433-1157
Field Team Leader	Ryan Wohlstrom	(212) 479-5483
Quality Assurance Officer	Michael Burke	(212) 479-5413

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 Health and Safety Plan (HASP) is to establish personnel protection standards and mandatory safety practices and procedures during implementation of the Site Management Plan (SMP) at 1676 Third Avenue in New York, New York (the "Site"). The SMP specifies the methods necessary to ensure compliance with all Engineering Controls and Institutional Controls required by the Environmental Easement for contamination that remains at the Site. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise during any future invasive activities at the Site.

The provisions of the plan are mandatory for all on-site personnel. Contractors shall prepare their own HASP 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 1676 Third Avenue in New York, New York and is identified as Block 1522, Lot 40 on the New York City Tax Map. The Site is approximately 930 square feet and is located on the city block bordered by 94th Street to the north, Third Avenue to the east, 93rd Street to the south, and Lexington Avenue to the west. A Site Location Map is provided as Figure 1 and a Site Layout Map is provided as Figure 2.

The Site was historically used as a gasoline station between the 1930s and 1980s. Gasoline underground storage tanks (USTs) were removed in 1990 and the Volunteer purchased the Site in 1993. The superstructure for a new five-story plus penthouse townhouse building is complete, but the basement slab has not yet been poured. Excavation for the basement extended to approximately 10 to 12 feet below grade surface (ft bgs). NYSDEC Spill No. 11-08991 is associated with the Site. The spill was reported on October 17, 2011 when petroleum-contaminated soil was observed during excavation to redevelop the Site as a residential townhouse building.

2.3 SCOPE OF WORK

Post-remedy Site management will consist of the following:

- Implement long-term Engineering and Institutional Controls in the form of a Site Management Plan and deed restriction, and;
- Development and execution of a Health and Safety Plan and a Community Monitoring Plan for the protection of on-site workers, the general public, and the environment during any post-remediation intrusive activities.

A Langan engineer will supervise any future intrusive work that will penetrate the cover system, or encounter or disturb the remaining contamination, including any modifications or

repairs to the existing cover system. .

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:	Joel Landes, P.E.	(212) 479-5404
Program Manager Project Manager:	Jason Hayes, P.E.	(212) 479-5427
Langan Health & Safety Officer:	Tony Moffa	(215) 756-2523
Field Safety Officer	Paul McMahon	(cell) (914) 433-1157
Field Team Leader	Ryan Wohlstrom	(212) 479-5483
Quality Assurance Officer	Michael Burke	(212) 479-5413

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 the 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 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 Health and Safety Plan.
- Conducts periodic inspections to determine if the Site 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) and semivolatile organic compounds (SVOCs), particularly naphthalene. 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 future intrusive work that will penetrate the cover system; 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

(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.

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)
Arsenic (As)	0.01	5	NA	NA	NA	0 (approx)	Noncombustible Solid(3)	NA
BTEX	200	NA	6	NA	Methanol	97	Noncombustible	Yes
Barium	5	50	NA	NA	NA	0 (approx)	Noncombustible	NA
Lead (Pb)	0.05	11	NA	NA	NA	0 (approx)	Noncombustible	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	NA
Zinc (Zn)	5	50	NA	NA	NA	0 (approx)	Combustible	NA

(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 FSO, 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 heavy 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

Hand and/or power tools may be utilized during future intrusive activities. 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 Soil Disturbance

The disturbance of contaminated soil exposes site personnel to a number of hazards including trip and fall hazards and potential collision with heavy equipment.

Chemical exposure may occur as workers encounter soil and groundwater beneath the cover system, or are exposed to products used at the site including gasoline, diesel and motor oil. Soil and groundwater sampling and screening 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 Excavation and Intrusive Activities

Operation of excavation and other heavy equipment 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 any intrusive work.

Chemical exposure may occur as workers encounter soil and groundwater beneath the cover system, or are exposed to products used at the site including gasoline, diesel and motor oil. 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.

3.5.3 Materials Handling, Loading and Off-site Disposal

Operation of heavy equipment during excavation and off-site transportation of site material 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 any intrusive work.

Chemical exposure may occur as workers encounter soil and groundwater beneath the cover system, or are exposed to products used at the site including gasoline, diesel and motor oil. 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: $ta\ adj\ ^\circ F = ta\ ^\circ F + (13 \times \% \text{ sunshine})$. 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)											
	70	75	80	85	90	95	100	105	110	115	120
RELATIVE HUMIDITY	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 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 HASP.
- 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. 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 continuously monitored with real-time field instrumentation during all intrusive activities. NYSDEC issues a 1989 memorandum on controlling fugitive dust emissions during "ground intrusive activities". 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 remediation 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:

- 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 remediation 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 remediation 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

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SECTION 5 WORK ZONES AND DECONTAMINATION

5.1 SITE WORK ZONES

To reduce the spread of hazardous 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 for exposed soil beneath the cover system as needed, based on previous environmental reports and field instrument measurements. Unprotected onlookers should not be located within the hazardous area during intrusive activities. 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.

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 DusTraks 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.

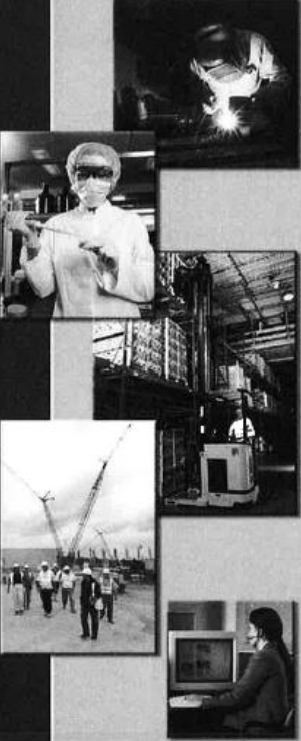
EMPLOYERS:

- 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 3145-13-008



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)

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 _____

Project Health and Safety Plan and Work plan Acceptance Form

(For Langan employees only)

I have read and agree to abide by the contents of the Work Plan and Health and Safety Plan for the following project:

(Project Title)

(Project Number)

Furthermore, I have read and am familiar with the work plan or proposal that describes the field work to be conducted and the procedures to be utilized in the conduct of this work.

Name (print)

Signature

Date

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Place in project Health and Safety File as soon as possible

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:

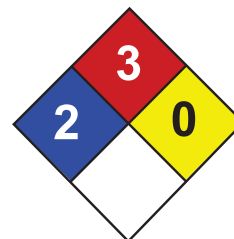
_____	_____	
(Project Title)	(Project Number)	
Name (print)	Signature	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Place in project Health and Safety File as soon as possible

ATTACHMENT C

Material Safety Data Sheets

- 1,2,4-trimethylbenzene
- 1,3,5-trimethylbenzene
- Alconox
- Arsenic
- Barium
- Benzene
- Butylbenzene
- Cadmium
- Cobalt
- Compressed Oxygen in Air
- Chromium
- Diesel Fuel
- Ethylbenzene
- Mercury
- Isobutylene Gas in Air, 100 ppm
- Isopropylbenzene
- Lead
- Motor Oil, 10W-40
- Naphthalene
- Nickel
- N-propylbenzene
- PCBs
- Unleaded Gasoline
- Sodium Persulfate
- Sec-butylbenzene
- Toluene
- Xylenes



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

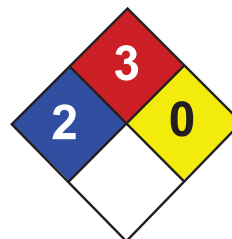
References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:54 PM

Last Updated: 06/09/2012 12:00 PM

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 ScienceLab.com 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 ScienceLab.com has been advised of the possibility of such damages.



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: C₆H₅-CH₃ or C₇H₈

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

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

Serious Skin Contact:

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

Inhalation:

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

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

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

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N₂O₄; AgClO₄; BrF₃; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m³) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

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

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal 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.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

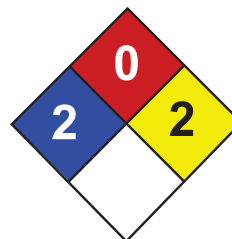
References: Not available.

Other Special Considerations: Not available.

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Last Updated: 06/09/2012 12:00 PM

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Health	2
Fire	0
Reactivity	2
Personal Protection	E

Material Safety Data Sheet

Sodium persulfate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium persulfate

Catalog Codes: SLS1333

CAS#: 7775-27-1

RTECS: SE0525000

TSCA: TSCA 8(b) inventory: Sodium persulfate

CI#: Not applicable.

Synonym: Peroxydisulfuric acid, disodium salt

Chemical Name: Sodium peroxydisulfate

Chemical Formula: Na₂S₂O₈

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium persulfate	7775-27-1	100

Toxicological Data on Ingredients: Sodium persulfate LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of inhalation. Hazardous in case of ingestion. Slightly hazardous in case of skin contact (permeator). Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Very hazardous in case of skin contact (corrosive, irritant, sensitizer), of eye contact (irritant), of inhalation. Hazardous in case of ingestion. Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, lungs. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.

Serious Skin Contact:

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

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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: Not applicable.

Special Remarks on Fire Hazards: Dangerous in contact with organic materials.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Oxidizing material. Stop leak if without risk. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Keep away from combustible material Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as reducing agents, organic materials, metals, acids, moisture.

Storage: Oxidizing materials should be stored in a separate safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid crystalline powder.)

Odor: Odorless.

Taste: Bitter. (Strong.)

Molecular Weight: 238.1 g/mole

Color: White.

pH (1% soln/water): 7 [Neutral.]

Boiling Point: Not available.

Melting Point: Decomposes.

Critical Temperature: Not available.

Specific Gravity: 2.6 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:

Soluble in cold water, hot water. Insoluble in methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: Unstable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:

Highly reactive with reducing agents, organic materials, moisture. Reactive with metals, acids. Slightly reactive to reactive with alkalis.

Corrosivity:

Corrosive in presence of steel, of aluminum, of zinc, of copper. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Incompatible with alcohols.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to blood, lungs.

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant, sensitizer), of inhalation. Hazardous in case of ingestion. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May cause allergic skin reactions with repeated exposure.

Special Remarks on other Toxic Effects on Humans: CAUTION: Certain sensitive individuals may develop eczema and/or asthma on exposure to this material.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation: Possibly hazardous short/long term degradation products are to be expected.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 5.1: Oxidizing material.

Identification: : Sodium persulfate : UN1505 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Sodium persulfate

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS C: Oxidizing material. CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R38- Irritating to skin. R41- Risk of serious damage to eyes. R43- May cause sensitization by skin contact.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 2

Personal Protection: E

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

Health: 2

Flammability: 0

Reactivity: 2

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II.

Other Special Considerations: Not available.

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MSDS 013
Foxboro Rev Date: November 2010
Part Number T0103RK
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SIGMA-ALDRICH

sigma-aldrich.com

Material Safety Data Sheet

Version 4.0
Revision Date 07/24/2010
Print Date 09/14/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : sec-Butylbenzene

Product Number : B90408
Brand : Aldrich

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +18003255832
Fax : +18003255052
Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Combustible Liquid, Irritant

GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)
H226 : Flammable liquid and vapour.
H315 + H320 : Causes skin and eye irritation.
H401 : Toxic to aquatic life.

Precautionary statement(s)
P305 + P351 + P338 : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard: 2
Flammability: 2
Physical hazards: 0

NFPA Rating

Health hazard: 2
Fire: 2
Reactivity Hazard: 0

Potential Health Effects

Inhalation : May be harmful if inhaled. Causes respiratory tract irritation.
Skin : May be harmful if absorbed through skin. Causes skin irritation.
Eyes : Causes eye irritation.
Ingestion : May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 2-Phenylbutane

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Part Number T0103RK
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Formula : C₁₀H₁₄
Molecular Weight : 134.22 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
sec-Butylbenzene			
135-98-8	205-227-0	-	-

4. FIRST AID MEASURES

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

Further information

Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection

Handle with gloves.

Eye protection

Face shield and safety glasses

Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form liquid, clear

Colour colourless

Safety data

pH	no data available
Melting point	75.5 °C (167.9 °F) - lit.
Boiling point	173 - 174 °C (343 - 345 °F) - lit.
Flash point	52.0 °C (125.6 °F) - closed cup
Ignition temperature	418 °C (784 °F)
Lower explosion limit	0.8 %(V)
Density	0.863 g/mL at 25 °C (77 °F)
Water solubility	no data available

10. STABILITY AND REACTIVITY

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

Vapours may form explosive mixture with air.

Conditions to avoid

Heat, flames and sparks.

Materials to avoid

Strong oxidizing agents

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity

LD50 Dermal - rabbit - > 13,792 mg/kg

Skin corrosion/irritation

Skin - rabbit - irritating - 24 h

Serious eye damage/eye irritation

Eyes - rabbit - Mild eye irritation - 24 h

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)

no data available

Aspiration hazard

no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information

RTECS: CY9100000

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability

no data available

Bioaccumulative potential

no data available

Mobility in soil

no data available

PBT and vPvB assessment

no data available

Other adverse effects

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An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

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

13. DISPOSAL CONSIDERATIONS

Product

This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN-Number: 2709 Class: 3 Packing group: III
Proper shipping name: Butyl benzenes
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG

UN-Number: 2709 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: BUTYLBENZENES
Marine pollutant: No

IATA

UN-Number: 2709 Class: 3 Packing group: III
Proper shipping name: Butylbenzenes

15. REGULATORY INFORMATION

OSHA Hazards

Combustible Liquid, Irritant

DSL Status

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

sec-Butylbenzene	CAS-No. 135-98-8

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

sec-Butylbenzene	CAS-No. 135-98-8	Revision Date

New Jersey Right To Know Components

sec-Butylbenzene	CAS-No. 135-98-8	Revision Date

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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Further information

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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 OLFACTORY 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. INGES T: 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 ORD EFTIVE. (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:CNTN 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 B E 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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**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 - 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
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: UNKNOWN
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).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

8/8/2002 12:59:10 AM

Material Safety Data Sheet



Flammable Liquid Mixture: Benzene / Cumene / M-Diisopropylbenzene /
P-Diisopropylbenzene / N-Propylbenzene

Section 1. Chemical product and company identification

Product Name : Flammable Liquid Mixture: Benzene / Cumene / M-Diisopropylbenzene /
P-Diisopropylbenzene / N-Propylbenzene

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

MSDS# : 007347

Date of Preparation/Revision : 6/27/2007.

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Liquid.

Emergency overview : Warning!
CANCER HAZARD
CONTAINS MATERIAL WHICH CAN CAUSE CANCER
CAUSES RESPIRATORY TRACT AND EYE IRRITATION.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM.
FLAMMABLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FLASH FIRE.
MAY BE HARMFUL IF SWALLOWED.
MAY CAUSE SKIN IRRITATION.
CONTENTS UNDER PRESSURE.

Do not ingest. Avoid contact with skin and clothing. Avoid breathing vapor or mist.
Keep away from heat, sparks and flame. Keep container closed. Use only with
adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on
duration and level of exposure.

Potential acute health effects

Eyes : Irritating to eyes.

Skin : Moderately irritating to the skin.

Inhalation : Irritating to respiratory system.

Ingestion : Harmful if swallowed.

Potential chronic health effects : **CARCINOGENIC EFFECTS** Classified A1 (Confirmed for human.) by ACGIH, 1
(Proven for human.) by IARC, 1 (Known To Be Human Carcinogens.) by NTP, +
(Proven.) by OSHA, + (Proven.) by NIOSH, 1 (Proven for human.) by European Union
[Benzene].
MUTAGENIC EFFECTS Not available.
TERATOGENIC EFFECTS Not available.

Medical conditions aggravated by overexposure : Repeated exposure to a highly toxic material may produce general deterioration of health
by an accumulation in one or many human organs.

See toxicological Information (section 11)

Section 3. Composition, Information on Ingredients

United States

Exposure limits

Flammable Liquid Mixture: Benzene / Cumene / M-Diisopropylbenzene / P-Diisopropylbenzene / N-Propylbenzene

cumene	98-82-8	96 - 99	ACGIH TLV (United States, 1/2005). Notes: 1999 Adoption. TWA: 50 ppm 8 hour(s). Form: All forms NIOSH REL (United States, 12/2001). Skin TWA: 245 mg/m ³ 10 hour(s). Form: All forms TWA: 50 ppm 10 hour(s). Form: All forms OSHA PEL (United States, 8/1997). Skin TWA: 245 mg/m ³ 8 hour(s). Form: All forms TWA: 50 ppm 8 hour(s). Form: All forms
propylbenzene	103-65-1	0.00005 - 0.9	ACGIH TLV (United States, 5/2004). Skin STEL: 8 mg/m ³ 15 minute(s). Form: All forms STEL: 2.5 ppm 15 minute(s). Form: All forms TWA: 1.6 mg/m ³ 8 hour(s). Form: All forms TWA: 0.5 ppm 8 hour(s). Form: All forms NIOSH REL (United States, 6/2001). Notes: See Appendix A - NIOSH Potential Occupational Carcinogen STEL: 1 ppm 15 minute(s). Form: All forms TWA: 0.1 ppm 10 hour(s). Form: All forms OSHA PEL (United States, 6/1993). STEL: 5 ppm 15 minute(s). Form: All forms TWA: 1 ppm 8 hour(s). Form: All forms OSHA PEL Z2 (United States, 6/2002). AMP: 50 ppm 10 minute(s). Form: All forms CEIL: 25 ppm Form: All forms TWA: 10 ppm 8 hour(s). Form: All forms
benzene, 1,4-bis(1-methylethyl)-	100-18-5	0.00005 - 0.9	
m-Diisopropylbenzene	99-62-7	0.00005 - 0.9	
Benzene	71-43-2	0.00005 - 0.9	

Section 4. First aid measures

Eye contact	: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Skin contact	: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
Inhalation	: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion	: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Section 5. Fire fighting measures

Flammability of the product	: Flammable.
Auto-ignition temperature	: The lowest known value is 425°C (797°F) (cumene).
Flash point	: The lowest known value is Closed cup: 35.85°C (96.5°F) (cumene)
Flammable limits	: The greatest known range is Lower: 0.9% Upper: 6.5% (cumene)
Products of combustion	: These products are carbon oxides (CO, CO ₂).
Fire fighting media and instructions	: In case of fire, use water spray (fog), foam, dry chemicals, or CO ₂ .

Flammable liquid and vapor. Vapor may cause flash fire. Vapors may accumulate in low or confined areas, travel considerable distance to source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Special protective equipment for fire-fighters	: Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion proof means to transfer material to a sealed, appropriate container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

Section 7. Handling and storage

- Handling** : Do not ingest. Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Extremely hazardous liquid and vapor under pressure.
- 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 occupational exposure limits. Ensure that eyewash stations and safety showers are proximal to the work-station location.
- Personal protection**
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- 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.

Product name

United States

cumene

Exposure limits

ACGIH TLV (United States, 1/2005). Notes: 1999 Adoption.

TWA: 50 ppm 8 hour(s). Form: All forms

NIOSH REL (United States, 12/2001). Skin

TWA: 245 mg/m³ 10 hour(s). Form: All forms

TWA: 50 ppm 10 hour(s). Form: All forms

OSHA PEL (United States, 8/1997). Skin

TWA: 245 mg/m³ 8 hour(s). Form: All forms

TWA: 50 ppm 8 hour(s). Form: All forms

propylbenzene
benzene, 1,4-bis(1-methylethyl)-
m-Diisopropylbenzene

Flammable Liquid Mixture: Benzene / Cumene / M-Diisopropylbenzene / P-Diisopropylbenzene / N-Propylbenzene

Benzene

ACGIH TLV (United States, 5/2004). SkinSTEL: 8 mg/m³ 15 minute(s). Form: All forms

STEL: 2.5 ppm 15 minute(s). Form: All forms

TWA: 1.6 mg/m³ 8 hour(s). Form: All forms

TWA: 0.5 ppm 8 hour(s). Form: All forms

NIOSH REL (United States, 6/2001). Notes: See Appendix A - NIOSH**Potential Occupational Carcinogen**

STEL: 1 ppm 15 minute(s). Form: All forms

TWA: 0.1 ppm 10 hour(s). Form: All forms

OSHA PEL (United States, 6/1993).

STEL: 5 ppm 15 minute(s). Form: All forms

TWA: 1 ppm 8 hour(s). Form: All forms

OSHA PEL Z2 (United States, 6/2002).

AMP: 50 ppm 10 minute(s). Form: All forms

CEIL: 25 ppm Form: All forms

TWA: 10 ppm 8 hour(s). Form: All forms

Section 9. Physical and chemical properties

Physical state	: Liquid.
Boiling/condensation point	: The lowest known value is 152.25°C (306.1°F) (cumene).
Melting/freezing point	: May start to solidify at -96.16°C (-141.1°F) based on data for: cumene.
Critical temperature	: The lowest known value is 358°C (676.4°F) (cumene).
Specific gravity	: The only known value is 0.866 (Water = 1) (cumene).
Vapor density	: The highest known value is 4.13 (Air = 1) (cumene).
Evaporation rate	: 0.43 (cumene) compared to Butyl acetate.

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Conditions of instability	: The material is stable at 70 F, 760 mm pressure. (cumene)
Incompatibility with various substances	: Highly reactive with oxidizing agents.

Section 11. Toxicological information

<u>Ingredient name</u>	<u>Test</u>	<u>Result</u>	<u>Route</u>	<u>Species</u>
cumene	LD50	1400 mg/kg	Oral	Rat
	LD50	12750 mg/kg	Oral	Mouse
	LD50	>10000 mg/kg	Dermal	Rabbit
	LC50	16000 ppm (1 hour(s))	Inhalation	Rat
propylbenzene	LD50	6040 mg/kg	Oral	Rat
	LC50	91910 ppm (1 hour(s))	Inhalation	Rat
benzene, 1,4-bis(1-methylethyl)-m-Diisopropylbenzene	LD50	3400 mg/kg	Oral	Mouse
	LD50	7400 mg/kg	Oral	Rat
	LD50	3100 mg/kg	Oral	Mouse
Benzene	LD50	930 mg/kg	Oral	Rat
	LD50	4700 mg/kg	Oral	Mouse
	LD50	5700 mg/kg	Oral	Mammal
	LD50	48 mg/kg	Dermal	Mouse
	LDLo	50 mg/kg	Oral	man
	LC50	10000 ppm (7 hour(s))	Inhalation	Rat

Chronic effects on humans	: CARCINOGENIC EFFECTS Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC, 1 (Known To Be Human Carcinogens.) by NTP, + (Proven.) by OSHA, + (Proven.) by NIOSH, 1 (Proven for human.) by European Union [Benzene]. Contains material which causes damage to the following organs: upper respiratory tract, skin, central nervous system (CNS).

Flammable Liquid Mixture: Benzene / Cumene / M-Diisopropylbenzene / P-Diisopropylbenzene / N-Propylbenzene

Other toxic effects on humans : Hazardous in case of inhalation (lung irritant).

Specific effects

Carcinogenic effects : Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

<u>Ingredient name</u>	<u>Species</u>	<u>Period</u>	<u>Result</u>
cumene	Daphnia magna (EC50)	48 hour(s)	10.6 mg/l
	Daphnia magna (EC50)	48 hour(s)	11.2 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	2.7 mg/l
	Poecilia reticulata (LC50)	96 hour(s)	5.1 mg/l
	Pimephales promelas (LC50)	96 hour(s)	6.32 mg/l
propylbenzene	Oncorhynchus mykiss (LC50)	96 hour(s)	1.55 mg/l
Benzene	Daphnia magna (EC50)	48 hour(s)	9.23 mg/l
	Daphnia magna (EC50)	48 hour(s)	10 mg/l
	Daphnia magna (EC50)	48 hour(s)	11.73 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	5.3 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	5.9 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	9.2 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	9.2 mg/l

Products of degradation : These products are carbon oxides (CO, CO₂) and water.

Toxicity of the products of biodegradation : The products of degradation are less toxic than the product itself.

Section 13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Consult your local or regional authorities.

Section 14. Transport information

<u>Regulatory information</u>	<u>UN number</u>	<u>Proper shipping name</u>	<u>Class</u>	<u>Packing group</u>	<u>Label</u>	<u>Additional information</u>
DOT Classification	UN3161	Liquefied gas, flammable, n.o.s.	2.1	-		-
TDG Classification	UN3161	Liquefied gas, flammable, n.o.s.	2.1	-		<u>Explosive Limit and Limited Quantity Index</u> 0.125 <u>ERAP Index</u> 3000 <u>Passenger Carrying Ship Index</u> Forbidden <u>Passenger Carrying Road or Rail</u>

Flammable Liquid Mixture: Benzene / Cumene / M-Diisopropylbenzene / P-Diisopropylbenzene / N-Propylbenzene

						Index Forbidden
Mexico Classification	UN3161	Liquefied gas, flammable, n.o.s.	2.1	-		-

Section 15. Regulatory information**United States**

HCS Classification : Flammable liquid
Irritating material
Carcinogen
Target organ effects

U.S. Federal regulations : TSCA 8(b) inventory: cumene; propylbenzene; benzene, 1,4-bis(1-methylethyl)-; m-Diisopropylbenzene; Benzene
TSCA 12(b) one time export: propylbenzene
SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: cumene
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: cumene: Fire hazard, Immediate (Acute) Health Hazard
Clean Water Act (CWA) 307: Benzene
Clean Water Act (CWA) 311: Benzene
Clean air act (CAA) 112 accidental release prevention: No products were found.
Clean air act (CAA) 112 regulated flammable substances: No products were found.
Clean air act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	: cumene	98-82-8	96 - 99
	Benzene	71-43-2	0.00005 - 0.9
Supplier notification	: cumene	98-82-8	96 - 99
	Benzene	71-43-2	0.00005 - 0.9

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : Pennsylvania RTK: cumene: (environmental hazard, generic environmental hazard); propylbenzene: (generic environmental hazard); Benzene: (special hazard, environmental hazard, generic environmental hazard)
Massachusetts RTK: cumene; propylbenzene; Benzene
New Jersey: cumene; propylbenzene; Benzene
WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>	<u>No significant risk level</u>	<u>Maximum acceptable dosage level</u>
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	Yes.

Canada

WHMIS (Canada) : Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (VERY TOXIC).
CEPA DSL: cumene; propylbenzene; benzene, 1,4-bis(1-methylethyl)-; m-Diisopropylbenzene; Benzene

Section 16. Other information

Label Requirements

: CANCER HAZARD
CONTAINS MATERIAL WHICH CAN CAUSE CANCER
CAUSES RESPIRATORY TRACT AND EYE IRRITATION.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM.
FLAMMABLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FLASH FIRE.
MAY BE HARMFUL IF SWALLOWED.
MAY CAUSE SKIN IRRITATION.
CONTENTS UNDER PRESSURE.

Hazardous Material Information System (U.S.A.)

Health	*	2
Fire hazard		3
Reactivity		0
Personal protection		C

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



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

**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 - 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
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

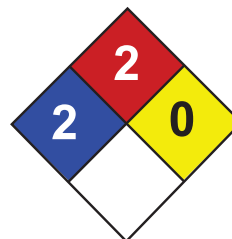
Section 16 - Other Information**NICKEL POWDER, NI02-10**

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



Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet

Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C₁₀H₈

Contact Information:

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
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

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

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

Flammable solid. **SMALL FIRE:** Use DRY chemical powder. **LARGE FIRE:** Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

Israel: TWA: 10 (ppm) TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m³) from ACGIH [1995]
Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

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

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:

Partially dispersed in hot water, methanol, n-octanol. Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

Solubility:

Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 490 mg/kg [Rat]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Rhode Island RTK hazardous substances: Naphthalene Pennsylvania RTK: Naphthalene Florida: Naphthalene Minnesota: Naphthalene Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87 SARA 313 toxic chemical notification and release reporting: Naphthalene: 1% CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-4: Flammable solid. CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R36- Irritating to eyes. R40- Possible risks of irreversible effects. R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed. R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:30 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

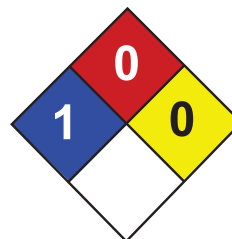
===== Stability and Reactivity Data =====

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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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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Material Safety Data Sheets

MSDS No: 98-82-8**Date: 03/09/2001**

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: ISOPROPYL BENZENE **SYNONYMS:** Cumene, Cumol, 2-phenyl propane

2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	Exposure Limits (PPM)		
					OSHA PEL	MAC	Other STEL
ISOPROPYL BENZENE	C9H12	98-82-8	99+%	50	50	50	NE

Note: NE = NONE ESTABLISHED

S/A = SIMPLE ASPHYXIAN

3. HAZARD IDENTIFICATION

*** EMERGENCY OVERVIEW ***

Flammable liquid and vapor.

Can cause irritation to eyes, skin, and respiratory tract.

Can form explosive mixtures with air.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: Irritation to the eyes, mucous membranes, and upper respiratory tract. Can be absorbed through the skin. Possible central nervous system depression. It is an aspiration hazard. This material is narcotic in high concentrations. Symptoms include irritation, dizziness, nausea, lack of coordination and narcosis. Skin contact can cause defatting and dermatitis. Ingestion of the liquid causes gastrointestinal irritation.

CHRONIC EFFECTS: Possible dermatitis from skin contact. Kidney and liver damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY (US ONLY):

NTP - No

IARC MONOGRAPHS - No

OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration.

EYE CONTACT: Do not allow victim to rub or keep eyes tightly shut. Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Consult an ophthalmologist immediately if pain or irritation persist.

SKIN CONTACT: Immediately remove contaminated clothing. Rinse the affected area with flooding amounts of water and then wash it with soap and water. For reddened or blistered skin, consult a physician.

INGESTION: Never give anything by mouth to an unconscious person. Contact a poison control center. Unless the poison control center advises otherwise, have the conscious and alert person drink 1 to 2 glasses of water to dilute.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 44 deg. C

AUTOIGNITION TEMPERATURE: 424 deg. C

FLAMMABLE LIMITS: Vol.% in air

LOWER: .90
UPPER: 6.50

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical. For large fires, use water spray, fog, or regular foam.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Move cylinders away from fire if this can be done safely. Keep fire exposed cylinders cool with water spray. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Vapors may travel a considerable distance to the source of ignition and flash back. May form explosive mixture in air. Poses an explosion hazard indoors, outdoors, and in sewers. Liquid can float on water and may travel to distant locations and/or spread fire.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Shut off source if possible and remove source of heat. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Gasoline-like

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg. C: 30 mm Hg

VAPOR DENSITY (AIR=1): 4.1

BOILING POINT (C): 152

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H₂O=1): @20 deg. C: 0.864

EVAPORATION RATE: N/A

ODOR THRESHOLD: 0.008-0.132 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 16,000 ppm, Rat 1 hour.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Isopropylbenzene
HAZARD CLASS: 3 (flammable), Packing group III
IDENTIFICATION NUMBER: UN1918
REPORTABLE QUANTITIES: 5,000 lbs
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): 3, 31 (c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 202-704-5

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10-37

S: N/Av

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

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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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 =====

Ingred 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

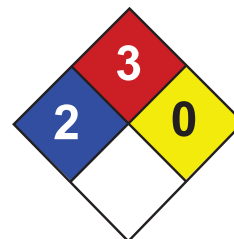
HALOGENS, NITRIC ACID

Stability Condition to Avoid:HIGH TEMPS

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

Waste Disposal Methods:RETURN TO SUPPLIER IAW/FEDERAL, STATE & LOCAL
 REGULATIONS.

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 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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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.

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 MATERIALS. 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 OPHTHALMOLOGIC
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 DISPOSAL, 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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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
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 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 - Composition/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:

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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.

FIRST AID

In NJ, for POISON INFORMATION call 1-800-764-7661

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	Not Found	Not Rated
REACTIVITY	Not Found	Not Rated
CARCINOGEN FLAMMABLE IN POWDER FORM TOXIC FUMES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

- * **Cadmium** is a noncombustible solid but finely divided **Cadmium powder** is FLAMMABLE.
- * Use dry chemical or CO₂ extinguishers for **Cadmium powder**.
- * FIRE MAY RESTART AFTER IT HAS BEEN EXTINGUISHED.
- * TOXIC FUMES ARE PRODUCED IN A FIRE.
- * CONTAINERS MAY EXPLODE IN FIRE.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Cadmium powder** is spilled, take the following steps:

- * Evacuate persons not wearing protective equipment from area of spill until clean-up is complete.
- * Remove all ignition sources.
- * Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- * Ventilate and wash area after clean-up is complete.
- * It may be necessary to contain and dispose of **Cadmium** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
- * If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

Eye Contact

- * Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

- * Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.
- * Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 0 mm Hg at 68°F (20°C)

Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:

Cadmium

Other Names:

C.I. 77180; Colloidal Cadmium

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES

Right to Know Program

PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: BUTYL BENZENE

TRADE NAMES/SYNONYMS:

MTG MSDS 139; BUTYLBENZENE; 1-PHENYLBUTANE; N-BUTYLBENZENE; UN 2709; MAT03530; RTECS CY9070000

CHEMICAL FAMILY: hydrocarbons, aromatic

CREATION DATE: Jan 24 1989

REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: BUTYL BENZENE

CAS NUMBER: 104-51-8

PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=2 REACTIVITY=0



EMERGENCY OVERVIEW:

COLOR: colorless

PHYSICAL FORM: liquid

ODOR: odorless

MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression

PHYSICAL HAZARDS: Combustible liquid and vapor.

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: irritation, vomiting, headache, symptoms of drunkenness, coma

LONG TERM EXPOSURE: lung damage

SKIN CONTACT:

SHORT TERM EXPOSURE: irritation, headache, symptoms of drunkenness

LONG TERM EXPOSURE: same as effects reported in short term exposure

EYE CONTACT:

SHORT TERM EXPOSURE: irritation, tearing

LONG TERM EXPOSURE: same as effects reported in short term exposure

INGESTION:

SHORT TERM EXPOSURE: vomiting, headache, symptoms of drunkenness, coma

LONG TERM EXPOSURE: lung damage

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: DO NOT induce vomiting. Never make an unconscious person vomit or drink fluids. If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage, catharsis and activated charcoal slurry.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny

entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

FLASH POINT: 160 F (71 C) (OC)

LOWER FLAMMABLE LIMIT: 0.8%

UPPER FLAMMABLE LIMIT: 5.8%

AUTOIGNITION: 770 F (410 C)

FLAMMABILITY CLASS (OSHA): IIIA

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

BUTYL BENZENE:

No occupational exposure limits established.

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before

use.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid

COLOR: colorless

ODOR: odorless

MOLECULAR WEIGHT: 134.21

MOLECULAR FORMULA: C₁₀-H₁₄

BOILING POINT: 356 F (180 C)

FREEZING POINT: -116 F (-82 C)

VAPOR PRESSURE: 1 mmHg @ 23 C

VAPOR DENSITY (air=1): 4.6

SPECIFIC GRAVITY (water=1): 0.9

WATER SOLUBILITY: insoluble

PH: Not available

VOLATILITY: Not available

ODOR THRESHOLD: Not available

EVAPORATION RATE: Not available

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SOLVENT SOLUBILITY:

Miscible: alcohol, ether, benzene

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: oxidizing materials

HAZARDOUS DECOMPOSITION:

Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

BUTYL BENZENE:

LOCAL EFFECTS:

Irritant: inhalation, skin, eye

TARGET ORGANS: central nervous system

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

INVERTEBRATE TOXICITY: 340 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Butyl benzenes

ID NUMBER: UN2709

HAZARD CLASS OR DIVISION: 3

PACKING GROUP: III

LABELING REQUIREMENTS: 3

MARINE POLLUTANT: BUTYL BENZENE



CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME: Butylbenzenes

UN NUMBER: UN2709

CLASS: 3

PACKING GROUP/CATEGORY: III

15. REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B

and C):

ACUTE: Yes

CHRONIC: No

FIRE: Yes

REACTIVE: No

SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.

STATE REGULATIONS:

California Proposition 65: Not regulated.

CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: Not determined.

NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDL): Not determined.

16. OTHER INFORMATION

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Division of Facilities Services

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

BENZENE

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

The information in this document is compiled from information maintained by the United States Department of Defense (DOD). Anyone using this information is solely responsible for the accuracy and applicability of this information to a particular use or situation.

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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 - Composition/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:

8/8/2002 1:28:59 AM



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.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: 1-877-WARN-DEP

HANDLING AND STORAGE (See page 3)

FIRST AID

In N.J. for POISON INFORMATION call 1-800-764-7661

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

- ## Skin Contact

- * Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

PHYSICAL DATA

If **Barium** is spilled, take the following steps:

Vapor Pressure: 10 mm Hg at 1,922°F (1,050°C)

Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:

Barium

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES

Right to Know Program

PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202



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 - 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

The information in this document is compiled from information maintained by the United States Department of Defense (DOD). Anyone using this information is solely responsible for the accuracy and applicability of this information to a particular use or situation.

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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 CHARACT 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 & H AS NO RQ IN ITS CURRENT FORM. IF AS HAZ WASTE CHARACT 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

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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 - Composition/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

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Material Safety Data Sheets

MSDS No: 108-67-8**Date: 03/09/2001**

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,3,5-TRIMETHYLBENZENE

SYNONYMS: Trimethylbenzol, Mesitylene

2. COMPOSITION, INFORMATION ON INGREDIENTS

Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	Exposure Limits (PPM)		
					OSHA PEL	MAC	Other STEL
1,3,5-TRIMETHYLBENZENE	C ₉ H ₁₂	108-67-8	99+%	25	NE	NE	NE

Note: NE = NONE ESTABLISHED

S/A = SIMPLE ASPHYXIAN

3. HAZARD IDENTIFICATION

* * * EMERGENCY OVERVIEW * * *

Flammable liquid and vapor.

Can form explosive mixtures with air.

Can cause skin and respiratory tract irritation.

May cause irritation to the eyes and mucous membrane.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Ingestion

ACUTE EFFECTS: Inhalation of vapors may cause pulmonary edema, circulatory collapse, damage to upper respiratory tract, coughing, difficulty breathing and choking. Symptoms include burning sensation, coughing, wheezing, shortness of breath, headache, nausea, and vomiting. May cause pulmonary edema, fainting, convulsions and coma. Skin contact can cause defatting and dermatitis. Eye contact may result in destruction of eye tissue. Ingestion irritates the digestive tract and results in systemic effects from absorption.

CHRONIC EFFECTS: Kidney and liver damage. Blood effects.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Liver, kidney, skin, and central nervous system diseases or disorders.

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY (US ONLY):

NTP - No

IARC MONOGRAPHS - No

OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes. Do not allow victim to rub or keep eyes tightly shut.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. If ingested, have that conscious and alert person drink 1 to 2 glasses of water. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration to the victim.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 50 deg. C

AUTOIGNITION TEMPERATURE: 595 deg. C

FLAMMABLE LIMITS: Vol. %

LOWER: .93
UPPER: 8.62

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical. Water is ineffective in putting out a fire, but should be used for cooling fire exposed cylinders.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May form explosive mixture in air. Dangerous fire hazard and moderate explosion hazard when heated. Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat.

SPECIALIZED EQUIPMENT: Absorb small spills using a solid adsorbent such as vermiculite. Use non-sparking tools.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable

hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses , Goggles.

SKIN PROTECTION: Protective gloves.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Odorless

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg.C: 1.86 mm Hg

VAPOR DENSITY (AIR=1): 4.14

BOILING POINT (C): 165

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): @4 deg.C: 0.888

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Ap

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 7,230 ppm, Rat 1 hour

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/AP

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: 1,3,5-Trimethylbenzene
HAZARD CLASS: 3 (flammable), Packing Group III
IDENTIFICATION NUMBER: UN2825
REPORTABLE QUANTITIES: None
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 202-436-9

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10

S: 9

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.



MATERIAL SAFETY DATA SHEET

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,2,4-Trimethylbenzene
Catalog Numbers: AC140090000, AC140090010, AC140090025, 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.
Chronic: Prolonged or repeated skin contact may cause dermatitis. May cause anemia and other blood cell abnormalities. 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.
- Inhalation:** 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.

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
LD50/LC50: RTECS:
CAS# 95-63-6: Inhalation, rat: LC50 = 18000 mg/m3/4H;
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 #5 Date 8/30/2007

Revisions were made in Sections: 3, 4, 5, 6, 7, 8, 9, 10, 11, 1

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.

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 E

Groundwater Monitoring Sampling Log Form

GROUND WATER SAMPLE FIELD INFORMATION FORM

Date:	Weather:	Sampling Personnel:

Well Information		Purging Information	

Purging Information

Purging Method	
Purging Rate (l/m; gpm)	
Start Purge Time	
End Purge Time	
Volume Purged (gal)	

Sampling Method	
Start Sampling Time	
End Sampling Time	
Depth Before Sampling (ft)	
Number Bottles Collected	

	Parameters

[illegible]

Notes/Remarks	

flow rate =

3 well volumes ~

APPENDIX F

Site-Wide Inspection Checklist

SITE WIDE INSPECTION CHECKLIST

Site Name: _____ Location: _____ Project Number: _____

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, severe condition, etc.): _____ Annual Inspection _____

Check one of the following: **Y:** Yes **N:** No **NA:** Not Applicable

	Y	N	NA	Normal Situation	Remarks
General					
1 What are the current site conditions?	--	--	--	--	
2 Are all applicable site records (e.g., documentation of construction activity, most current easement, etc.) complete and up to date?					
Easement					
3 Has site use (restricted residential) remained the same?					
4 Does it appear that all environmental easement restrictions have been followed?					
Impermeable Cap					
5 Are there any indications of a breach in the capping system at the time of this inspection?					
6 Are there any cracks in the building slabs?					
7 Are there any cracks in the building walls?					
8 Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the capping system, on-site at the time of this inspection?					
9 If YES to number 8, is there documentation that the Soil Management Plan, HASP, and CAMP for the site was/is being followed?					

*** If the answer to any of the above questions indicate non-compliance with any IC/ECs for the site, additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.

Additional remarks _____

Minimum Inspection Schedule: Site-wide inspections will be conducted annually, per certification year, at a minimum. Additional inspections will also be conducted at times of severe condition events. All inspection events will utilize this checklist.

APPENDIX G

Quality Assurance Protection Plan

Quality Assurance Project Plan

for

**1676 THIRD AVENUE
New York, New York**

Prepared For:

**Bevin Associates, LLC
c/o KLM Construction
155 East 56th Street, 6th Floor
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**November 2013
170206301**

LANGAN

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was prepared on behalf of Bevin Associates LLC (the "Volunteer"), for the approximately 930 square-foot property located at 1676 Third Avenue in Manhattan, New York in support of the Site Management Plan (SMP) pursuant to the Brownfield Cleanup Program Agreement. The proposed development included the construction of a five-story plus penthouse residential building with a basement. Additional Site information and data collected previously is provided in the SMP.

This Quality Assurance Project Plan (QAPP) specifies analytical methods to be used to ensure that data from the SMP at the Site are precise, accurate, representative, comparable, and complete.

1.2 PROJECT OBJECTIVES

The objectives of this QAPP are to specify the analytical methods to be used to ensure that data from future intrusive activities at the Site are precise, accurate, representative, comparable, and complete. The SMP activities would involve the execution of post remediation groundwater sampling to confirm effectiveness of remedy.

These objectives have been established in order to meet standards that will protect public health and the environment for the currently proposed residential use development.

1.3 SCOPE OF WORK

The specific scope of work covered by this QAPP includes any future intrusive work at the Site that may be conducted beneath the Site-cap and any Site activities covered under the SMP. Any future samples will be collected from soil stockpiles or excavations, as necessary.

1.4 DATA QUALITY OBJECTIVES AND PROCESSES

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 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. Sampling 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), 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 will be determined by assessing a number of investigation procedures, including chain of custody, decontamination, and analysis of field blanks and trip blanks.
- **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, instrument calibrations, using standard reporting units and reporting formats, and data validation.

Each of the above objectives are discussed in detail in Section 3.

2.0 PROJECT ORGANIZATION

Any future intrusive activities beneath the site cap will be overseen by Langan or another environmental consultant on behalf of the owner. The environmental consultant will provide on-site field representatives to perform the intrusive activity oversight and any required sampling. The environmental consultant will also arrange data analysis and reporting tasks. The analytical services will be performed by a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-approved laboratory for analysis. Quality assurance review will be performed by the Langan Quality Assurance Officer or another environmental consultant on behalf of the owner to determine whether future intrusive work is being implemented according to the SMP. Data validation services will be performed by approved data validation contractor(s). The data validation portion of the assessment will check the quality of the analytical data against the quality control programs used by the laboratory.

Key contacts for this project are as follows:

Bevin Associates LLC.:

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Langan Project Manager:

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Langan Quality Assurance Officer (QAO):

Mr. Michael D. Burke
Telephone: (212) 479-5413
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Program Quality Assurance Monitor:

Mr. Ryan Wohlstrom
Telephone: (212) 479-5483

Laboratory Representatives:

Alpha Analytical Laboratories (Alpha):
Kevin Hoogerhyde
Telephone: (508) 898-9220

3.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OBJECTIVES FOR MEASUREMENT OF DATA

3.1 INTRODUCTION

The quality assurance and quality control objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability. These objectives are defined in following subsections. They are formulated to meet the requirements of the USEPA SW-846. The analytical methods and their Contract Required Quantification Limits (CRQLs) are given in Section 7.

3.2 PRECISION

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

For this project, field sampling precision will be determined by analyzing coded duplicate samples (labeled so that the laboratory does not recognize them as duplicates) for the same parameters, and then, during data validation (Section 8), calculating the RPD for duplicate sample results.

Analytical precision will be determined by the laboratory by calculating the RPD for the results of the analysis of internal QC duplicates and matrix spike duplicates. The formula for calculating RPD is as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where:

- RPD = Relative Percent Difference.
- V1, V2 = The two values to be compared.
- |V1 - V2| = The absolute value of the difference between the two values.
- (V1 + V2)/2 = The average of the two values.

The data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, are presented in Tables 3.1 and 3.2.

TABLE 3.1
QUALITY CONTROL LIMITS FOR WATER SAMPLES

Laboratory Accuracy and Precision							
Analytical Parameters	Analytical Method (a)	Matrix Spike (MS) Compounds	MS/MSD (b) % Recovery	MS/MSD RPD I	LCS (d) % Recovery	Surrogate Compounds	Surrogate % Recovery
VOCs (e)	8260	1,1-Dichloroethane	61-145	-	NA	Toluene-d8	88-110
		Trichloroethene	71-120	-	NA	Bromofluorobenzene	86-115
		Benzene	76-127	-	NA	1,2-Dichloroethane-d4	76-114
		Toluene	76-125	-	NA		
		Chlorobenzene	75-130	-	NA		

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990; any subsequent revisions shall supersede this information

(b) Matrix Spike/Matrix Spike Duplicate

(c) Relative Percent Difference

(d) Laboratory Control Sample

(e) Target Compound List Volatile Organic Compounds plus library search

NA - Not Applicable

TABLE 3.2
QUALITY CONTROL LIMITS FOR SOIL SAMPLES

Laboratory Accuracy and Precision							
Analytical Parameter	Analytical Method (a)	Matrix Spike (MS) Compounds	MS/MSD (b) % Recovery	MS/MSD RPD (c)	LCS (d) % Recovery	Surrogate Compounds	Surrogate % Recovery
VOCs (e)	8260	1,1-Dichloroethane	59-172	22	NA	Toluene-d8	84-138
		Trichloroethene	62-137	24	NA	Bromofluorobenzene	59-113
		Benzene	66-142	21	NA	1,2-Dichloroethane-d4	70-121
		Toluene	59-139	21	NA		
		Chlorobenzene	60-133	21	NA		

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990, any subsequent revisions shall supersede this information

(b) Matrix Spike/Matrix Spike Duplicate

(c) Relative Percent Difference

(d) Laboratory Control Sample

(e) Target Compound List Volatile Organic Compounds

NA - Not Applicable

3.3 ACCURACY

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987), or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material, and is expressed as the percent of the known quantity, which is recovered or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes, which are close to the detection limits are less accurate because they are more affected by such factors as instrument "noise". Higher concentrations will not be as affected by instrument noise or other variables and thus will be more accurate.

Sampling accuracy may be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike) or to a blank (blank spike). The %R is calculated as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:

- %R = Percent recovery.
- SSR = Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added.
- SR = Sample result: the background value, i.e., the concentration of the analyte obtained by analyzing the sample.
- SA = Spiked analyte: concentration of the analyte spike added to the sample.

The acceptance limits for accuracy for each parameter are presented in Tables 3.1 and 3.2.

3.4 REPRESENTATIVENESS

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 a qualitative parameter, which is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the Field Sampling Plan. Analysis of field blanks, trip blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of blank, duplicate and Chain-of-custody procedures are presented in Sections 4 and 5.

3.5 COMPLETENESS

Completeness is defined as the percentage of measurements made which are judged to be valid (USEPA, 1987). The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

where:

%C = Percent completeness.

V = Number of measurements judged valid.

T = Total number of measurements.

3.6 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the U.S. Environmental Protection Agency (USEPA) or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

4.0 SAMPLING PROGRAM

4.1 INTRODUCTION

The sampling program will provide post-remediation groundwater samples to document effectiveness of remedy. This section presents sample container preparation procedures, sample preservation procedures, sample holding times, and field QC sample requirements.

4.2 SAMPLE CONTAINER PREPARATION AND SAMPLE PRESERVATION

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be labeled and the appropriate preservatives will be added. The types of containers are shown in Tables 4.1 and 4.2.

Samples shall be preserved according to the preservation techniques given in Tables 4.1 and 4.2. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 4°C with ice or "blue ice", and delivered to the laboratory within 48 hours of collection. Chain-of-custody procedures are described in Section 7.

4.3 SAMPLE HOLDING TIMES

The sample holding times for organic and inorganic parameters are given in Tables 4.1 and 4.2 and must be in accordance with the NYSDEC ASP requirements. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to Langan.

4.4 FIELD QC SAMPLES

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike/matrix spike duplicates (MS/MSDs). The blanks will include:

- a. Trip Blanks - A trip blank will be prepared before the sample containers are sent by the laboratory. The trip blank will consist of a 40-ml VOA vial containing distilled, deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for Part 375 volatiles analysis. The Trip Blank will be analyzed for volatile organic compounds to assess any contamination from sampling and transport, and internal laboratory procedures.

- b. Field Blanks - Field blanks will be taken at a minimum frequency of one per 20 field samples per sample matrix. Field blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. The field blank will consist of a sample of deionized, distilled water provided by the laboratory that has passed through a decontaminated bailer, tubing or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to taking an environmental sample. The field blank may be analyzed for all or some of the parameters of interest.

The duplicates will include:

- a. Coded Field Duplicate - To determine the representativeness of the sampling methods, coded field duplicates will be collected at a minimum frequency of one per 20 field samples. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise.
- b. Matrix Spike/Matrix Spike Duplicate (MS/MSD) - MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The percent recoveries and RPDs are given in Tables 3.1 and 3.2.

TABLE 4.1
WATER SAMPLE CONTAINERIZATION, PRESERVATION,
AND HOLDING TIMES

Analysis	Bottle Type	Preservation (a)	Holding Time (b)
Volatile Organic Compounds (VOCs)	2-40 mL glass vial w/ Teflon septum	Cool to 4°C, HCL pH<2	7 days

(a) All samples to be preserved in ice during collection and transport.

(b) Days from validated time of sample receipt (VTSR).

TABLE 4.2
SOIL SAMPLE
CONTAINERIZATION, PRESERVATION AND HOLDING TIMES

Analysis	Bottle Type	Preservation ^(a)	Holding Time ^(b)
Volatile Organic Compounds (VOCs)	Wide-mouth glass w/ teflon lined cap	Cool to 4°C	14 days

(a) All samples to be preserved in ice during collection and transport.

(b) Days from date of sample collection.

5.0 SAMPLE TRACKING AND CUSTODY

5.1 INTRODUCTION

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the Chain-of-custody (COC) and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5.1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody; or
- In a secured area which is restricted to authorized personnel.

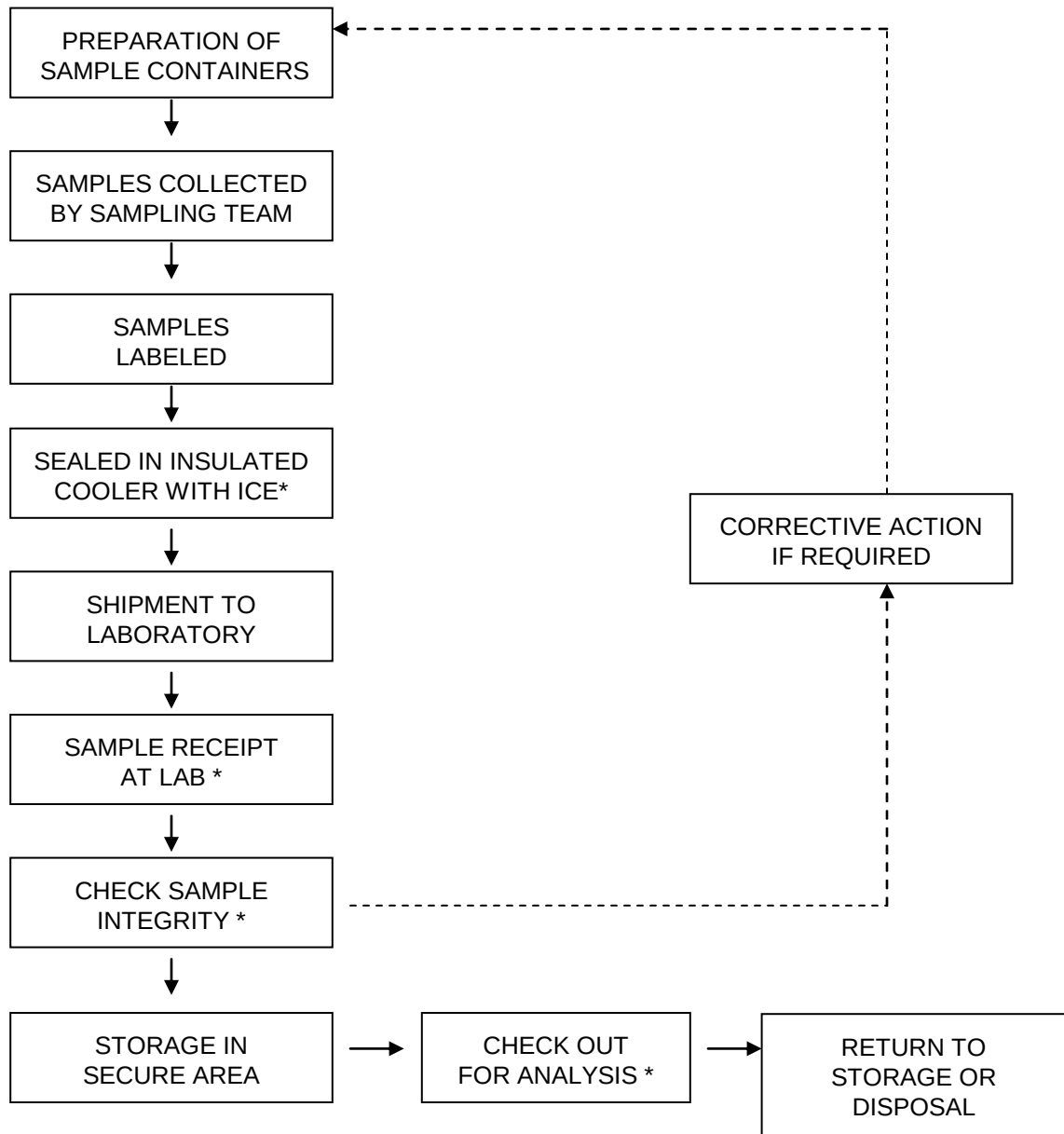
5.2 FIELD SAMPLE CUSTODY

A COC record (Figure 5.2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

The REMARKS space on the COC is used to indicate if the sample is a matrix spike, matrix spike duplicate, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first RELINQUISHED BY space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC.

Figure 5-1 Sample Custody



* REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

PAGE ____ OF ____

17

Mistakes will be crossed out with a single line in ink and initialed by the author.

One copy of the COC is retained by sampling personnel (notations identifying blind duplicate samples will be added to this copy of the COC but not the others that will go to the laboratory) and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the sample will not be analyzed.

5.3 LABORATORY SAMPLE CUSTODY

The Project Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities, and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples, and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain-of-custody procedure.
- The samples will be stored in a secured area at a temperature of approximately 4°C until analyses commence.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

6.0 CALIBRATION PROCEDURES

6.1 FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions and are described in the Field Sampling Plan. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all the instrument manuals will be maintained on-site by the Field Team Leader.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector and explosimeter) are provided in the Health and Safety Plan.

6.2 LABORATORY INSTRUMENTS

The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods given in Section 7.

7.0 ANALYTICAL PROCEDURES

7.1 INTRODUCTION

Samples will be analyzed according to the USEPA SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition and subsequent updates. The methods to be used for the laboratory analysis of water and soil samples are presented in Table 7.1. These methods were selected because they attain the desired quantitation limits, which are compiled on Table 7.1.

TABLE 7.1
PROJECT QUANTITATION LIMITS

Analysis/Compound	Method	Estimated Quantitation Limits	
		RL (mg/L)	MDL(mg/kg)
Volatile Organics			
1 Methylene Chloride	SW8260B	0.034	0.0028
2 1,1-Dichloroethane	SW8260B	0.0051	0.001
3 Chloroform	SW8260B	0.0051	0.0011
4 Carbon Tetrachloride	SW8260B	0.0034	0.00072
5 1,2-Dichloropropane	SW8260B	0.012	0.00087
6 Dibromochloromethane	SW8260B	0.0034	0.001
7 1,1,2-Trichloroethane	SW8260B	0.0051	0.0013
8 Tetrachloroethene	SW8260B	0.0034	0.001
9 Chlorobenzene	SW8260B	0.0034	0.00064
10 Trichloroflouromethane	SW8260B	0.017	0.0013
11 1,2-Dichloroethane	SW8260B	0.0034	0.00078
12 1,1,1-Trichloroethane	SW8260B	0.0034	0.00092
13 Bromodichloromethane	SW8260B	0.0034	0.0016
14 Trans-1,3-Dichloropropene	SW8260B	0.0034	0.0017
15 Cis-1,3-Dichloropropene	SW8260B	0.0034	0.00082
16 1,1-Dichloropropene	SW8260B	0.017	0.001
17 Bromoform	SW8260B	0.014	0.00083
18 1,1,2,2-Tetrachloroethane	SW8260B	0.0034	0.00076
19 Benzene	SW8260B	0.0034	0.0027
20 Toluene	SW8260B	0.0051	0.0022
21 Ethylbenzene	SW8260B	0.0034	0.0026
f22 Chloromethane	SW8260B	0.017	0.0015
23 Bromomethane	SW8260B	0.0068	0.00089
24 Vinyl Chloride	SW8260B	0.0068	0.0013
25 Chloromethane	SW8260B	0.0068	0.00077
26 1,1-Dichloroethene	SW8260B	0.0034	0.0012
27 Trans-1,2-Dichloroethene	SW8260B	0.0051	0.0014
28 Trichloroethene	SW8260B	0.0034	0.0014
29 1,2-Dichlorobenzene	SW8260B	0.017	0.0017
30 1,3-Dichlorobenzene	SW8260B	0.017	0.0015
31 1,4-Dichlorobenzene	SW8260B	0.017	0.0014
32 Methyl tert butyl ether	SW8260B	0.0068	0.001
33 p/m-Xylene	SW8260B	0.0068	0.0015

TABLE 7.1 (Continued)

PROJECT QUANTITATION LIMITS PROJECT QUANTITATION LIMITS

Analysis/Compound	Method	Estimated Quantitation Limits	
		Water (mg/L)	Soil (mg/kg)
Volatile Organics (cont.)			
34 o-xylene	SW8260B	0.0068	0.0014
35 Cis-1,2-Dichloroethene	SW8260B	0.0034	0.001
36 Dibromomethane	SW8260B	0.034	0.0015
37 Styrene	SW8260B	0.0068	0.0025
38 Dichlorodiflouromethane	SW8260B	0.034	0.0013
39 Acetone	SW8260B	0.034	0.011
40 Carbon disulfide	SW8260B	0.034	0.0013
41 2-Butanone	SW8260B	0.034	0.013
42 Vinyl acetate	SW8260B	0.034	0.0026
43 4-Methyl-2pentanone	SW8260B	0.034	0.0028
44 1,2,3-Trichloropropane	SW8260B	0.034	0.0013
45 2-Hexanone	SW8260B	0.034	0.0014
46 Bromochloromethane	SW8260B	0.017	0.001
47 2,2-Dichloropropane	SW8260B	0.017	0.0027
48 1,2-Dibromoethane	SW8260B	0.014	0.0014
49 1,3-Dichloropropane	SW8260B	0.017	0.0019
50 1,1,1,2-Tetrachloroethane	SW8260B	0.0034	0.0011
51 Bromobenzene	SW8260B	0.017	0.00075
52 n-Butylbenzene	SW8260B	0.0034	0.0011
53 Sec-Butylbenzene	SW8260B	0.0034	0.00094
54 Tert-Butylbenzene	SW8260B	0.017	0.0021
55 O-chlorotoluene	SW8260B	0.017	0.0011
56 p-chlorotoluene	SW8260B	0.017	0.0012
57 1,2-Dibromo-3-chloropropane	SW8260B	0.017	0.0029
58 Hexachlorobutadiene	SW8260B	0.017	0.0016
59 Isopropylbenzene	SW8260B	0.0034	0.00061
60 p-Isopropylbenzene	SW8260B	0.0034	0.00094
61 Naphthalene	SW8260B	0.017	0.0026
62 Acrylonitrile	SW8260B	0.034	0.0013
63 n-Propylbenzene	SW8260B	0.0034	0.00097
64 1,2,3-Trichlorobenzene	SW8260B	0.017	0.0014
65 1,2,4-Trimethylbenzene	SW8260B	0.017	0.0027
66 1,3,5-Trimethylbenzene	SW8260B	0.017	0.0021
67 1,2,4-Trimethylbenzene	SW8260B	0.017	0.002

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

Analysis/Compound	Method	Estimated Quantitation Limits	
		RL (ug/L)	MDL (ug/kg)
Volatile Organics (cont.)			
8 1,4-Diethylbenzene	SW8260B	0.014	0.00068
9 4-Ethyltoluene	SW8260B	0.014	0.00033
0 1,2,4,5-Tetramethylbenzene	SW8260B	0.014	0.00062
1 Ethyl ether	SW8260B	0.017	0.0013
2 Trans-1,4-Dichloro-2-butene	SW8260B	0.017	0.0051

Notes:

- (1) RL = Reporting Limit
- (2) MDL = Minimum Detection Limit
- (3) RL and MDL values are taken from representative laboratory reports issued by Alpha Analytical Laboratories
- (4) RL and MDL values are estimated and may vary depending on instruments

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 INTRODUCTION

Data collected 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.

8.2 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.

8.3 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.

9.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

9.1 QUALITY ASSURANCE BATCHING

Each set of samples will be analyzed concurrently with calibration standards, method blanks, matrix spikes (MS), matrix spike duplicates (MSD) or laboratory duplicates, and QC check samples (if required by the protocol). The MS/MSD samples will be designated by the field personnel. If no MS/MSD samples have been designated, the laboratory will contact the Langan Project Manager for corrective action.

9.2 CALIBRATION STANDARDS AND SURROGATES

All organic standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. All standards are traceable to a source of known quality certified by the USEPA or NIST, or other similar program. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or more frequently, based upon data indicating deterioration.

9.3 ORGANIC BLANKS AND MATRIX SPIKE

Analysis of blank samples verifies that the analytical method does not introduce contaminants or detect "false positives". The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing KMnO_4 . The matrix spike is generated by addition of surrogate standard to each sample.

9.4 TRIP AND FIELD BLANKS

Trip blanks and field blanks will be utilized in accordance with the specifications in Section 4. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

10.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

10.1 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.

10.2 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.

10.3 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.

10.4 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.

11.0 PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

11.1 PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators.

A list of critical spare parts will be established by the operator. These spare parts will be available for use in order to reduce the downtime. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

11.2 SCHEDULES

Written procedures will establish the schedule for servicing critical items in order to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule, and arrange any necessary and prompt service. Required service will be performed by qualified personnel.

11.3 RECORDS

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories. The QAO may audit these records to verify complete adherence to these procedures.

12.0 CORRECTIVE ACTION

12.1 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.

12.2 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 12.1

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: _____					

13.0 REFERENCES

USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D.C.

Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan

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.

APPENDIX H

Field Sampling Plan

Field Sampling Plan
for
1676 THIRD AVENUE
New York, New York

Prepared For:

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1.0 INTRODUCTION

This Field Sampling Plan (FSP) was prepared on behalf of Bevin Associates LLC (the "Volunteer"), for the approximately 930 square-foot property located at 1676 Third Avenue in Manhattan, New York in support of the Site Management Plan (SMP) pursuant to the Brownfield Cleanup Program Agreement. The proposed development included the construction of a five-story plus penthouse residential building with a basement. Additional Site information and data collected previously is provided in the SMP. This FSP defines the methods and procedures for conducting sampling in support of the SMP at the Site.

1.1 OVERVIEW OF FIELD SAMPLING ACTIVITIES

As part of the SMP, quarterly groundwater monitoring from two off-site wells (MW-4 and MW-5) will be implemented to document the effectiveness of the remedy. Groundwater will be sampled quarterly for a minimum of two years following ISCO treatment. The location of the off-site monitoring wells is shown on Figure 10. The samples will be submitted to a NYSDOH ELAP-accredited laboratory for analysis of the volatile organic compounds (VOC) via EPA method 8260. A Groundwater Monitoring Report, indicating whether sample analysis shows any downward trend in groundwater concentrations, will be provided to NYSDEC following each monitoring event and in the annual Periodic Review Report (PRR). The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

2.0 GENERAL FIELD GUIDELINES

2.1 SITE HAZARDS AND UNDERGROUND UTILITIES

Potential on-site surface hazards, such as sharp objects, overhead power lines, energized areas, and other building hazards will be identified prior to initiation of fieldwork. Additionally, prior to beginning the construction activities, the New York City One-Call Center will be contacted for a Code 753 utility mark-out.

2.2 FIELD LOG BOOKS

All field activities will be documented in field logbooks. Entries will be of sufficient detail that a complete daily record of significant events, observations, and measurements is obtained. The field logbook will provide a legal record of the activities conducted at the Site. Accordingly:

- Field books will be assigned a unique identification number.
- Field books will be bound with consecutively numbered pages.
- Field books will be controlled by the Field Team Leader while fieldwork is in progress.
- Entries will be written with waterproof ink.
- Entries will be signed and dated at the conclusion of each day of fieldwork.
- Erroneous entries made while fieldwork is in progress will be corrected by the person that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing the correction.
- Corrections made after departing the field will be made by the person who made the original entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing and dating the time of the correction.

At a minimum, daily field book entries will include the following information:

- Location of field activity;
- Date and time of entry;
- Names and titles of field team members;
- Names and titles of any site visitors and site contacts;

-
- Weather information, for example: temperature, cloud coverage, wind speed and direction;
 - Purpose of field activity;
 - A detailed description of the field work conducted;
 - Sample media (soil, sediment, groundwater, etc.);
 - Sample collection method;
 - Number and volume of sample(s) taken;
 - Description of sampling point(s) including location and depth;
 - Volume of groundwater removed before sampling;
 - Preservatives used;
 - Analytical parameters;
 - Date and time of collection;
 - Sample identification number(s);
 - Sample distribution (e.g., laboratory);
 - Field observations;
 - Any field measurements made, such as pH, temperature, conductivity, water level, etc.;
 - References for all maps and photographs of the sampling site(s);
 - Information pertaining to sample documentation such as:
 - Bottle lot numbers;
 - Dates and method of sample shipments; and
 - Chain-of-Custody Record and if shipped, Federal Express Air Bill numbers.
-

3.0 GROUNDWATER SAMPLING

3.1 INTRODUCTION

Groundwater sampling from two off-site wells (MW-4 and MW-5) will be implemented to document the effectiveness of the remedy. Groundwater will be sampled quarterly for a minimum of two years following the initial ISCO treatment. The location of the off-site monitoring wells is shown on Figure 10.

3.2 SAMPLING PROCEDURES

The following methods will be used to collect groundwater samples:

Suggested Equipment and Supplies

- Field book
- Personal protective equipment in accordance with the HASP
- A pump with new, dedicated polyethylene tubing
- Coolers and ice
- Laboratory sample bottles
- Tape measure
- Horiba U-10 water quality meter

Samples Collection

- The wells will be purged of three well volumes and sampled in general accordance with the United States Environmental Protection Agency (USEPA) low-flow (minimal drawdown) groundwater sampling procedures.
- Purge water from each well will be transferred into a labeled 55-gallon drum for storage and off-site disposal.
- Groundwater samples will be collected after chemical and physical field parameters (i.e., pH, temperature, electroconductivity, dissolved oxygen, redox potential, and turbidity) have stabilized to within 10% variability between consecutive measurements.
- Collect samples for volatile VOC via EPA method 8260
- The sample containers will be labeled, placed in a laboratory-supplied cooler and packed on ice (to maintain a temperature of 4°C). The cooler will be transported via courier under standard chain-of-custody protocol to the laboratory for analysis.
- Chain-of-custody procedures will be followed as outlined in the Quality Assurance Project Plan (QAPP)
- Water sampling data will be recorded in the field log book.

4.0 FIELD INSTRUMENTS AND CALIBRATION

All field analytical equipment will be calibrated immediately prior to each day's use and more frequently if required by the equipment manufacturer. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. All instrument calibrations will be documented in the project field book and in an instrument calibration log. Records of all instrument calibration will be maintained by the Field Team Leader and will be subject to audit by the Project Manager or Technical Manager. Copies of all of the instrument manuals and/or instruction sheets will be maintained on-site by the Field Team Leader.

The following field instrument, or equivalent, will be used during the collection of groundwater samples:

- Horiba U-10 water quality meter capable of measuring pH, conductivity, and temperature .

4.1 WATER QUALITY METER

All of the individual probes within the Horiba U-10 water quality meter, except for redox potential, are calibrated with a 2 to 3 point calibration curves before the meter is deployed to the field. In addition, field calibration shall consist of a daily check against a factory provided auto calibration solution. The concentrations in the auto calibration solution and the acceptable range of field calibration are as follows:

<u>PARAMETER</u>	<u>CONCENTRATION</u>	<u>CALIBRATION RANGE</u>
pH	4.01	3.9 – 4.1 standard units
Conductivity	4.49	4.40 – 4.58 mS/cm

5.0 FIELD SAMPLE IDENTIFICATION AND CUSTODY

5.1 SAMPLE LOCATION NUMBERING SYSTEM

- Water samples collected will be numbered consecutively by beginning with well name (MW-4 or MW-5) and collection date.

5.2 SAMPLE IDENTIFICATION

Each sample will be given a unique alphanumeric identifier similar to the following classification system guidance.

SAMPLE IDENTIFICATION

W-*	NN-**	N-N-	LL
Sample Type	Sample Number	Depth Code	QC Identifier

Sample Type: Soil – SL; Water – W; Test Pit – TP; Waste Class. – WC; End Point – EP;
Bottom – B; Sidewall - SW

Sample Number: Number referenced to a sample location map.

Depth Code: Depth in feet of sample interval (e.g., 0-2 = Sample depth of 0-2 feet bgs).

QC Identifier: DUP = Field Duplicate (blind sample, do not indicate sample location)

Trip Blank: Designated by TB and the date (e.g., TB-062504)

- * L = Letter
- ** N = Number

Field duplicate samples will be assigned identifiers that do not allow the laboratory to distinguish them as field duplicates. Each sample container will be labeled prior to packing for shipment. The sample identifier, site name, date and time of sampling, and analytical parameters will be written on the label in waterproof ink and recorded in the field book.

5.3 CHAIN OF CUSTODY

- A Chain-of-Custody (COC) record (Figure 5.1 or similar) will accompany the sample containers during selection and preparation at the laboratory, during shipment to the field, and during return shipment to the laboratory.
- The COC will identify each sample container and the analytical parameters for each, and will list the field personnel that collected the samples, the project name and number, the name of the analytical laboratory that will receive the samples, and the method of sample shipment.

-
- If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample shipment.
 - The COC will be completed by field personnel as samples are collected and packed for shipment.
 - Erroneous markings will be crossed-out with a single line and initialed by the author.
 - The REMARKS space will be used to indicate if the sample is a matrix spike, matrix spike duplicate, or matrix duplicate.
 - Trip and field blanks will be listed on separate rows.
 - After the samples have been collected and sample information has been listed on the COC form, the method of shipment, the shipping cooler identification number(s), and the shipper airbill number will be entered on the COC.
 - A second member of the field team will review the COC for completeness and accuracy whenever possible.
 - Finally, a member of the sampling team will write his/her signature, the date, and time on the first RELINQUISHED BY space. Duplicate copies of each COC must be completed.
 - One copy of the COC will be retained by sampling personnel. Blind duplicate samples will be identified on the copy retained by the sampling crew. The other copy and the original will be sealed in a plastic bag and taped inside the lid of the shipping cooler without the additional identification of blind duplicate samples.
 - Sample shipments will be refrigerated at 4°C, typically by packing with ice, to preserve the samples during shipment.
 - After the shipping cooler is closed, custody seals provided by the laboratory will be affixed to the latch and across the front and back of the cooler lid, and signed by the person relinquishing the samples to the shipper or courier.
 - The seal will be covered with clear tape, and the cooler lid will be secured by wrapping with packing tape if shipped.
 - The cooler will be relinquished to the courier or shipper.
 - The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the samples will not be analyzed.
 - The samples must be delivered to the laboratory within 48 hours of collection.

5.4 SAMPLE DOCUMENTATION

The field team leader will retain a copy of the COC, and, in addition, the field team leader will ensure that the following information about each sample is recorded in the field book:

- Sample identifier;
 - Identification of sampled media (e.g., water);
 - Sample location with respect to known reference point;
 - Physical description of sample location;
-

-
- Field measurements, (e.g., pH, temperature, conductivity, and water levels);
 - Date and time of collection;
 - Sample collection method;
 - Volume of groundwater purged before sampling;
 - Number of sample containers;
 - Analytical parameters;
 - Preservatives used; and
 - Shipping information:
 - Dates and method of sample shipments;
 - Chain-of-Custody Record numbers;
 - Federal Express Air Bill numbers, if shipped; and
 - Sample recipient (e.g., laboratory name).

Figure 5.1 Chain-of-Custody Form

[illegible]

APPENDIX I

Monitoring Well Boring and Construction Logs

PROJECT 1676 THIRD AVENUE				PROJECT NO. 170206301			
LOCATION NEW YORK, NEW YORK				ELEVATION AND DATUM			
DRILLING AGENCY ADT				DATE STARTED 2013-11-02		DATE FINISHED 2013-11-02	
DRILLING EQUIPMENT Sonic 17-C				COMPLETION DEPTH 18'		ROCK DEPTH	
SIZE AND TYPE OF BIT				NO. SAMPLES		DIST.	
CASING				WATER LEVEL		FIRST	
CASING HAMMER		WEIGHT		DROP		FOREMAN D. MOON	
SAMPLER 5', 3.5" Sonic Sampling BIT				INSPECTOR D. CARRUS			
SAMPLER HAMMER		WEIGHT		DROP			

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOG.	TYPE	REC'D. FT.	RETR. REPT. BUSH	
brown m-f SAND some gravel tr. concrete	1					PID
	2					
	3					
	4					
	5					
brown m-f SAND some gravel	6					W. Bedrock is mica schist 11-12 is pet impacted, stained. no free product/smudge.
	7					
	8					
	9					
	10					
brown f- SAND some gravel pet. odor black SILT some f- sand tr. gravel tr. Weathered rock pet. odor grey weathered bedrock some silt tr. f- sand pet odor grey weathered bedrock some silt tr. f- sand	11					pet odor
	12					
	13					
	14					

JOB NO. 170206301

DATE 2013.11.02

LOG OF BORING NO. MW-4

SHEET OF 2

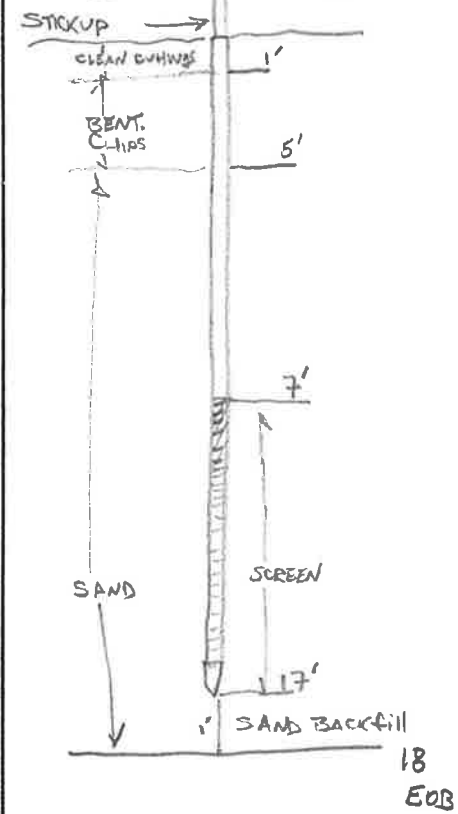
SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLDG.	
brown m.f. SAND to silt to gravel M-1 SAND some gravel (brown) Weathered bedrock - stained grey weathered bedrock AND white bedrock fragments	14					
	15					
	16					
	17					
	18					
EOB @ 18' REFUSAL.	19					
	20					
	21					
	22					
	23					
	24					
	25					

S-4
5' SAMPLE BAG

100-150
3'
↓

Ret odor
↓

SETTING well @ 17' bg.



STICKUP = 0.8'



Engineering and Environmental Services, Inc.

LOG OF BORING

MW-5

SHEET 1 OF 2

PROJECT 1676 THIRD AVENUE				PROJECT NO. 170206301			
LOCATION NEW YORK, NEW YORK				ELEVATION AND DATUM			
DRILLING AGENCY ADT				DATE STARTED 2013-11-02		DATE FINISHED 2013-11-02	
DRILLING EQUIPMENT Sonic 17-C				COMPLETION DEPTH 17'		ROCK DEPTH	
SIZE AND TYPE OF BIT 3" Rotobit				NO. SAMPLES		DIST.	
CASING				WATER LEVEL		FIRST	
CASING HAMMER		WEIGHT		DROP		FOREMAN D. MOON	
SAMPLER S', 3.5" Sonic Sampling Bit		WEIGHT		DROP		INSPECTOR D. CARRUS	
SAMPLER HAMMER		WEIGHT		DROP			

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOG.	TYPE	REC'D. FT.	RECOVERED FT.	
brown f-SAND some coarse gravel tr. wood	1	S-1	5' SAMPLE BAG	3'	0.0	MN-5 BEGIN @ 10:10 AM.
	2				0.0	
	3				0.0	
	4				0.0	
brown f-SAND some gravel.	5	S-2	5' SAMPLE BAG	4'	0.0	
	6				0.0	
brown f-SAND AND CONCRETE some gravel	7				0.0	
slight PETROLEUM ODOR MOIST	8				2.0	
PETROLEUM ODOR	9	S-3	5' SAMPLE BAG	3'	10.0	
brown SILT tr. f-sand gravel pet. odor	10				>1000	
red-brown silt tr. f-sand some weathered bedrock pet. odor	11				>1000	
grey silt tr. f-sand and weathered bedrock pet. odor	12				>1000	
grey silt tr. f-sand some weathered bedrock pet. odor	13				>1000	
	14					

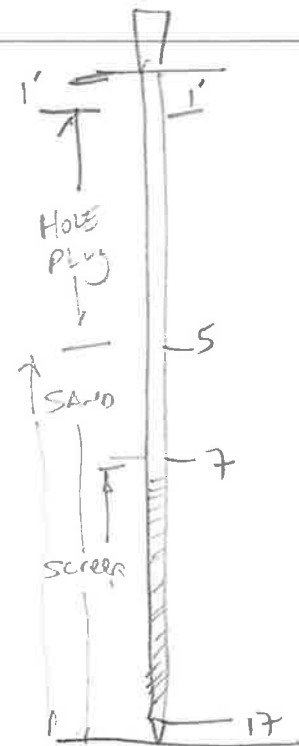
JOB NO. 170206301

DATE 2013.11.02

LOG OF BORING NO. MW-5

SHEET 2 OF 2

DEPTH SCALE 14	SAMPLE DESCRIPTION	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BLW. FT.	
15	GM SAND AND GRAVEL grey SILT and f-sand some gravel grey SILT AND CLAY some f-sand some gravel ROCK FRAGMENTS SAND AND GRAVEL REFUSAL (ROCK?)	S-4	5' SAMPLE BAG		10.0	
16					16.0	
17					17.0	
18						
19						
20						
21						
22						
23						
24						
25						



17'-7 - SCREEN
19'-5 - SAND
5'-1' - HOLE PLUG
8'-1' - GRADE
~1' stickup.

WELL CONSTRUCTION SUMMARY

Well No.

MW-4

PROJECT 1676 Third Avenue			PROJECT NO. 170206301			
LOCATION New York, NY			ELEVATION AND DATUM			
DRILLING AGENCY ADT			DATE STARTED 2013-11-02		DATE FINISHED 2013-11-02	
DRILLING EQUIPMENT AMS Compact Roto Sonic 17C			DRILLER D. Moon			
SIZE AND TYPE OF BIT 3" Sonic Bit			INSPECTOR D. Carrus			
METHOD OF INSTALLATION Boring was advanced to 18 feet below existing grade using a Sonic 3" bit. Clean, #1 sand was used to backfill 1 foot of the boring. A 2-inch diameter, 10-foot ten-slot screen, and 7-foot long PVC risers were installed. The total depth of the well below grade is 17 feet. The void space around the screen was backfilled with clean #1 sand to 5 feet below grade. Bentonite chips were filled to 1 foot below grade. Approximately 1 foot of well riser was allowed to stick up from the ground.						
METHOD OF WELL DEVELOPMENT Well was surged and purged.						
TYPE OF CASING PVC		DIAMETER 2"	TYPE OF BACKFILL MATERIAL Sand			
TYPE OF SCREEN 10-slot PVC		DIAMETER 2"	TYPE OF SEAL MATERIAL Bentonite			
BOREHOLE DIAMETER 6"		TYPE OF FILTER MATERIAL Sand				
TOP OF CASING	ELEVATION	DEPTH (ft)			SUMMARY SOIL CLASSIFICATION FILL, SAND SAND AND DECOMP BEDROCK	
TOP OF SEAL	ELEVATION	DEPTH (ft)				0.0
		1				1.0
TOP OF FILTER	ELEVATION	DEPTH (ft)				5.0
		5				
TOP OF SCREEN	ELEVATION	DEPTH (ft)				
		7				
BOTTOM OF BORING	ELEVATION	DEPTH (ft)				
		17				
SCREEN LENGTH		(ft)				
SLOT SIZE						
		10				
GROUNDWATER ELEVATIONS						
ELEVATION	DATE	DEPTH TO WATER				
	2013-11-02	10.45				
ELEVATION	DATE	DEPTH TO WATER				
	2013-11-05	13.05				
ELEVATION	DATE	DEPTH TO WATER				
ELEVATION	DATE	DEPTH TO WATER				
ELEVATION	DATE	DEPTH TO WATER				
ELEVATION	DATE	DEPTH TO WATER				
ELEVATION	DATE	DEPTH TO WATER				
LANGAN Engineering and Environmental Services, Inc. 21 Penn Plaza, 360 West 31st Street, Suite 900, New York, New York 10001-2727						

MW-5

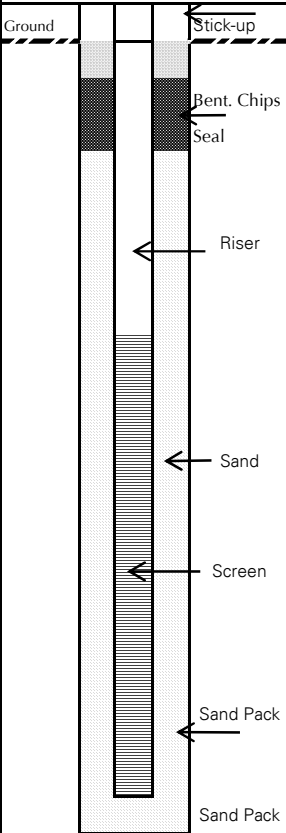
PROJECT	1676 Third Avenue	PROJECT NO.	170206301
LOCATION	New York, NY	ELEVATION AND DATUM	
DRILLING AGENCY	ADT	DATE STARTED	DATE FINISHED
		2013-11-02	2013-11-02
DRILLING EQUIPMENT	AMS Compact Roto Sonic 17C	DRILLER	
		D. Moon	
SIZE AND TYPE OF BIT	3" Sonic Bit	INSPECTOR	
		D. Carrus	

METHOD OF INSTALLATION

Boring was advanced to 17 feet below existing grade using a Sonic 3" bit. A 2-inch diameter, 10-foot ten-slot screen, and 7-foot long PVC risers were installed. The total depth of the well below grade is 17 feet. The void space around the screen was backfilled with clean #1 sand to 5 feet below grade. Bentonite chips were filled to 1 foot below grade. Approximately 1 foot of well riser was allowed to stick up from the ground.

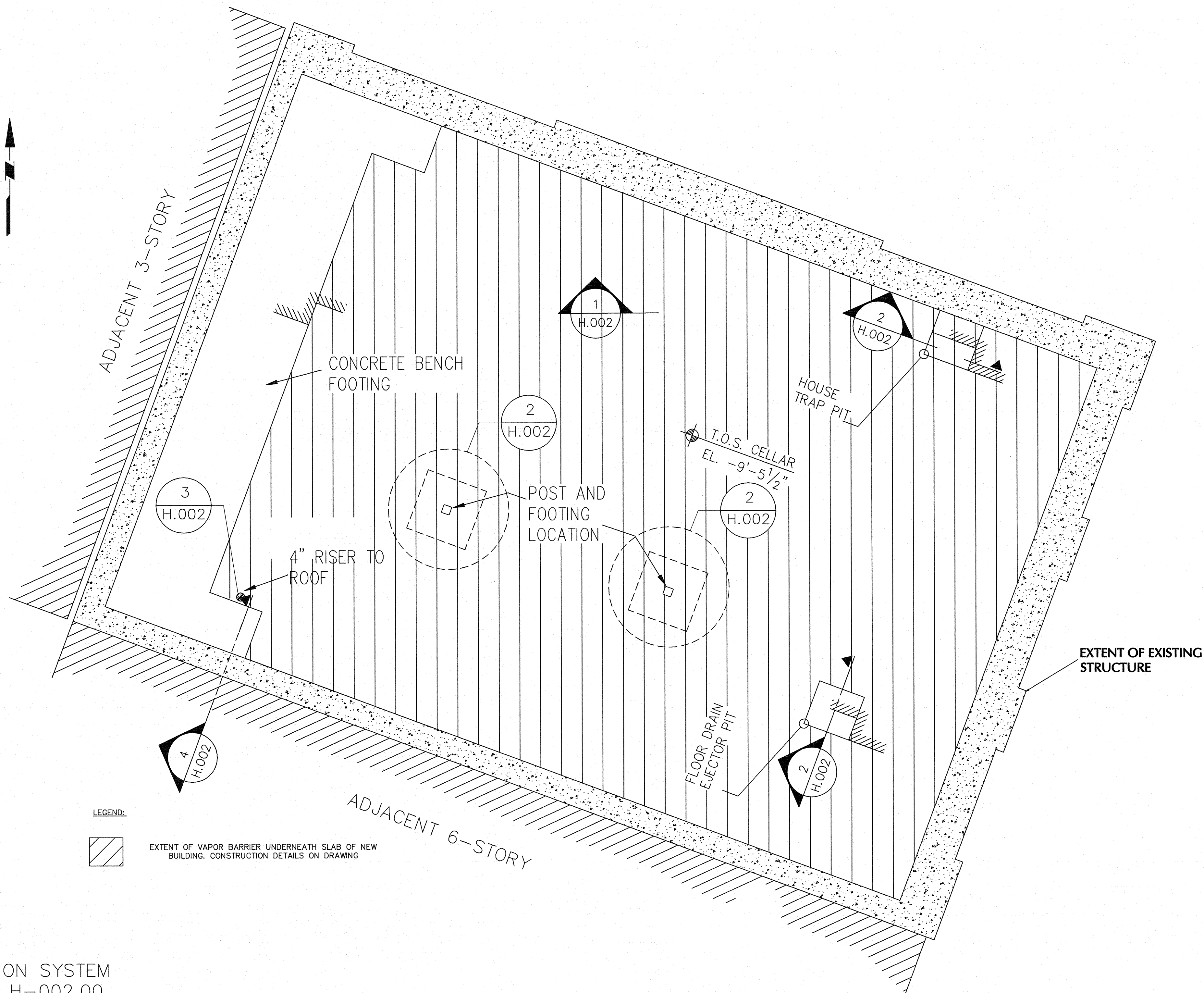
METHOD OF WELL DEVELOPMENT

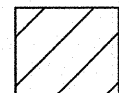
Well was surged and purged.

TYPE OF CASING			DIAMETER			2"			TYPE OF BACKFILL MATERIAL						Sand							
TYPE OF SCREEN			DIAMETER			2"			TYPE OF SEAL MATERIAL						Bentonite							
BOREHOLE DIAMETER			6"			TYPE OF FILTER MATERIAL						Sand										
TOP OF CASING			ELEVATION			DEPTH (ft)			WELL DETAILS						SUMMARY SOIL CLASSIFICATION						DEPTH (FT)	
TOP OF SEAL			ELEVATION			DEPTH (ft)									FILL, SAND						0.0	
																					1.0	
TOP OF FILTER			ELEVATION			DEPTH (ft)															5.0	
TOP OF SCREEN			ELEVATION			DEPTH (ft)																
BOTTOM OF BORING			ELEVATION			DEPTH (ft)																
SCREEN LENGTH						(ft)															10	
SLOT SIZE																					10	
GROUNDWATER ELEVATIONS																						
ELEVATION			DATE			DEPTH TO WATER																
			2013-11-02			11.31																
ELEVATION			DATE			DEPTH TO WATER																
			2013-11-05			13.5																
ELEVATION			DATE			DEPTH TO WATER																
ELEVATION			DATE			DEPTH TO WATER																
ELEVATION			DATE			DEPTH TO WATER																
LANGAN Engineering and Environmental Services, Inc.																						
21 Penn Plaza, 360 West 31st Street, Suite 900, New York, New York 10001-2727																						

APPENDIX J

As-Built Drawing for Composite Cover System

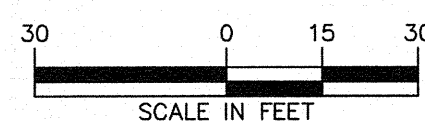


LEGEND:
 EXTENT OF VAPOR BARRIER UNDERNEATH SLAB OF NEW BUILDING. CONSTRUCTION DETAILS ON DRAWING

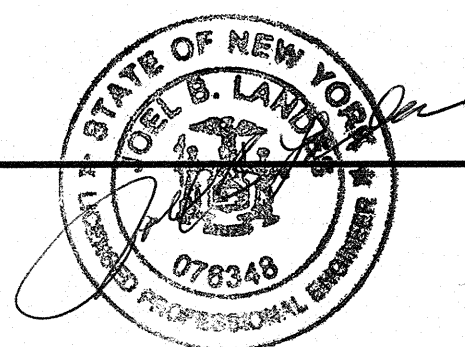
NOTES

1. SUB-MEMBRANE DEPRESSURIZATION SYSTEM DETAILS ARE SHOWN ON DRAWING H-002.00.

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.



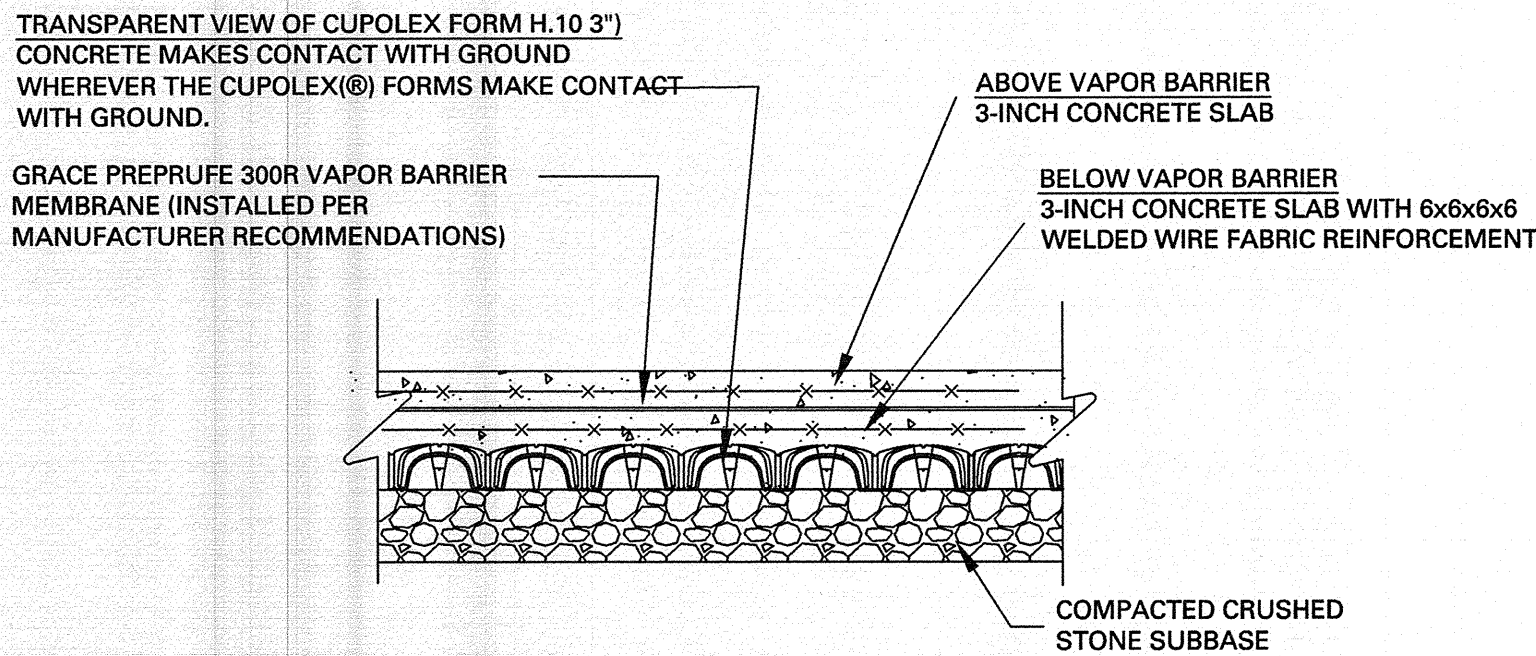
21 Penn Plaza, 360 West 31st Street, 8th Floor, New York, NY 10001 T: 212.479.5400 F: 212.479.5444 www.langan.com NEW JERSEY NEW YORK VIRGINIA CALIFORNIA PENNSYLVANIA CONNECTICUT FLORIDA ABU DHABI ATHENS DOHA DUBAI ISTANBUL Langan Engineering, Environmental, Surveying and Landscape Architecture, P.C. Langan Engineering and Environmental Services, Inc. Langan CT, Inc. Langan International LLC Collectively known as Langan			Project 1676 THIRD AVENUE BLOCK No. 1522, LOT No. 40 NEW YORK NEW YORK MANHATTAN		Drawing Title AS BUILT SUB-MEMBRANE DEPRESSURIZATION SYSTEM PLAN		Project No. 170206301 Date 11/18/2013 Scale 1" = 30' Drawn By DC Submission Date 11/18/2013		Drawing No. H-001.00 Sheet 1 of 2					
<table><thead><tr><th>Date</th><th>Description</th><th>No.</th></tr></thead><tbody><tr><td colspan="3">REVISIONS</td></tr></tbody></table>			Date	Description	No.	REVISIONS			SIGNATURE PROFESSIONAL <i>Sed B. Lander</i> STATE LIC. No. <i>026348</i>		DATE SIGNED			
Date	Description	No.												
REVISIONS														



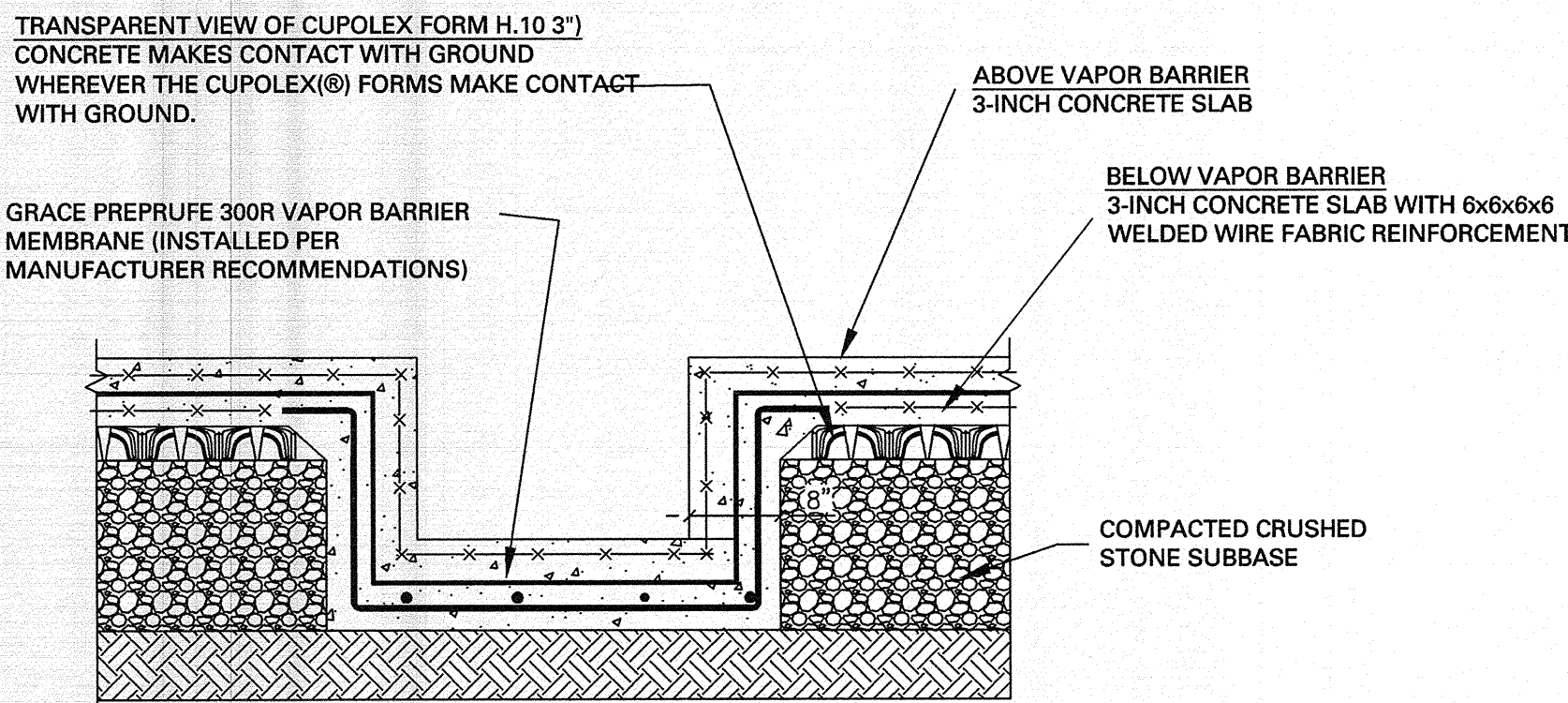
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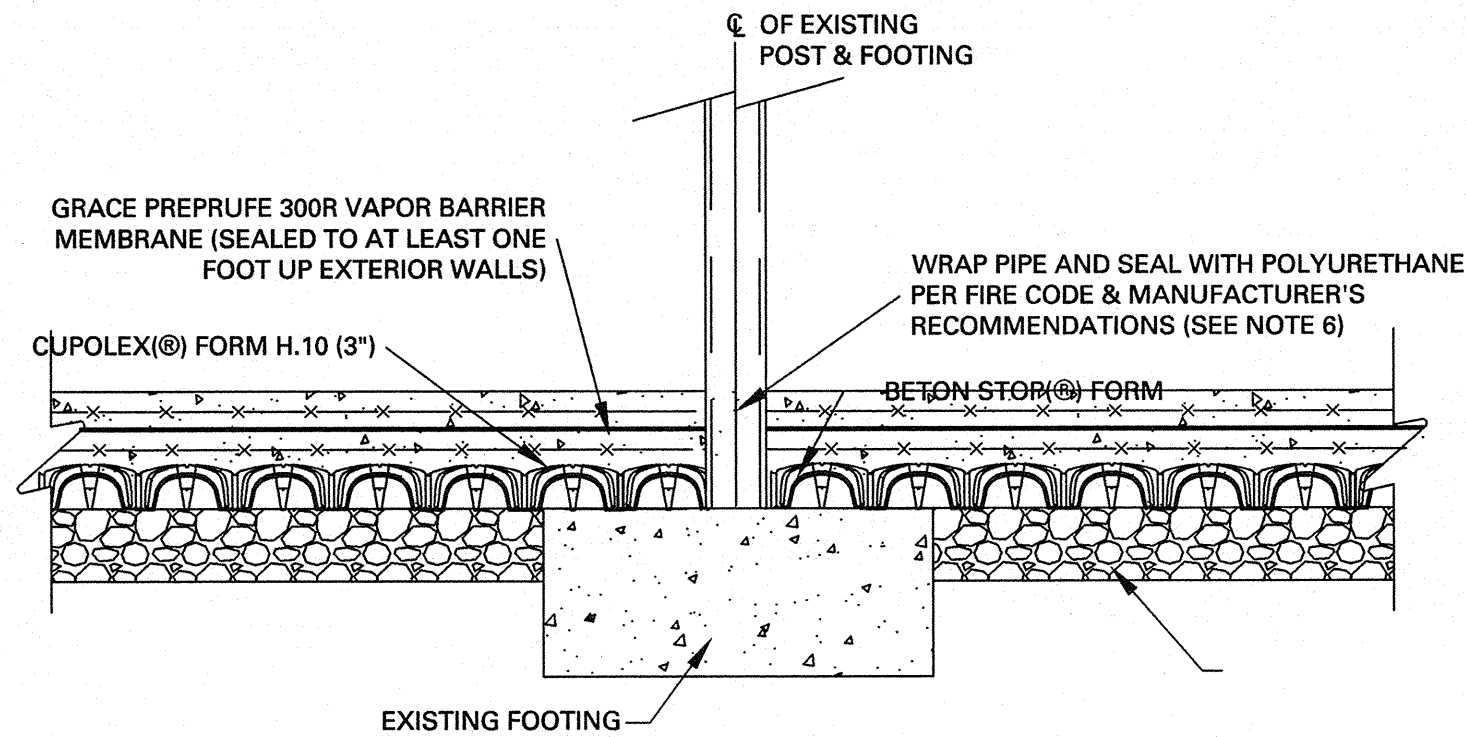
A
B
C
D
E
F



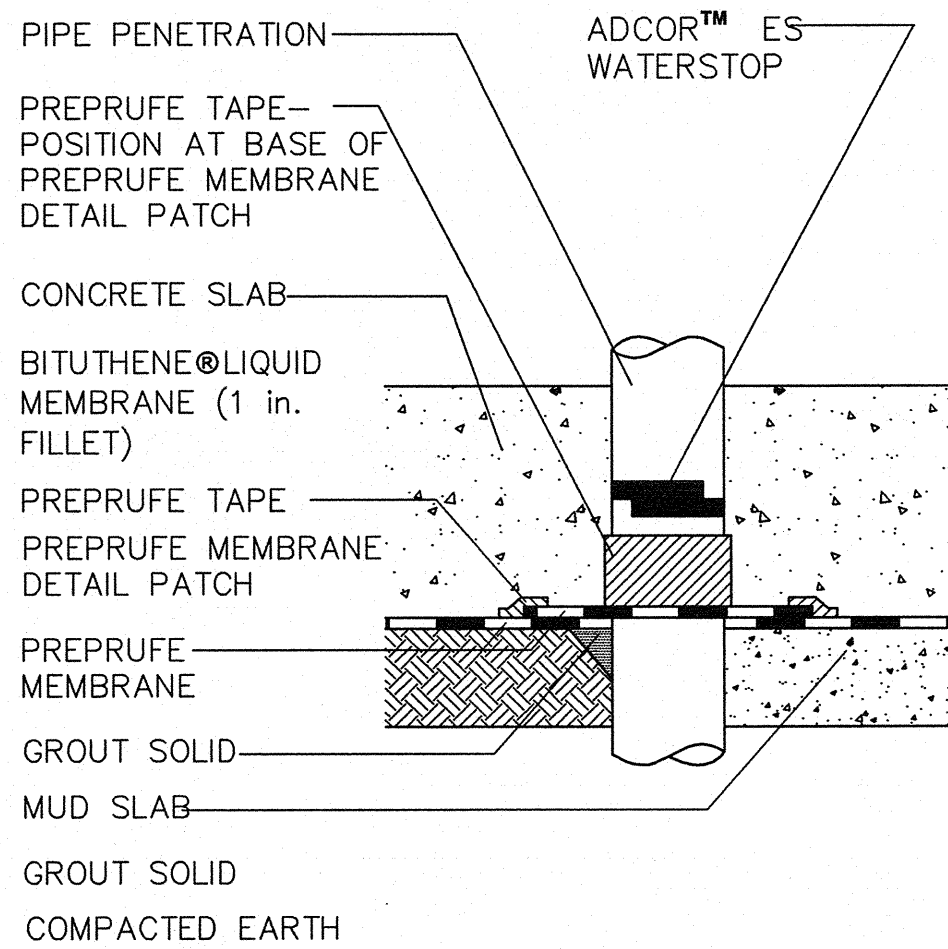
DETAIL 1: SUB-MEMBRANE DEPRESSURIZATION SYSTEM
NOT TO SCALE



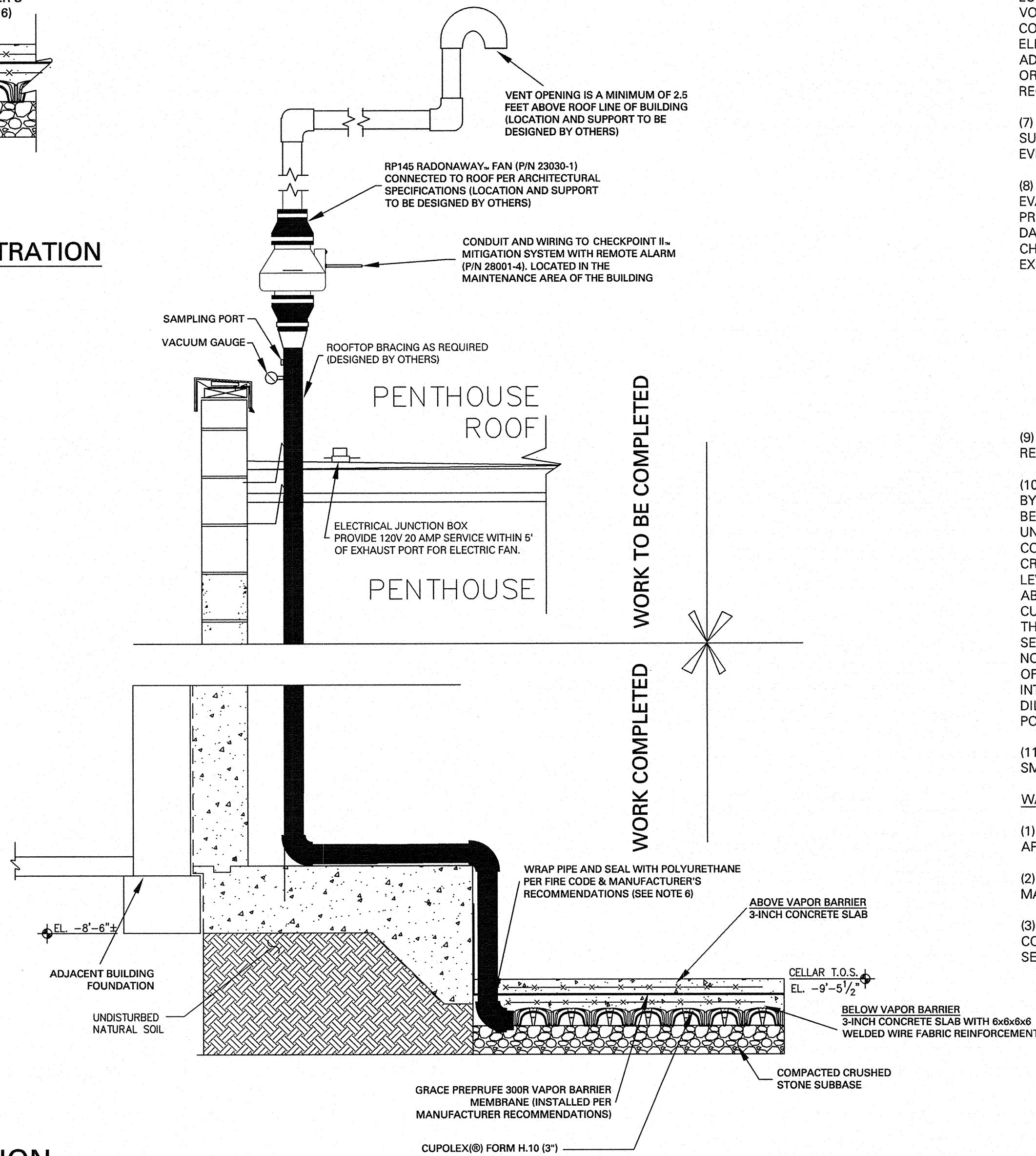
SECTION 2: TYP PIT NO PENETRATIONS
NOT TO SCALE



DETAIL 2: TYPICAL POST/FOOTING PENETRATION
NOT TO SCALE



DETAIL 3: RISER PIPE PENETRATION CONNECTION
NOT TO SCALE



DETAIL 4: MAT-ON-GRADE WALL INTERFACE CONSTRUCTION
AND VENT RISER PIPE WITH ELECTRIC FAN
NOT TO SCALE

GENERAL NOTES

(1) DESIGN DETAILS AND DRAWING ARE ADAPTED FROM EPA DOCUMENT EPA/625/R-92/016.

(2) THE CONTRACTOR SHALL CONFER WITH AND SEEK THE APPROVAL OF THE ARCHITECT FOR THE FINAL LOCATIONS OF VENTING SYSTEM COMPONENTS, SUCH AS THE POINTS OF FLOOR PENETRATION, PIPE RUNS, FAN LOCATION, AND EXHAUST POINTS ON THE ROOF.

(3) ALL PIPING CONNECTIONS SHALL BE SOLVENT CEMENTED AND PERMANENTLY SEALED USING A PRIMER MEETING ASTM F666 AND SOLVENT MEETING ASTM D2564. JOINTS SHALL BE MADE WHILE SOLVENT IS WET AND SHALL BE IN ACCORDANCE WITH ASTM 2865 AND ASTM F402

(4) THE GRACE PREPRUFE 300R VAPOR BARRIER MEMBRANE WILL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

(5) THE VENT RISER PIPE (DESIGNED BY OTHERS) SHALL BE 4-INCH Ø METAL PIPE OR OTHER MATERIAL THAT COMPLIES WITH APPLICABLE BUILDING CODE.

(6) THE VOID BELOW THE CUPOLEX FLOOR SLAB IS SEALED AT ALL LOCATIONS, TO PREVENT OR MINIMIZE THE LEAKAGE OF AIR BETWEEN THE VOID SPACE AND THE INDOOR AIR SPACE OF THE BUILDING. ALL PIPE AND CONDUIT PENETRATIONS THROUGH THE SLAB (INCLUDING MECHANICAL, ELECTRICAL, PLUMBING, OR OTHER) SHALL BE SEALED WITH A HIGH ADHESIVE SEALANT (E POLYURETHANE SEALANT, MODEL GE39495 12C, OR APPROVED EQUIVALENT) ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND APPLICABLE FIRE CODES.

(7) THE RISER PIPE MUST BE CLEARLY LABELED "CAUTION: DO NOT ALTER SUB-SLAB VAPOR VENT PIPE" IN EACH ACCESSIBLE AREA (A MINIMUM OF EVERY 10 LINEAR FEET OF RISER PIPE RUN).

(8) SYSTEM INSTALLATION SHALL ADHERE TO: FINAL GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION IN THE STATE OF NEW YORK PREPARED BY NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH), DATED OCTOBER 2006 AND 2008 NEW YORK CITY MECHANICAL CODE, CHAPTER 5, SECTION MC 512-SUBSLAB EXHAUST SYSTEMS. POINT OF EXHAUST (DESIGNED BY OTHERS) SHALL BE

- ABOVE THE EAVE OF THE ROOF (PREFERABLY, ABOVE THE HIGHEST EAVE OF THE BUILDING AND AT LEAST 12-INCHES ABOVE THE SURFACE OF THE ROOF);
- AT LEAST 10 FEET ABOVE GROUND LEVEL;
- AT LEAST 10 FEET AWAY FROM ANY OPENING THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT, AND
- 10 FEET FROM ANY ADJOINING OR ADJACENT BUILDINGS, OR HVAC INTAKES OR SUPPLY REGISTERS.

(9) ALL EXTERNAL PIPES SHALL BE PAINTED WITH A CORROSION RESISTANT COATING, DEPENDING ON PIPE MATERIAL.

(10) THE INTEGRITY OF THE CUPOLEX FLOOR SLAB SEALS SHALL BE TESTED BY A QUALIFIED PROFESSIONAL AFTER THE CONCRETE HAS BEEN POURED AND SET, BY PLACING THE VOID SPACE BELOW THE FLOOR UNDER A TEMPORARY VACUUM (APPROXIMATELY 0.5 TO 1.5" WATER COLUMN) AND CHECKING FOR DETECTABLE AIR LEAKS AT ALL JOINTS, CRACKS, AND OTHER PENETRATIONS IN THE OVERLYING SLAB. VACUUM LEVELS SHOULD BE RELATIVELY UNIFORM ACROSS THE SLAB IN THE ABSENCE OF SIGNIFICANT AIR LEAKS. THE CONTRACTOR INSTALLING THE CUPOLEX FLOOR SLAB SHALL BE RESPONSIBLE FOR SEALING ANY LEAKS IN THE SLAB DETECTED AND IDENTIFIED BY THIS TEST ACCORDING TO THE SEALING PROCEDURES DESCRIBED AND SHOWN ON PLANS. IT SHOULD BE NOTED THAT NO SLAB OR MITIGATION SYSTEM CAN BE COMPLETELY FREE OF AIR LEAKS AND THAT THE VENTING SYSTEM DESIGN SHOULD TAKE THIS INTO ACCOUNT BY ENSURING ADEQUATE DEPRESSURIZATION AND/OR DILUTION (VENTING) OF VAPORS BELOW THE SLAB AND BY POST-CONSTRUCTION PERFORMANCE TESTING AND MONITORING.

(11) CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS OF COMPLETE SMD SYSTEM TO ENGINEER FOLLOWING INSTALLATION.

WATERPROOFING/VAPOR BARRIER NOTES:

(1) THE VAPOR BARRIER SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE MANUFACTURER GUIDELINES AND DETAILS.

(2) THE VAPOR BARRIER SHALL BE INSTALLED BY A MANUFACTURER-CERTIFIED INSTALLER.

(3) THE VAPOR BARRIER SHALL BE INSPECTED IMMEDIATELY BEFORE CONCRETE IS PLACED. ALL PENETRATIONS, HOLES, OR TEARS SHALL BE SEALED BEFORE CONCRETE IS PLACED.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 148 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

Date	Description	No.
REVISIONS		

SIGNATURE		DATE SIGNED
PROFESSIONAL STATE LIC. No. 026348		

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Langan Engineering and Environmental Services, Inc.
Langan CT, Inc.
Langan International LLC
Collectively known as Langan

Project

1676 THIRD AVENUE

BLOCK No. 1522, LOT No. 40
NEW YORK

MANHATTAN NEW YORK

Drawing Title

**AS-BUILT
SUB-MEMBRANE
DEPRESSURIZATION
SYSTEM DETAILS**

Project No.	170206301	Drawing No.	H-002.00		
Date	11/18/2013				
Scale	#				
Drawn By	DC				
Submission Date	11/18/2013				
		Sheet	2	of	2