TETRA TECH ENGINEERING
CORPORATION PC

DRAFT REMEDIAL DESIGN WORK PLAN

for the

Troy (Smith Avenue) Former Manufactured Gas Plant Site

Operable Unit No. 3

Troy, NY

CERTIFICATION:

I Michael J. Byle certify that I am currently a NYS registered professional engineer and that this Draft Remedial Design Work Plan was prepared in accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Signed: _____

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Prepared For:

nationalgrid

Prepared By:

TETRA TECH EC, INC.

September 2011

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1.0 INTRODUCTION

1.1 General

This Remedial Design Work Plan (RD Work Plan) has been prepared in accordance with the requirements specified in the 2003 Order-On-Consent (Index #A4-0473-0000) between National Grid and the New York State Department of Environmental Conservation (NYSDEC) to address recommended remedial actions within the Hudson River adjacent to the Troy (Smith Avenue) Former Manufactured Gas Plant (MGP) site (the Site) in Troy, New York.

Non-aqueous phase liquid (NAPL) has been observed in the Hudson River sediments immediately adjacent to the former gas holder area of Operable Unit No. 1 (OU-1). OU-1 is the location of the former MGP. The selected remedy for OU-1, as presented in the June 2007 Record of Decision (ROD) for the Troy (Smith Avenue) Site, OU-1, will mitigate potential NAPL migration to the River. The Hudson River sediments have been designated as Operable Unit No. 3 (OU-3) by the NYSDEC is a Class 2 inactive hazardous waste disposal site (No. 4-42-030) and is adjacent to the United States Army Corps of Engineers (USACE) lock on the Hudson River.

As presented in the ROD, the remediation objectives for OU-3 are to eliminate or reduce to the extent practicable:

- Direct contact with contaminated sediments;
- Contaminant releases from sediments that could result in surface water levels in excess of ambient water quality criteria; and
- Impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the aquatic food chain;

Further, the remediation objectives for OU-3 include attaining, to the extent practicable:

- Remediation of sediment exceeding pre-release/background levels of PAHs.

This RD Work Plan discusses the methods and procedures that will be used to perform the remedial design to achieve the OU-3 objectives.

The remainder of Section 1.0 discusses project objectives, provides relevant background information, and provides the organization of the RD Work Plan.

1.2 RD Work Plan Objectives

The objectives of the RD Work Plan include:

- Present the work to be performed and the documents to be presented and submitted to gain NYSDEC approval of the remedial design.
- Describe the methods and procedures that will be used to gather and evaluate data needed to design the remedial action to meet the OU-3 remedial objectives;
- Provide the project plans (Sampling, Analysis, and Monitoring Plan; Quality Assurance Project Plan; and Health and Safety Plan) that will be used during the field investigation to gather the data needed for the design of the OU-3 remedial action;
- Provide a conceptual design for the OU-3 remedial action;
- Preliminarily identify the various approvals and permits required for the OU-3 field investigation and remedial design; and,
- Provide a proposed schedule for the activities from the OU-3 field investigation through the final remedial design and a preliminary schedule of OU-3 construction and Operation, Maintenance, and Monitoring (OM&M) activities.

1.3 Background Information

The information contained in this section includes a discussion of the location of the Site, a description of present site conditions, a history of the Site (beginning with its first use as an MGP facility), and a summary of previous investigations.

1.3.1 Site Description and History

The Troy (Smith Avenue) Site is located adjacent to the Hudson River at Smith Avenue in Troy, Rensselaer County, New York. Figure 1 depicts the Site location (USGS - North Troy Quadrangle).

The subject of this document is the sediment of the Hudson River adjacent to the former manufactured gas plant area at Smith Avenue. The reach of the Hudson River adjacent to the former manufactured gas plant area has been designated Operable Unit No. 3. An operable unit represents a portion of the Site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. OU-1 consists of the upland portion of the Site, and occupies a total of approximately five acres comprising portions of two properties, one owned by National Grid (NG) and the other by the USACE. Ingalls Avenue has been designated as OU-2. OU-2 consists mostly of a former canal that was filled in the early 20th century, and is located south of the Troy (Smith Avenue) Site (Figure 2).

1.3.1.1 Site Geology

The OU-3 sediments near the shoreline, including those near the bulkhead and to the south of the lock, typically consisted of gray to dark gray sand with gravel and silt, and varying amounts of organic material. In the area closer to the western lock approach wall, the sediments were primarily gravel, and to south and west of the lock approach wall (those areas greater than approximately 175 feet west of the river bank), the substrate appeared to be primarily cobbles, and no sediment was recovered.

The top of weathered bedrock occurs immediately beneath the sand, silt and gravel, at an elevation which is consistent with the approximate top of bedrock encountered during drilling activities at OU-1 (the former MGP area).

1.3.1.2 Site History

In response to the NYSDEC Order-On-Consent, a search and review of historical background data was conducted for the Troy (Smith Avenue) Site by National Grid. Available resources used to accomplish this task, included, but were not limited to:

- National Grid records and files;
- Sanborn Fire Insurance Maps, Hopkins' Atlases, and other historical maps;
- Deeds and site surveys;
- Manufactured gas industrial publications;
- Brown's Directory of American Gas Companies;
- National Grid personnel interviews;
- Syracuse University Library historical documents; and
- NYSDEC files.

Site history information is presented below and is based upon information presented in the Remedial Investigation Report for the Troy (Smith Avenue) Site (May 1998).

1.3.1.2.1 Operational/Disposal History

Site history information is summarized below and is based upon the National Grid search and review of historical background data.

In 1886, the parcel immediately north of Smith Avenue was conveyed from Manufacturers National Bank of Troy to the Troy Fuel Gas Company, which later consolidated into the Troy Gas Company. By 1888, manufactured gas was being produced at the Site. The plant used the carbureted water gas process to produce gas from coal for lighting, cooking and heating. At least seven additional parcels were purchased between 1889 and 1920, significantly increasing the site area. In 1928, the last gas was produced at the Site. The Site continued to be used for storing gas generated elsewhere for an undetermined time. In 1960, the last gas holder was removed from the Site. While not part of the MGP operation, the Troy lock, dam, and southern approach

wall were constructed from 1913 to 1915, and thus were contemporary with the latter years of manufactured gas production.

In 1965, NG conveyed a 0.64 acre parcel along the Hudson River, west of the former gas plant, to New York State which later transferred the property to the U.S. Government (New York State Department of Public Works, Acquisition of Property, 6/19/1965). By 1986, the main gas building north of Smith Avenue had been removed from the Site.

1.3.1.2.2 Site Characterization History

There have been several environmental studies of the Troy Smith Avenue Former MGP Site over the last 15 years. The following is a summary of those studies:

In 1992, Niagara Mohawk Power Corporation (Niagara Mohawk), currently a subsidiary of National Grid, entered into an Order-On-Consent (Index # D0-0001-9210) with the NYSDEC for the investigation and, if necessary, the remediation of 21 former MGP sites, including the Troy (Smith Avenue) Former MGP Site.

In 1994, Niagara Mohawk conducted a Preliminary Site Assessment (PSA). The primary objectives of the PSA were to confirm the presence of MGP impacts and evaluate the need for interim remedial measures or additional site studies. An interim remedial measure is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the environmental studies.

In 1997, based upon the information gathered in the PSA, the NYSDEC listed the Site as a Class 2 Site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 Site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

A Remedial Investigation (RI) and Supplemental Remedial Investigations (SRI) were performed at OU-3. Surface water and sediment samples were collected from the Hudson River in 1997 as part of the RI. TtEC conducted a Supplemental Remedial Investigation (SRI) in 2006 to provide additional sediment data for OU-3. The purpose of the SRI was to evaluate the presence of non-aqueous phase liquid (NAPL), related to former manufactured gas plant (MGP) operations, in the Hudson River sediment.

TtEC conducted additional investigations of the Hudson River sediment in October 2007 to address comments on the 2006 SRI that the NYSDEC provided in a letter dated August 2, 2007. The purpose of the 2007 investigation was to obtain additional data regarding depth to bedrock and toxicity information. In addition, TtEC and ENSR Corporation collected sediment samples as part of a study regarding PAH bioavailability.

TtEC conducted further investigations of the Hudson River sediment in July 2008 to obtain additional data regarding PAH concentration data and information regarding PAH toxicity.

A summary of investigation activities is provided in Section 1.3.2. In March 2011, the NYSDEC issued the ROD for the Site. The ROD presents the selected remedy for remediating the Site.

1.3.1.3 Standards, Criteria, and Guidance (SCGs)

SCGs are identified in the NYSDEC-approved Final Feasibility Study Report (TtEC, 2010). SCGs are categorized as chemical-, location-, or action-specific and are presented in Appendix A. The Remedial Design will be performed in accordance with the SCGs.

1.3.2 Site Investigation Activities

A Remedial Investigation (RI), and Supplemental Remedial Investigation (SRI) were performed at the Site. A detailed description of the programs and their findings is presented in the Final FS Report (TtEC, 2010).

1.3.2.1 Summary of Nature and Extent

The top of weathered shale bedrock occurs immediately beneath the sand, silt, and gravel, at an elevation which is consistent with the approximate top of bedrock encountered during drilling activities at OU-1 (the former MGP area).

The nature and extent of MGP impacts to sediments at OU-3 have been characterized, and indicate the following:

- Evidence of NAPL presence in sediments was only observed within the lock approach.
- No NAPL was observed in the rock cores collected near the bulkhead.

Polycyclic aromatic hydrocarbon (PAH) concentrations in sediments collected from outside the lock area are much lower, typically by an order of magnitude, than the PAH concentrations in sediments in the lock area. In the samples collected in 2006 and 2008, PAH concentrations in the surficial sediments (e.g., 0-0.5 feet) ranged from 0 to 20.64 mg/kg at those locations where no NAPL was observed. PAH concentrations in subsurface sediments in the samples collected in 2006 and 2008 ranged from 0 to 62.68 mg/kg at those locations where no NAPL was observed. The maximum PAH concentration at the upgradient background location was 2.87 mg/kg.

Analysis of toxicity data, PAH data and benthic macroinvertebrate sampling and analysis data indicates that the surficial sediments, other than those locations within 15-20 feet of the bulkhead in the lock approach where NAPL was observed, are not toxic.

1.4 Remediation Work Plan Organization

In addition to Section 1.0 – Introduction, the RD Work Plan includes the following sections:

Section 2.0 – OU-3 Remedial Design Activities, provides the information necessary for preparing the remedial design and the proposed remedial activities that will be performed to achieve the OU-3 remedial objectives.

Section 3.0 – OU-3 Pre-Design Investigation, describes the activities that will be performed to gather and evaluate the information needed for the OU-3 remedial design.

Section 4.0 – Sampling and Analysis Plan for Pre-Design Investigation Activities, describes the methods, procedures, and testing that will be used to collect data during the pre-design field investigation.

Section 5.0 – Quality Assurance Project Plan for Pre-Design Investigation Activities, provides the procedures and methods that will be implemented to guarantee the accuracy of the data gathered during the pre-design field investigation.

Section 6.0 – Site Specific Health and Safety Plan, presents the procedures that will be followed to ensure the safety of field personnel and the community during the pre-design field investigation.

Section 7.0 – Preliminary Identification of Federal, Local, and State Permits Required for the OU-3 Remediation, describes the federal, state, and local permits that may be required for the Pre-Design Investigation and the OU-3 remedial action.

Section 8.0 – Remedial Design Schedule, provides a schedule for the OU-3 pre-design through the final remedial design as well as a draft schedule for the conceptual OU-3 remedial construction and OM&M activities.

Section 9.0 - References, provides the references used in preparing the RD Work Plan.

2.0 REMEDIAL DESIGN ACTIVITIES

2.1 General

This section presents the activities that will be performed to prepare the remedial design and obtain NYSDEC approval. Prior to design, a pre-design investigation will be performed to gather data. Detailed design of the OU-3 components will be initiated as soon as the data from the geotechnical testing, performed during the pre-design investigation, is received from the laboratory and evaluated. The design will be a two-step process with each step having a defined deliverable product, a review period, and a review meeting as part of the scope. The steps will include the preparation of a Preliminary Remedial Design Package and Final Remedial Design Package.

The remedial design is based on the selected remedy for the Troy (Smith Avenue) Former MGP Site OU-3, as presented in the March 2011 ROD. The elements of the selected remedy, as set forth in the ROD, are as follows:

1. *Removal of sediments containing separate phase coal tar from the lock area.*

2. *Removed sediment will be dewatered, amended as needed for moisture content, and subsequently transported off-site for appropriate treatment and/or disposal.*

3. *In the area of removal, the river bottom will receive a minimum two-foot thick layer of backfill satisfying the sediment criteria and suitable for benthic habitat.*

4. *Green remediation and sustainability efforts are considered in the design and implementation of the remedy to the extent practicable.*

2.2 OU-3 Remedial Design Packages

This section discusses the components of the Preliminary and Final Remedial Design Packages for the OU-3 construction. Discussion will be held prior to preparation of the Preliminary Remedial Design Package to solicit concerns and comment from the USACE.

2.2.1 Preliminary Remedial Design Package

The Preliminary Remedial Design Package (Preliminary Design Package) provides the basis for the OU-3 removal and restoration. The Preliminary Design Package will include:

- The results of the pre-design testing performed during the pre-design investigation;
- A description of the design criteria and objectives for the OU-3 remediation;
- A Table of Contents (TOC) for the specifications that will be prepared for the OU-3 construction. The Specifications will be prepared in accordance with the requirements of the Construction Specification Institute (CSI), 2004 Format;

- Preliminary drawings for the OU-3 construction; and
- Preliminary specifications for the major work components, including:
  - Summary of Work
  - General requirements
  - Sediment Dredging
- A Citizen Participation Plan
- A Contingency Plan

The Preliminary Design Package will be submitted to NYSDEC for review. A meeting (including representatives from National Grid's consultant, National Grid, and the NYSDEC) will be scheduled during NYSDEC's review. The completed Preliminary Remedial Design Package will be presented to the USACE for comment and discussion.

2.2.2 Final Remedial Design Package

The Final Remedial Design Package (Final Design Package) finalizes contract documents, drawings, and specifications. It also provides plans and estimates that, when combined with the contract documents, drawings, and specifications, develop a comprehensive bid package for OU-3 construction. The Final Design Package will be submitted to the NYSDEC in two phases. The first phase is the Draft Final Design Package. The Draft Final Design Package includes:

- The draft final contract documents, drawings, and specifications;
- A draft Site Management Plan detailing the operation, maintenance, and monitoring (OM&M) activities to be performed after OU-3 construction;
- A Construction Quality Assurance Project Plan (CQAPP) for sampling, analysis, testing, and monitoring during OU-3 construction activities;
- A generic Health and Safety Plan (HASP) for OU-3 construction activities;
- A draft schedule for OU-3 construction, O&M, and post-construction monitoring activities;
- A plan for the implementation of construction and construction oversight;
- A method for selecting the contractor to perform the OU-3 construction activities; and,
- A schedule for implementing these tasks.

It is anticipated that the Final Design Package will include the following specifications and drawings:

Specifications	
Acronyms and Abbreviations	Field Engineering
Summary of Work	Pre-mobilization and Pre-construction conferences
Health and Safety Requirements	Project Progress Meetings
Submittals	Record Drawings
Resuspension/Contaminant Migration Control and Monitoring	Construction Quality Control
Excavation (Dredging)	Measurement and Payment
Vehicle and Equipment Decontamination	Backfill
Temporary Facilities, Utilities and Controls	Project Record Documents
Environmental Compliance and Materials Management	

Drawings:	Content:
Cover Sheet	Name of the project Name of the client Name of the company preparing the drawing
Index, General Notes, Legend, Abbreviations, and Site Maps	Index of drawings in the package General notes Legends for existing and proposed features Abbreviations A map showing the general area
Site Plan	A plan of the Site prior to construction that includes bathymetry, topography, utilities, structures, adjacent roads, etc.
Dredging Plan	Plan showing horizontal extent of dredging limits
Dredging Sections and Details	Cross sections and details of dredging limits Cross sections and details of backfill
Resuspension/Contaminant Migration Control and Monitoring Plan	Notes Control and Monitoring features General construction activities

Preparation of the Draft Final Design Package will begin while the Preliminary Design Package is being reviewed by NYSDEC. A meeting (including representatives from Tetra Tech EC, National Grid, USACE, and NYSDEC) will be scheduled during NYSDEC's review of the Draft Final Design Package. The final Contract Drawings and the Final Design Package will be signed and sealed by Professional Engineers licensed in the State of New York in the relevant disciplines.

2.3 Preparation of Biddable Remediation Plans

Biddable quality documents will be prepared for the implementation of the remedial design, including, but not limited to, documents and specifications prepared, signed, and sealed by a Professional Engineer licensed in the State of New York. These plans shall satisfy applicable local, state, and federal laws, rules, and regulations. The major components of the biddable documents will be the Remedial Design Specifications and Drawings prepared as part of the Final Remedial Design Package described above.

2.4 OU-3 Remedial Action Components

The OU-3 project objectives include removal of sediments containing separate phase coal tar from the lock area; dewatering and amendment of removed sediment as needed for moisture content; subsequent transport of dewatered/amended sediment off-site for appropriate treatment and/or disposal; placement of a two-foot thick layer of backfill in the area of removal, satisfying the sediment criteria and suitable for benthic habitat; and consideration of using green remediation and sustainability efforts in the design and implementation of the remedy to the extent practicable.

This section discusses the proposed OU-3 construction activities that will be implemented to achieve the project objectives. The actual OU-3 construction activities will be finalized after the pre-design investigation and will be detailed in the Preliminary Remedial Design Package.

2.4.1 Site Preparation Activities

The Site will be prepared prior to the commencement of OU-3 remediation activities. Site preparation activities are expected to include, but not be limited to, the following:

- Mobilization of personnel, equipment, supplies, and materials to the Site;
- Utility mark-out;
- Installation of site control measures (*i.e.*, barricades, warning signs, caution tape, etc.) to maintain the safety of the public and prevent unauthorized access to the work areas and the Site;
- Installation of temporary facilities including field offices, equipment storage, decontamination pad and associated facilities, health and safety storage, stockpiling and material storage areas, fences, and barriers; and
- Demarcation of exclusion zones, contaminant reduction zones, and support zones as required in the Site-specific Health and Safety Plan.

2.4.2 Removal of Sediment

The removal of sediments observed to contain NAPL, within the lock approach, from the shoreline to the guide wall, approximately 80 feet west of the bulkhead wall. Although NAPL has only been observed within 40 feet of the bulkhead, limited sampling was conducted from 40 to 80 feet west of the bulkhead, therefore, that sediment will be removed from the bulkhead west to the lock approach guide wall, a distance of 80 feet. The estimated volume of sediments to be removed is 4,000 yd^3. The average depth of the sediment in the area to be dredged is approximately 6 feet (to top of bedrock).

2.4.3 Disposal of Dredged Sediment

The dredged sediments would be dewatered and amended as-needed for moisture content, and subsequently transported to a commercial thermal desorption facility and/or non-hazardous landfill for treatment/disposal in accordance with applicable rules and regulations. Any hazardous materials encountered would be managed in accordance with the appropriate protocols for these materials (*e.g.,* thermal treatment).

2.4.4 Backfill of Dredged Area

A two-foot thick layer of backfill will be placed in the area of removal. The final backfill thickness will be determined by existing conditions, providing a suitable depth and composition for benthic habitat, and USACE requirements for the area. The backfill placed will satisfy the sediment criteria and be suitable (e.g., proper grain size distribution for benthic habitat).

3.0 OU-3 PRE-DESIGN INVESTIGATION

3.1 General

A pre-design investigation will be performed to gather data that will be used in preparing the OU-3 remedial design. The pre-design investigation will include collection of sediment samples and flow measurements. The data collected during the pre-design investigation will be used in conjunction with previously collected data in development of the design.

Sediment samples will be collected for a dewatering pilot study, and to obtain waste characterization data for disposal of the dewatered sediment and the free water removed from the sediment. Flow measurement as well as grain size data collected during the Remedial Investigation will be used to determine the backfill composition.

Discussions will be held with the USACE prior to initiating the Pre-Design Investigation to solicit input and comment on the sediment core locations and details of the investigation.

3.2 Sediment Cores

National Grid's consultant will complete sediment cores at approximately six (6) locations along the eastern shore of the Hudson River, within the lock approach. Cores will be collected from areas that are both impacted and unimpacted by NAPL. Based on input from the USACE, sediment borings will not be located within 75 feet of the entrance to the lock. Figure 10 shows general locations for the six sediment cores; the actual locations will be determined in the field, in conjunction with NG and NYSDEC.

The sediment cores will be completed to collect sediment for a dewatering pilot test, and to obtain media for analysis for waste characterization. The analyses will be conducted in accordance with the QAPP. Cores will be logged, and screening will be conducted in accordance with the generic QAPP and FSP.

3.3 Dewatering and Waste Characterization

The sediment collected from the cores will be used to conduct a dewatering pilot test. The collected sediment will be segregated into NAPL impacted and non-NAPL impacted sediment, and dewatering of each if these two types of sediment will be conducted using appropriate technologies. Samples of the dewatered sediment and the water from these processes will be submitted to an accredited laboratory for waste characterization analysis. This analytical data will be used to determine the appropriate treatment and handling of the sediment and water generating during the dredging activities.

LABORATORY ANALYSIS PROGRAM

Matrix	No. of Samples	Parameter	Analytical Method
Sediment & Water	3	TCLP Volatiles	1311/8260B
Sediment & Water	3	TCLP Semivolatiles	1311/8270C
Sediment & Water	3	TCLP Pesticides	1311/8081A
Sediment & Water	3	TCLP Herbicides	1311/8151A
Sediment & Water	3	TCLP Metals	1311/6010B
Sediment & Water	3	Corrosivity	9040C/9045D and SM4500-H B-00
Sediment & Water	3	Reactivity	9030B/9012B
Sediment & Water	3	Toxicity	9020
Sediment & Water	3	Ignitability	130/1010A
Sediment & Water	3	TPH	EPA 1664
Water	3	% Solids	SM 2540 B

3.4 Current Meter Deployments

Data logging current meters will be deployed at each of the locations identified on Figure 10 for the duration of the field program (or at least three tidal cycles). The meters will be deployed at the nine locations shown on Figure 11. The current meters will be configured to measure a current profile, to obtain the most representative velocity at varying depths, particularly immediately above the substrate. Meters will record current speed and direction at a minimum of 10-minute intervals throughout the duration of the deployment.

4.0 SAMPLING AND ANALYSIS PLAN FOR PRE-DESIGN INVESTIGATION ACTIVITIES

A Sampling and Analysis Plan (SAP) has been prepared for the OU-3 pre-design investigation activities discussed in Section 3.0. The SAP includes:

- The locations and procedures that will be used to collect the sediment samples;
- The methods and equipment that will be used to classify and screen the soil samples; and
- Procedures for managing waste generated during the field investigation.

The SAP for the pre-design investigation is included in Appendix B.

5.0 QUALITY ASSURANCE PROJECT PLAN FOR PRE-DESIGN INVESTIGATION ACTIVITIES

A Quality Assurance Project Plan (QAPP) has been prepared for the OU-3 pre-design investigation activities. The QAPP includes:

- The organization for the field investigation and the responsibilities of the personnel performing the investigation;
- QA objectives for the measurement of the data;
- Procedures for collecting, handling, and tracking the samples;
- Quality Audits;
- Preventative measure procedures; and
- Corrective action.

The QAPP for the pre-design investigation is included in Appendix C.

6.0 SITE SPECIFIC HEALTH AND SAFETY PLAN

A site specific Health and Safety Plan (HASP) has been prepared for the OU-3 pre-design investigation activities. The HASP includes:

- The organization for the investigation and the responsibilities of project personnel;
- The site history and description of the project;
- A discussion of the potential chemical, biological, and physical hazards on the site;
- Activity Hazard Analyses (AHAs) for the project tasks;
- A discussion on the requirements and use of Personal Protective Equipment;
- Air monitoring;
- Establishing work zones;
- Medical surveillance procedures;
- An Emergency Response Plan; and
- Tracking and Records Keeping.

The HASP for the pre-design investigation is included as Appendix D.

A separate site-specific Health and Safety Plan for the OU-3 remediation activities will be prepared to address the health and safety of on-site workers, visitors, and the surrounding public during remedial construction. The Health and Safety Plan will be prepared in accordance with applicable Federal, State, and Local requirements including, but not limited to, the requirements of the Occupational Safety and Health Administration (OSHA). Upon selection of a remediation contractor for the OU-3 remediation activities, the remediation HASP will be prepared. The HASP will reflect the execution of excavation activities within an enclosed temporary structure, if feasible.

7.0 PRELIMINARY IDENTIFICATION OF FEDERAL, LOCAL, AND STATE PERMITS REQUIRED FOR THE OU-3 REMEDIATION

7.1 Pre-Design Investigation Permits

No permits will be required to complete the pre-design investigation.

7.2 OU-3 Remediation Permits/Compliance with Substantive Permit Requirements

The permits and agreements referred to in this section are based on the proposed OU-3 remedial action activities described in Section 2.0. These remedial actions include:

7.2.1 State Permits

Dredging of an approximately 200 feet by 80 feet portion of the Hudson River adjacent to the Site may require meeting the substantive aspects of the following certification or regulatory programs:

- 6 NYCRR Parts 608 -Use and Protection of Waters
- State Pollutant Discharge Elimination System (SPDES) - There is an exception from the SPDES permit requirement for "dredged or fill material discharged into navigable waters" in 6 NYCRR Part 751.3(a)(6). Discharges that do not require a SPDES permit are regulated under a 401 Water Quality Certificate.
- Clean Water Act (CWA) § 401 Water Quality Certification

7.2.3 Federal Permits

Remedial activities will occur within the floodplain of the Hudson River. Therefore, federal floodplain management permits may be required. The applicable regulations for this work may include:

- Section 404 of the Clean Water Act;
- Section 10 of the Rivers and Harbor Act ;

The proposed activities would most likely be authorized under a Nationwide General Permit, NWP # 38 Cleanup of Hazardous and Toxic Waste. However, since dredging would entail greater than 25 cubic yards, an individual permit could be required.

8.0 REMEDIAL DESIGN SCHEDULE

This section provides the schedules for the OU-3 remedial design and the preliminary schedule for the OU-3 remediation activities.

8.1 Remedial Design Schedule

The remedial design schedule for OU-3 is included as Figure 11. This schedule tracks project tasks from the submittal of this RD Work Plan through submittal the Final Design Package.

8.2 Preliminary Remedial Construction Schedule

The preliminary remedial construction schedule for OU-3 is included as Figure 12. This schedule tracks project tasks from permit preparation and contractor procurement (based on the approved Final Design Package) through mobilization for the remedial activities. This schedule is identified as "Preliminary" because the OU-3 remedial design will not be finalized until after the pre-design investigation. This schedule assumes that the stabilization of the existing bulkhead wall will be completed in 2012-2013. The schedule may be modified based on the pre-design investigation results.

It is assumed that no post-construction requirements are necessary for this remedial design/action.

9.0 REFERENCES

Foster Wheeler Environmental Corporation, 1998, *Remedial Investigation Report for the Troy (Smith Avenue) Site,* May 1998.

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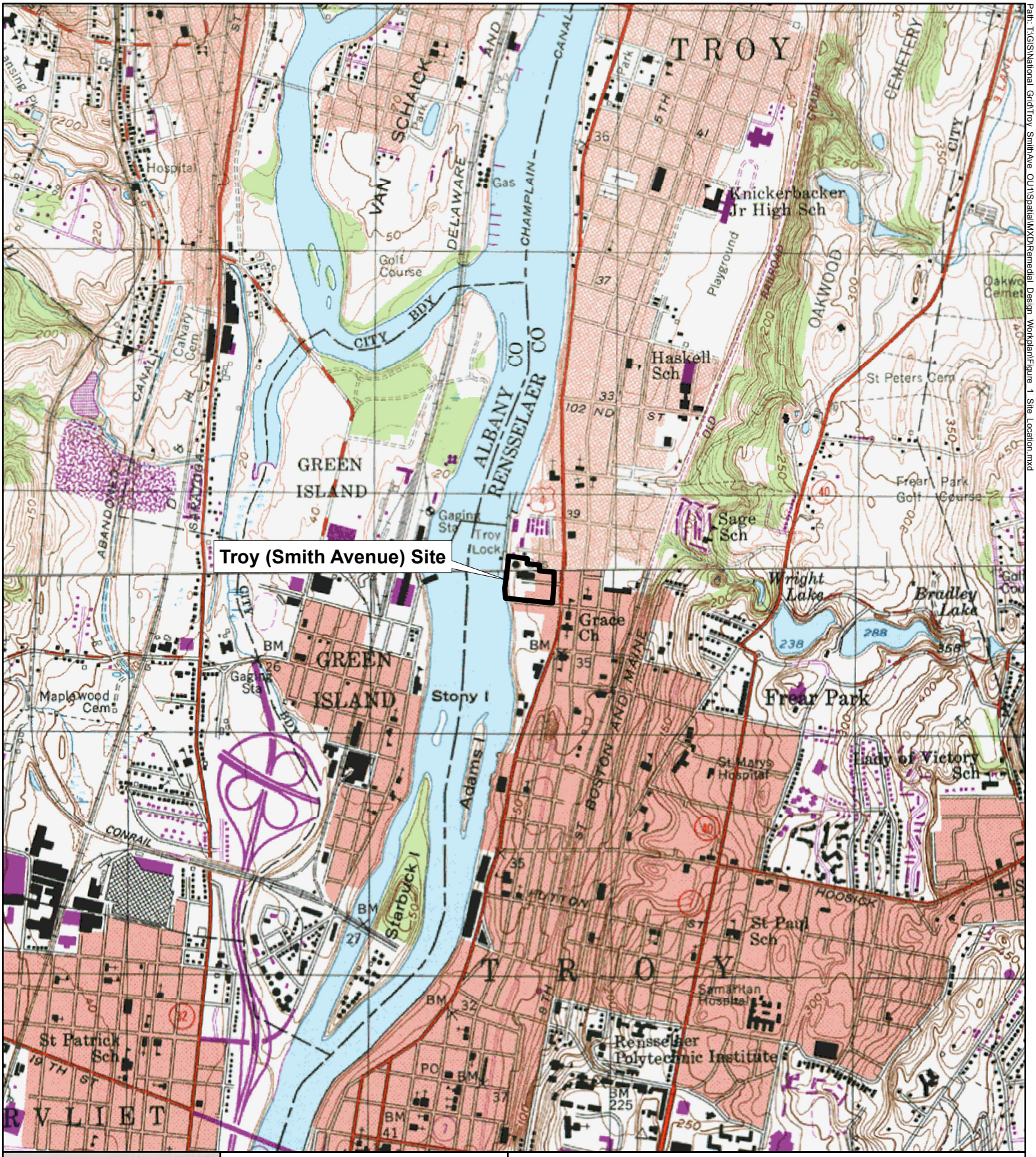
FIGURES



Miles
0 0.25 0.5

Source: USGS Quadrangle
Troy North 1954 & Troy South 1953.

TETRA TECH

FIGURE 1

Site Location Map
Remedial Design Workplan
Troy (Smith Avenue) Site - OU-3

Path: T:\GIS\National_Grid\Troy_SmithAve_OU1\Spatial\MXD\Remedial_Design_Workplan\Figure_1_Site_Location.mxd

NOTES:

2007 Natural color ortho imagery:
NYS GIS Clearinghouse

OU-3 consists of the Hudson River sediments in the vicinity of the Troy (Smith Avenue) Site.

0 100 200
Feet

Legend

Cross Sections
- A - A'
- B - B'
- C - C'

- RI SAMPLE LOCATIONS
- 2006 SAMPLE LOCATIONS
- 2007 SAMPLE LOCATIONS
- OPERABLE UNITS

TETRA TECH

FIGURE 2

SITE MAP

TROY (SMITH AVE.) OU-3
TROY, NY

Path: T:\GIS\National_Grid\Troy_SmithAve_OU1\Spatial\MXD\Remedial_Design_Workplan\Figure_2_Site_Map\v10\Figure_2_Site_Map.mxd

A
NORTH

A'
SOUTH

MEAN SEA LEVEL ELEVATION (MSL)

−18
−19
−20
−21
−22
−23
−24
−25
−26
−27
−28
−29
−30
−31
−32
−33

V−11
[15.2]
[7.4]
V−1
TS−02
V−2
V−3
TS−04
V−4
V−5
SEDIMENT SURFACE
[279.2/874.5]
BEDROCK
BEDROCK

LEGEND

DENSE SAND/SILT MIX WITH FREQUENT AMOUNTS OF GRAVEL

LOOSE FINE TO COARSE SAND/GRAVEL WITH VARYING AMOUNTS OF SILT AND ORGANIC MATTER

WEATHERED SHALE

SILT WITH VARYING AMOUNTS OF SAND, GRAVEL AND ORGANIC MATTER

LOOSE FINE TO MEDIUM SAND, LITTLE SILT AND GRAVEL

NAPL SATURATION & NAPL GLOBULES IN SEDIMENT CORES

TRACE SHEEN

BORING

INFERRED CONTACT

CONTACT

[TOTAL PAH_{16} /PAH_{34} CONCENTRATIONS IN PPM]

0 20 40
SCALE IN FEET

TETRA TECH EC, INC.

TITLE:
Cross Section A–A'

Troy (Smith Ave.) Former MGP Site

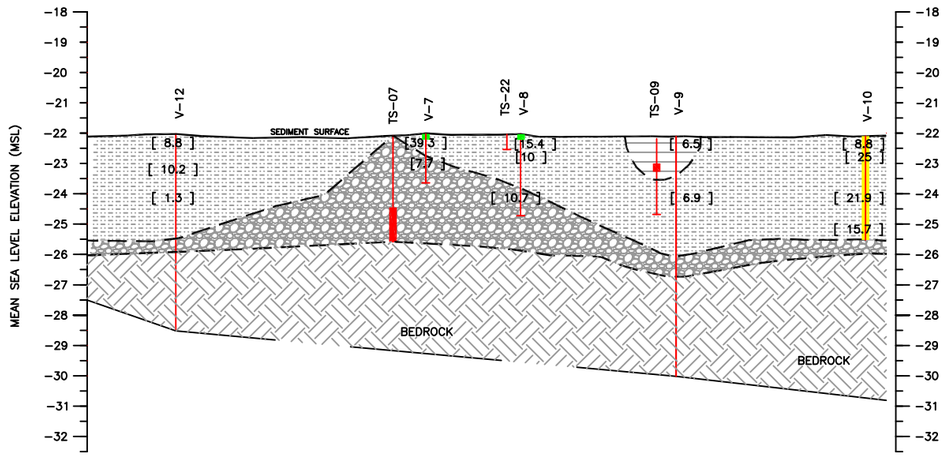
DWN.: DB/FGM	DATE: 03/04/08	PROJECT NO.:	
CHKD: RC	DRAFT: 2	FIGURE NO.: 3	
DES.: CJ	APPD: RC		

P:\Troy-Smith Avenue Former MGP Site\CAD - GIS\OU-3 Feasibility Study\DWG\2907Troy-OU-3 FIG3 AND 5-CROSS_SECTION_AA_CC.dwg, 7/20/2011 11:09:32 AM

B

NORTH

B’



LEGEND

- DENSE SAND/SILT MIX WITH FREQUENT AMOUNTS OF GRAVEL
- LOOSE FINE TO COARSE SAND/GRAVEL WITH VARYING AMOUNTS OF SILT AND ORGANIC MATTER
- WEATHERED SHALE
- CLAY WITH SLIT
- SILT WITH VARYING AMOUNTS OF SAND, GRAVEL AND ORGANIC MATTER
- NAPL SATURATION & NAPL GLOBULES IN SEDIMENT CORES
- TRACE SHEEN
- SHEEN
- BORING
- INFERRED CONTACT
- CONTACT

[TOTAL PAH_{16} /PAH_{34} CONCENTRATIONS IN PPM]

0 40 80

SCALE IN FEET

TETRA TECH EC, INC.

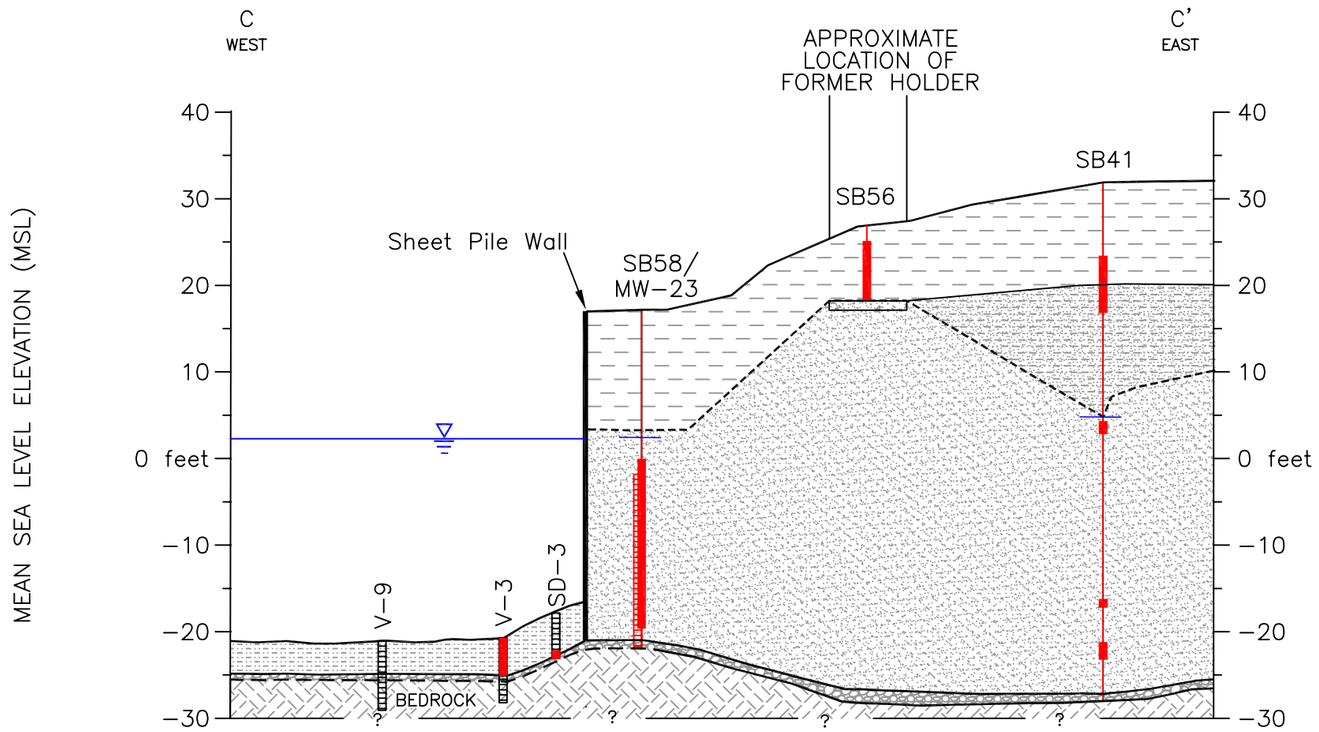
TITLE:

Cross Section B–B’

Troy (Smith Ave.) Former MGP Site

DWN.:	DATE:	PROJECT NO.:
DB/FGM	03/04/08	
CHKD:	DRAFT:	
RC	2	FIGURE NO.:
DES.:	APPD:	4
CJ	RC	

P:\Troy-Smith Avenue Former MGP Site\CAD - GIS\OU-3 Feasibility Study\DWG\2907Troy-OU-3 FIG4_4A-CROSS_SECTION_BB.dwg, 7/20/2011 11:22:43 AM



LEGEND

- FILL – FINE TO COARSE SAND WITH VARYING AMOUNTS OF SILT AND GRAVEL
- GLACIAL/FLUVIAL, OUTWASH DEPOSITS – FINE TO COARSE SAND AND GRAVEL WITH TRACE AMOUNTS OF SILT
- SOFT CLAYEY SILT WITH TRACE AMOUNTS OF GRAVEL
- FINE TO COARSE SAND AND GRAVEL WITH VARYING AMOUNTS OF SILT
- LOOSE SANDY SILT/SILTY SAND WITH VARYING AMOUNTS OF GRAVEL AND WOOD FRAGMENTS
- WEATHERED SHALE
- NAPL SATURATION & NAPL GLOBULES
- DEPTH AT WHICH SATURATED SOILS WERE OBSERVED
- BORING
- SCREEN INTERVAL
- SEDIMENT BORING
- APPROXIMATE 2006 WATER LEVEL
- CONTACT
- INFERRED CONTACT

NOTES:

1. V-3 LOCATED APPROXIMATELY 15 WEST OF BULKHEAD.
2. V-9 LOCATED APPROXIMATELY 37 FEET WEST OF BULKHEAD.

TETRA TECH EC, INC.

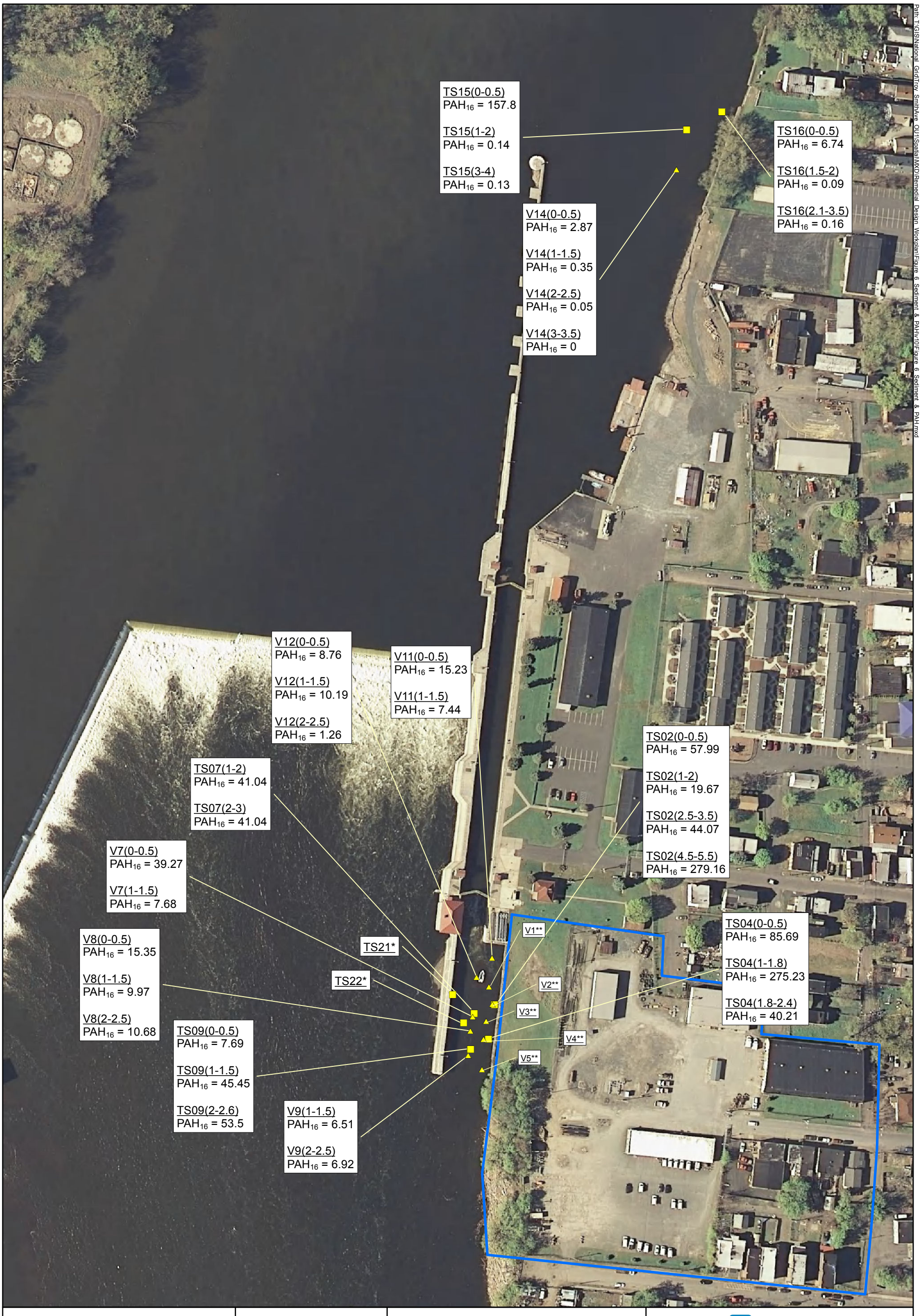
TITLE:

Cross Section C–C'

Troy (Smith Ave.) Former MGP Site

DWN.: DB/FGM	DATE: 03/04/08	PROJECT NO.:	
CHKD: RC	DRAFT: 2	FIGURE NO.: 5	
DES.: CJ	APPD: RC		

P:\Troy-Smith Avenue Former MGP Site\CAD - GIS\GEOTECH REPORT\DWG\29070001FIG3 AND 5-CROSS_SECTION_AA_CC.dwg



NOTES:

- PAH CONCENTRATIONS IN mg/kg
- ** NO SAMPLE COLLECTED FOR PAH ANALYSIS DUE TO THE PRESENCE OF NAPL
- PAH ANALYSIS PERFORMED BY NYSDOH CERTIFIED LABORATORIES

0 100 200
Feet

Legend

- 2006 SAMPLE LOCATIONS
- 2007 SAMPLE LOCATIONS
- TROY SMITH AVE. OU-1

TETRA TECH

FIGURE 6

SEDIMENT SAMPLE LOCATIONS AND ASSOCIATED PAH CONCENTRATIONS WITHIN REMOVAL AREA AND AT BACKGROUND LOCATIONS

TROY (SMITH AVE.) OU-3
TROY, NY

TS15
Tox

TS16
Tox

TS02
Tox+

TS09
Tox

TS04
Tox+

OU-3

OU-1

NOTES:

Tox - Tox - SAMPLES COLLECTED FOR TOXICITY ANALYSIS AND WAS NOT TOXIC TO *H.azteca*

Tox+ - Tox+ - SAMPLES COLLECTED FOR TOXICITY ANALYSIS AND WAS TOXIC TO *H.azteca*

0 100 200
Feet

Legend

- 2006 SAMPLE LOCATIONS
- 2007 SAMPLE LOCATIONS

TETRA TECH

FIGURE 7

TOXICITY SAMPLE RESULTS
WITHIN REMOVAL AREA AND AT BACKGROUND LOCATIONS

TROY (SMITH AVE.) OU-3
TROY, NY

NOTES:

- (0-1) - INTERVAL BELOW TOP OF SEDIMENT

0 100 200
Feet

Legend

- 2006 SAMPLE LOCATIONS
- 2007 SAMPLE LOCATIONS
- NAPL
- Sheen or Trace Sheen
- None

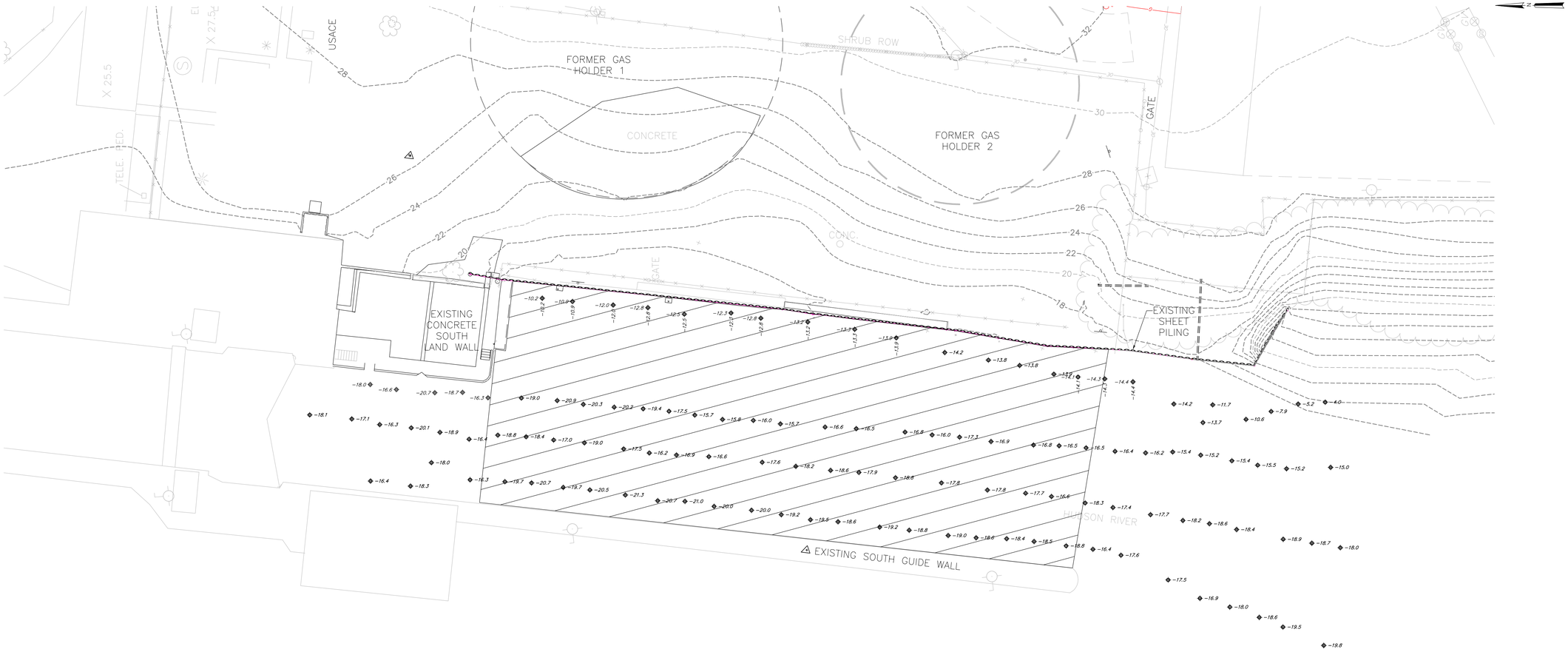
TETRA TECH

FIGURE 8

OBSERVED OCCURRENCE OF
NAPL AND SHEENS IN SEDIMENT
WITHIN REMOVAL AREA AND AT BACKGROUND LOCATIONS

TROY (SMITH AVE.) OU-3
TROY, NY

Path: T:\GIS\National Grid\Troy Smith Ave OU1\Spatial\MXD\Remedial Design Workplan\Figure 8 NAPL Sheen\V10\Figure 8 NAPL Sheen.mxd



LEGEND

PROPOSED AREA OF DREDGING

20 0 20 40

GRAPHIC SCALE IN FEET

Source:

1. Base map adapted from Niagara Mohawk Drawing No. D-31434-E, Index 21.0-R1.16-M49, dated 9/8/94.
   Primary survey control for photogrammetric mapping was established from an on-the-ground survey, performed on 5/24/94 using the global position system (GPS) and conforms to Order 2, Class 2 FGCS accuracy specifications.
   The horizontal reference datum North American Datum of 1983 (NAD 83) is based on a reference elipsoid associated with the Geodetic Reference System of 1980 (GRS 80).
   Coordinates are based on the New York State Plan Geodetic System of 1983 (East Zone 3101). Geodetic coordinates from least squares, fully constrained. Adjustment of the primary control network tied to monuments 186, Van Rensselaer Reset and 851 8995 D Tidal.
   Reference materials included Tax Map, City of Troy, Rensselaer County, N.Y. SH 090.62 and NYP&L Corp. Maps - Land and Land Rights, SH 925-7 and 1025-1.
   Additional survey work, including supplemental sample location information, was performed by Creighton Manning Engineering, LLP from September through December 2004.
2. Creighton Manning Engineering, LLP. Vertical datum for the site is NGVD29.
3. Rettew Associates performed ground survey to obtain data required for OU-3.
4. The existing conditions map incorporates base map provided by Niagara Mohawk and survey performed by Rettew Associates.
5. Bathymetry provided by USACE.

BRIAN M. SIELSKI
NEW YORK PROFESSIONAL ENGINEER
LIC. NO. 084250-1

REV	DESCRIPTION	DRN	DES	CHK	APR	DATE

DESIGNED BY: BS
DRAWN BY: DL
CHECKED BY: RC
APPROVED BY: BS
DATE: 8-2-11

TETRA TECH ENGINEERING CORPORATION PC
1000 THE AMERICAN ROAD
MORRIS PLAINS, NJ 07950
TEL: (973) 630-8080

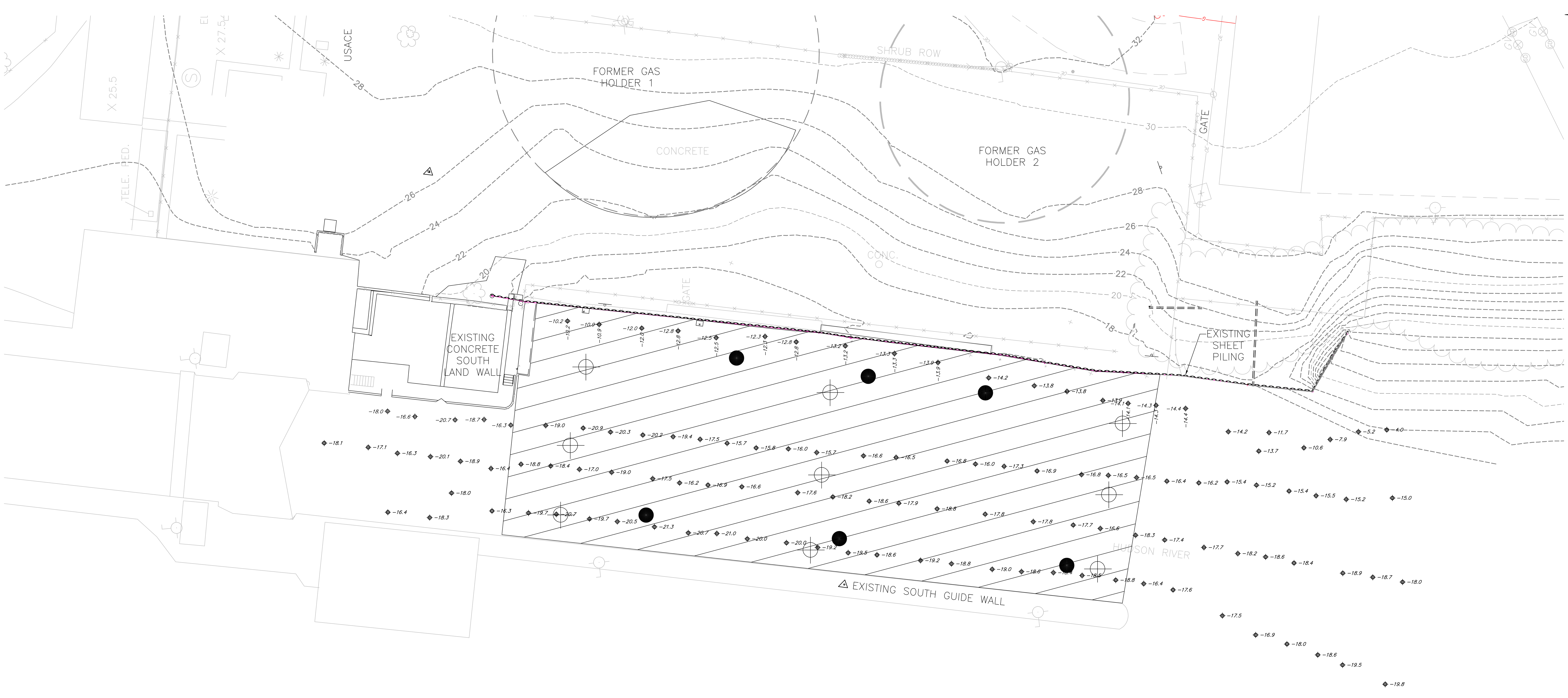
TROY-SMITH AVENUE FORMER MGP SITE
OPERABLE UNIT NO. 3

NATIONAL GRID
TROY-SMITH AVENUE FORMER MGP SITE
OPERABLE UNIT NO. 3

FIGURE 9
REMEDIATION PLAN

CONTRACT NO.: 106-2907
SPEC. NO.:
SCALE: AS NOTED
CAD FILE: 2907TROY-OU-3 SITE LAYOUT-REV-0.DWG
SHEET 1 OF 1
SIZE: ARCH D
REV: 0

P:\Troy-Smith Avenue Former MGP Site\CAD - GIS\OU-3 Feasibility Study\DWG\2907Troy-OU-3 SITE LAYOUT-REV-0.dwg



LEGEND

PROPOSED AREA OF DREDGING

PROPOSED SEDIMENT CORE LOCATIONS

PROPOSED FLOW METER LOCATIONS

20 0 20 40

GRAPHIC SCALE IN FEET

Source:

1. Base map adapted from Niagara Mohawk Drawing No. D-31434-E, Index 21.0-R1.16-M49, dated 9/8/94.
   Primary survey control for photogrammetric mapping was established from an on-the-ground survey, performed on 5/24/94 using the global position system (GPS) and conforms to Order 2, Class 2 FGCS accuracy specifications.
   The horizontal reference datum North American Datum of 1983 (NAD 83) is based on a reference elipsoid associated with the Geodetic Reference System of 1980 (GRS 80).
   Coordinates are based on the New York State Plan Geodetic System of 1983 (East Zone 3101). Geodetic coordinates from least squares, fully constrained. Adjustment of the primary control network tied to monuments 186, Van Renselaer Reset and 851 8995 D Tidal.
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5. Bathymetry provided by USACE.

BRIAN M. SIELSKI
NEW YORK PROFESSIONAL ENGINEER
LIC. NO. 084250-1

REV	DESCRIPTION	DRN	DES	CHK	APR	DATE

DESIGNED BY: BS
DRAWN BY: DL
CHECKED BY: RC
APPROVED BY: BS
DATE: 8-2-11

TETRA TECH ENGINEERING CORPORATION PC
1000 THE AMERICAN ROAD
MORRIS PLAINS, NJ 07950
TEL (973) 630-8000

TROY-SMITH AVENUE FORMER MGP SITE
OPERABLE UNIT NO. 3

NATIONAL GRID
TROY-SMITH AVENUE FORMER MGP SITE
OPERABLE UNIT NO. 3

FIGURE 10
PROPOSED SAMPLING LOCATIONS

CONTRACT NO.: 106-2907
SPEC. NO.:
SCALE: AS NOTED
CAD FILE: 2907TROY-OU-3 FIGURE 10 REV-0.DWG
SHEET 1 OF 1
REV. 0
SIZE: ARCH D

P:\Troy-Smith Avenue Former MGP Site\CAD - GIS\OU-3 Feasibility Study\DWG\2907Troy-OU-3 figure 10 REV-0.dwg

APPENDICES

APPENDIX A

STANDARDS, CRITERIA, AND GUIDANCE (SCGS)

TABLE 1
CHEMICAL-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
STATE				
Inactive Hazardous Waste Sites	Program for designating and managing inactive hazardous waste sites	Article 27, Title 13	Establishes general cleanup goals for environmental media to levels that will eliminate a significant threat to the environment. This allows NYSDEC to designate inactive hazardous waste disposal sites.	Sites are listed based on evidence of a significant threat posed by hazardous waste disposed of at the site. A significant adverse impact on the environment and/or a significantly increased risk to human health would constitute a significant threat. The Troy (Smith Ave.) site is classified as an Inactive Hazardous Waste Site.
Sediment Cleanup Goals	Draft DER-10 Technical Guidance for Site Investigation and Remediation. December 2002	DER-10, Section 4.1 - December 2002,	Guidance document developed by NYSDEC for implementing the Site Investigation and Remediation process.	Guidance for development of remedial action objectives.
	Division of Environmental Remediation, Environmental Remediation programs,	6 NYCRR Part 375-2.8(a)	Guidance document developed by NYSDEC for the development and implementation of remedial programs for inactive hazardous waste sites.	Guidance for development of remedial action objectives.

TABLE 2 (Sheet 1 of 7)
ACTION-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
FEDERAL				
Generation, Management, and Treatment of Hazardous Waste	Resource Conservation and Recovery Act (RCRA) Subtitle C - Hazardous Waste Management Identification and Listing of Hazardous Wastes	40 U S C Section 6901 et seq. 40 CFR Part 261	Outlines criteria for determining if a solid waste is a hazardous waste and is subject to regulation under 40 CFR Parts 260-266	These regulations do not set clean-up standards, but would apply to the classification of all impacted material and residual waste streams generated during remedial activities.
	Hazardous Waste Determinations	40 CFR Part 262.11	Generators must characterize their wastes to determine if the waste is hazardous by listing (40 CFR 261, Subpart D) by characteristic (40 CFR 261, Subpart C) or excluded from regulation (40 CFR 261.4)	Dredged material may be classified as characteristic or listed hazardous wastes. By-products or residues from the treatment of contaminated sediments and water must also be characterized.
	Manifesting	40 CFR 262, Subpart B	Generators must prepare a Hazardous Waste Manifest (EPA form 8700-22) for all off-site shipments of hazardous waste to disposal or treatment facilities	Will apply to all off-site shipments of RCRA/NYSDEC hazardous wastes.
	Recordkeeping	40 CFR 262.40	Generators must retain copies of all hazardous waste manifests used for off-site disposal	Generator must retain copies of waste manifests for a minimum period of three years after shipment date.

TABLE 2 (Sheet 2 of 7)
ACTION-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
Generation, Management, and Treatment of Hazardous Waste (cont'd)	Labeling and Marking	40 CFR 262, Subpart C	Species EPA marking, labeling and container requirements for off-site disposal of hazardous waste	Pre-transportation requirements for off-site shipments of hazardous wastes.
	Accumulation Limitations	40 CFR Part 262.34	Allows generators of hazardous waste to store and treat hazardous waste at the generation site for up to 90 days in tanks, containers, and containment buildings without having to obtain a RCRA hazardous waste permit.	Hazardous wastes may be stored for up to 90 days on-site without the need for a storage permit unless NYSDEC waives the 90-day limit as an administrative requirement.
	Standards for Owners/Operators of Hazardous Waste Treatment, Storage, Disposal (TSD) Facilities General Facility Standards	40 CFR Part 264/265 Subpart B	General requirements for owners/operators of TSD facilities including general waste analysis and compatibility, notices and inspection requirements, location and construction standards, and security	These subpart standards would be applicable to the on-site management of hazardous waste sediments in tanks, containers or containment buildings.
	Closure and Post-Closure	Subpart G	Established closure and post-closure requirements for hazardous waste treatment and storage units	

TABLE 2 (Sheet 3 of 7)
ACTION-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
	Container Management	Subpart I	Hazardous waste stored in containers must comply with management requirements, including types of containers used, waste compatibility and inspection requirements.	Applicable to storage and/or treatment of hazardous wastes in containers on-site.
	Tank Systems	Subpart J	Tank systems for the treatment or storage of hazardous wastes are to be designed and operated in a manner to prevent releases to the environment	Applicable for the tank treatment and/or storage of all site generated wastes classified as a hazardous waste.
	Containment Buildings	Subpart DD	Containment buildings must be designed, constructed, and operated to meet regulatory performance standards	Standards applicable to the construction of containment buildings used to treat and/or store hazardous waste.
Capping of Hazardous Waste	RCRA Subtitle C Standards for Capping Surface Impoundments Waste Piles Landfills	40 U S C Section 6901 et seq. 40 CFR Part 264/265 Subpart K Subpart L Subpart N	Regulations governing placement of caps or similar barriers over hazardous waste. Requirements for installation, permeability, maintenance of cover, elimination of free liquids or solidification, run-on/run-off damage control, and post-closure use of property	Requirements potentially applicable to the upland disposal of hazardous waste sediment.
Capping of Non-Hazardous Waste	RCRA Subtitle D Criteria for Classification of Solid Waste Disposal Facilities	42 U S C Section 6901 et seq. 40 CFR Part 257	Minimum criteria for siting, construction, operation, and closure of solid waste disposal facilities. Each State is to develop, permit, and enforce a solid waste management program based on USEPA requirements	Requirements potentially applicable to the on-site disposal of contaminated material and the upland disposal of any associated residual waste streams.

TABLE 2 (Sheet 4 of 7)
ACTION-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
Water Quality Impacts	Clean Water Act	33 U S C Section 1251-1376		
	Ambient Water Quality Criteria Guidelines	40 CFR Part 131	Establishes toxicity-based surface water quality criteria for protection of aquatic organisms and human health.	Ambient water quality criteria would be potentially applicable in establishing discharge standards for treated water.
	Wastewater Discharge Permits, Effluent Guidelines, Best Available Technology (BAT) and BMPPT	40 CFR Parts 122, 125, 401	Permit requirements for point source discharges to waters of the United States, establishes effluent standards and requirements for preventing toxic releases	Potentially applicable for remedial activities involving a direct wastewater discharge to nearby surface water and/or diversions/disruptions of the surface water flow of the river that would impact water quality.
Air Emissions from a Point Source	Clean Air Act (CAA)	40 U S C Section 7401-7642		
	National Ambient Air Quality Standards (NAAQS)	40 CFR Part 50	Establishes ambient air quality standards for protection of public health	NAAQS may be applicable in evaluating whether there are air impacts at the site during remedial activities.
	New Source Review (NSR) and Prevention of Significant Deterioration (PSD) Requirements	40 CFR Part 52	New Sources or modifications which emit greater than the defined threshold for listed pollutants must perform ambient impact analysis and install controls which meet best available control technology (BACT)	These regulations are potentially applicable and would require a comparison of potential emissions from the remedial activity to the emission thresholds for NSR.
	National Emission Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 61 40 CFR Part 63	Source-specific regulations which establish emissions standards for hazardous air pollutants (HAPs)	NESHAPs may be applicable if emissions from remediation activities exceed the thresholds for compliance.

TABLE 2 (Sheet 5 of 7)
ACTION-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
Transportation	Department of Transportation Regulations	49 CFR 107, 171-174 and 177-179	DOT requirements for hazardous waste transportation	Hazardous waste transport to off-site disposal facilities must be conducted in accordance with applicable DOT requirements.
Land Disposal of Hazardous Waste	RCRA Subtitle C Land Disposal Restrictions (LDRs)	40 U S C Section 6901 et seq. 40 CFR Part 268	Restricts land disposal of hazardous wastes that exceed specific criteria. Establishes Universal Treatment Standards (UTSs) to which hazardous wastes must be treated to prior to land disposal. Phase IV rule revision establishes Alternate Treatment Standards for Soils containing hazardous wastes.	Wastes exhibiting a hazardous characteristic would need to be treated to meet UTS for all hazardous constituents present in the sediment prior to any upland disposal. Characteristically hazardous material can be treated to meet the UTS standards or to meet the alternative treatment standards for RCRA hazardous material.

TABLE 2 (Sheet 6 of 7)
ACTION-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
STATE				
Generation, Management, and Treatment of Hazardous Waste	Siting of Industrial Hazardous Waste Facilities	6 NYCRR Part 361	Establishes procedures for selecting appropriate sites for hazardous waste facilities	These regulations are potentially applicable for remediation activities which would involve the construction of upland hazardous waste management facilities
	NYSDEC Division of Hazardous Substances Regulation Identification and Listing of Hazardous Wastes	6 NYCRR Part 371	Outlines criteria for determining if a solid waste is a hazardous waste and is subject to regulation under 6 NYCRR Parts 372-376	These regulations do not set clean-up standards, but would apply during the on-site management of excavated hazardous waste and the upland management of and residual waste streams generated during remediation activities.
	In Water and Riparian Management of Sediment and Dredged Material	TOGS 5.1.9	The document outlines recommended procedures to be followed during dredging and dredged material management in riparian or in-water locations.	This guidance is applicable for the removal of NAPL impacted sediments from OU-3.
	New York State Hazardous Waste Management Facility Regulations	6 NYCRR Part 370.373.372	Establishes New York State's USEPA equivalent hazardous waste management program. Includes regulations for hazardous waste facility construction, operation, and closure, and standards for hazardous waste generation, manifesting, and transport	[See RCRA Hazardous Waste Management Regulations. 40 CFR Parts 263 and 264/265 under Federal SCGs listed in this table]

TABLE 2 (Sheet 7 of 7)
ACTION-SPECIFIC SCGs

ACTION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
Disposal of Non-Hazardous Waste	New York State Solid Waste Management Facility Regulations	6 NYCRR Part 360, 364	Establishes New York State's USEPA equivalent solid waste management program. Includes regulations governing construction, operation, and closure of solid waste disposal facilities	These regulations are potentially applicable to remediation activities involving the upland management and disposal of non-hazardous wastes.
Water Treatment Discharge	New York State Regulations on the State Pollution Discharge Elimination System (SPDES)	6 NYCRR Parts 750-758	State Pollution Discharge Elimination System (SPDES) Permitting Requirements	May be applicable to discharge of treated water.
	New York State Water Classifications and Quality Standards	6 NYCRR Parts 701, 702, 704	Defines surface water classifications and ambient water quality standards that are the basis for establishing effluent limitations under the SPDES program.	The Hudson River is classified as a Class C water body.
	NYSDEC Ambient Water Quality Standards and Guidance Values	Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1	Provides a compilation of ambient water quality standards and guidance values for toxic and non-conventional pollutants for use in NYSDEC programs, including the SPDES permit program.	These standards and guidance values are applicable in establishing discharge limitations to surface waters.
Air Emissions	New York State Air Pollution Control Regulations	6 NYCRR Parts 120, 200-203, 207, 211, 211, 212, 219 Air Guide-1	Establishes emissions standards for new sources of air pollutants and specific contaminants.	Requirements would be applicable to remediation alternatives that result in emissions of air contaminants, including particulate matter.
	New York State Ambient Air Quality Standards	6 NYCRR Part 257	Establishes state ambient air quality standards and guidelines for protection of public health.	May be applicable in evaluating air impacts during remediation activities. Establishes short-term action limits for occupational exposure.

TABLE 3
LOCATION-SPECIFIC SCGs

LOCATION	REQUIREMENTS	CITATION	DESCRIPTION	COMMENT
FEDERAL				
Floodplains	Executive Order 11988 - Floodplain Management	40 CFR 6, Subpart A; 40 CFR 6.302	Activities taking place within floodplains must be done to avoid adverse impacts and preserve beneficial values in floodplains.	Activities may occur within the floodplain of the Hudson River.
Wetlands/Waters of the U.S.	Dredge and Fill in Wetlands and Navigable Waters	33 CFR Parts 320-330/40 CFR Part 230	Dredge or fill material into wetlands and navigable waters must be evaluated based on specific criteria.	Would be applicable to remediation activities impacting jurisdictional wetlands and the Hudson River.
	Minimum Draft in Navigable Watercourse	33 CFR 207.50 USACE Public Notice No. HR-AFO-09	Deep draft boats must clear the miter sills by at least three inches. The authorized depth of the Federal Navigation Channel from Dunn Memorial Bridge at Albany to the Federal Lock at Troy is 14 feet.	Backfill of sediment in removal areas would extend vertically only to draft requirements.
	Construction of structures in or over navigable waters	33 CFR 322 Section 10	Applicable to sheet piling within the Hudson River.	
	Clean Water Act	Section 404	Establishes permit requirements to regulate placement of fill and dredging in navigable waters.	Will provide requirements for dredging in the Hudson River.
Historic/Cultural Resources	National Historic Preservation act	16 USC 470	Establishes requirements for the identification and preservation of historic and cultural resources	Would be applicable to the management of historic or archeological artifacts identified on the site.
Critical Habitat	Endangered Species Act and Fish and Wildlife Coordination Act	16 USC 661 and 16 U.S.C. 1531	Actions must be taken to conserve critical habitat in areas where there are endangered or threatened species.	Requirements would be applicable if endangered or threatened species are identified on or adjacent to the site.
STATE				
Water Resources	Protection of Waters (Water Quality Certification)	6 NYCRR 608	Regulates removal or placement of fill materials within state waters.	Placement of fill materials and/or excavation of sediment within the Hudson River.
Floodplains	Floodplain Management Regulations	6 NYCRR Part 500	Establishes floodplain management requirements including limitations on projects, including placement of fill, which may result in an increase in flood levels or water surface elevations during a base flood discharge.	Remediation activities occur within the floodplain of the Hudson River.
Floodplain	TSD Facility Permitting Requirements	6 NYCRR Subpart 373-1	Facility must be designed and operated to avoid washout.	Requirements are potentially applicable to any upland treatment, storage or disposal of hazardous wastes within the floodplain of the Hudson River.

APPENDIX B

SAMPLING AND ANALYSIS PLAN (SAP)

DRAFT SAMPLING AND ANALYSIS PLAN
FOR PRE-DESIGN INVESTIGATION ACTIVITIES

for the

Troy (Smith Avenue) Former MGP Site
Operable Unit No. 3
Troy, NY

Prepared For:

nationalgrid

Prepared By:

TETRA TECH EC, INC.

SEPTEMBER 2011

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This Sampling and Analysis Plan (SAP) has been prepared to provide information on the investigation that will be performed at Operable Unit 3 (OU-3) of the Troy (Smith Ave) Site (the Site) in Troy, New York. This SAP is intended to specify procedures and protocols to be followed during the implementation of the sampling activities that will be conducted during the Pre-Design Investigation as specified in the Remediation Work Plan (RD Work Plan).

1 General Field Guidelines

1.1 Subsurface Utilities

The gas main crossing the river has been identified and mapped by Aqua Survey during previous investigations. National Grid will confirm that the configuration or location of this main has not been altered. Contingencies addressing these hazards are included in the site-specific Health and Safety Plan (HASP).

1.2 Equipment Decontamination

All equipment used in intrusive work will be scrubbed with a wire brush and an Alconox/water solution to remove dirt, grease, and oil before leaving the project Site upon completion of sampling activities. Decontamination water will be containerized on-site pending disposal during construction activities. Decontamination may be completed over buckets or plastic sheeting.

2 Sample Collection

2.1 Sediment cores

Sediment cores will be completed at approximately six (6) locations along the eastern shore of the Hudson River, within the lock approach. The sediment cores will be completed to collect sediment for a dewatering pilot test, and to obtain media for analysis for waste characterization. The analyses will be conducted in accordance with the QAPP.

At each of the sediment boring locations, three-inch diameter sediment cores will be collected using Vibracore™ or Pushcore drilling methods in accordance with NG's Generic Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP), where applicable, and standard drilling practices in the State of New York. The sediment cores will be extended to bedrock (or refusal), which, based on the previous sediment investigation, is anticipated to be encountered at less than 6 feet below the sediment surface.

Bulk samples will be collected for dewatering studies. The dewatered sediment and resulting removed liquid will then be submitted to a laboratory for waste characterization analysis, to consist of TCLP, RCRA characteristics, TPH, and % solids for the liquid fraction. The analyses will be conducted in accordance with the QAPP.

Cuttings and excess sediment generated during the core collection will be placed into drums. Decontamination liquids, generated during the field investigation, are assumed to be non-hazardous and will be stored in drums. The drums will be labeled and staged on-site. The IDW will be disposed of prior to or during remedial construction activities.

2.2 Current Meter Deployment

Data logging current meters will be deployed at each of the locations identified in the RDWP for the duration of the field program (or at least three tidal cycles). The current meters will be configured to measure a current profile, to obtain the most representative velocity at varying depths, particularly immediately above the substrate. Meters will record current speed and direction at a minimum of 10-minute intervals throughout the duration of the deployment.

3 Work Area Air Monitoring

Air monitoring in the work area will be conducted with a portable photoionization detector (PID) during all vibracoring and sampling activities. The PID will be used to monitor the presence of organic vapors in the breathing zone. Action levels are identified in the site specific HASP. The PID readings will be recorded in the field logbook during coring activities. All equipment will be calibrated at least once each day, and more frequently if needed, using the manufacturer-specified calibration gas. Detailed procedures for air monitoring are included in the site specific HASP.

All field analytical equipment will be calibrated immediately prior to each day's use and more frequently if required. Further details on calibration, precision, accuracy, etc. are provided in the QAPP. The calibration procedures will conform to manufacturer's standard instructions. 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 FOL and will be subject to audit by the Project Manager. Copies of instrument manuals will be maintained on-site by the FOL.

3.1 Portable Photoionization Detector (PID)

The PID will be equipped with a minimum 10.6 eV lamp. The PID should be capable of ionizing and detecting compounds with an ionization potential of less than 10.6 eV. This accounts for up to 73% of the volatile organic compounds on the NYSDEC Analytical Services Protocol (ASP) TCL. Calibration will be performed at the beginning and end of each day of use with a standard calibration gas specified by the manufacturer. If the unit experiences abnormal perturbation or erratic readings, additional calibration will be required. All calibration data will be recorded in field logbooks and on calibration log sheets to be maintained on-site by the FOL.

A battery check will be completed at the beginning and end of each working day. If erratic readings are experienced, the battery will be checked for proper voltage. This information will also be recorded in field logbooks and on the calibration log sheets.

4 Management of Investigation Derived Waste

During the field effort, investigation derived wastes (IDW) will be generated at the Site. IDW will include decontamination wash water, PPE, poly sheeting, etc. IDW will be properly containerized in 55-gallon drums. PPE will be bagged and placed in 55-gallon drums. The containers will be properly labeled with the date of generation, the Site name, client name and

address, contents of the containers, etc. The containers will be secured at the end of each day at the Site. IDW will be disposed of prior to or during Phase 1 construction activities.

5 Schedule

The pre-design investigation will be completed approximately five (5) working days after initiation. The task will be started after approval of the RD Work Plan by NYSDEC.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN (QAPP)

DRAFT PRE_DESIGN INVESTIGATION
QUALITY ASSURANCE PROJECT PLAN

for

Operable Unit No. 3
Troy (Smith Avenue) Former Manufactured Gas Plant Site
Troy, New York

Prepared for:

nationalgrid

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September 2011

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QUALITY ASSURANCE PROJECT PLAN

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1.0 GENERAL

This Remedial Investigation Quality Assurance Project Plan (QAPP) has been prepared to specify procedures that will provide data of known, documented quality, and which will be legally defensible, should the need exist. This document specifically supplements the Sampling and Analysis Plan (SAP), also attached as an appendix to the Remediation Work Plan (RDWP) for Operable Unit No. 3 (OU-3). To the extent discrepancies exist between this QAPP and the RDWP, the RDWP shall control.

2.0 PROJECT DESCRIPTION

The Troy (Smith Avenue) Former Manufactured Gas Plant Site (the Site) is located adjacent to the Hudson River at Smith Avenue in Troy, Rensselaer County, New York. Figure 1 depicts the Site location.

The reach of the Hudson River adjacent to the former manufactured gas plant area has been designated OU-3. An operable unit represents a portion of the Site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. OU-1 consists of the upland portion of the Site, and occupies a total of approximately five acres comprising portions of two properties, one owned by National Grid and the other by the U.S. Army Corps of Engineers (USACE). Ingalls Avenue has been designated as OU-2. OU-2 consists mostly of a former canal that was filled in the early 20th century, and is located south of the Site (Figure 1).

The purpose of this pre-design investigation is to gather sufficient data to enable National Grid to complete a remedial design for OU-3. The remedial design will be reviewed and approved by the New York State Department of Environmental Conservation (NYSDEC). The types, numbers, and locations of samples to be collected are also described in the RDWP. Field procedures for sampling activities are detailed in the SAP.

3.0 PROJECT ORGANIZATION

A project organization has been developed to identify the roles and responsibilities of the various parties involved with the pre-design investigation. The organizational structure for this investigation includes the New York State Department of Environmental Conservation (NYSDEC), National Grid, and National Grid's consultant (the Consultant) and the required subcontractors (i.e., laboratories, drillers, etc). Although the Quality Assurance/Quality Control (QA/QC) responsibilities are principally the responsibility of the Consultant's Project Manager and Project Quality Assurance Manager (PQAM), proper implementation of QA/QC requirements necessitate that the entire project staff be cognizant of all procedures and goals.

The Consultant's team will consist of the following personnel, with a description of their responsibilities:

Project Manager (PM): The PM for the OU-3 remedial design project has primary responsibility and authority for implementing and executing the technical, QA, and administrative aspects of the pre-design investigation, including the overall management of the project team. The Project Manager is accountable for ensuring that the predesign investigation is conducted in accordance with applicable plans and guidelines, including the RDWP, the QAPP, the SAP, and the Environmental Health and Safety (EHS Plan). In addition, the Project Manager will communicate all technical, QA and administrative matters to National Grid. He will ensure that any deviations from the approved RDWP, QAPP, SAP, and EHS Plan are documented and communicated to National Grid personnel.

Project Quality Assurance Manager (PQAM): The PQAM will be responsible for review of data upon receipt from the laboratory. The PQAM will be responsible for ensuring that all data are in conformance with requirements of this QAPP.

Field Operations Lead (FOL): The FOL will be responsible for the management and supervision of the pre-design investigation and for providing consultation and decision-making on day-to-day issues relating to the sampling activities. The FOL will monitor the sampling to determine that operations are consistent with plans and procedures, and that the data acquired meets the data quality needs. When necessary, the FOL will document any deviations from the plans and procedures for approval.

Environmental Site Supervisor (ESS): The ESS reports to the Consultant's Environmental Health and Safety Management, and is responsible for the implementation of the EHS Plan. The ESS shall advise project staff on health and safety issues, conduct health and safety training sessions, and monitor the effectiveness of the health and safety program conducted in the field.

In addition, other personnel may provide support to the PM on an as-needed basis.

The services of subcontractors (i.e., driller, laboratory, etc.) will also be necessary to perform the investigation. The PM, with assistance from the FOL and PQAM, will be the liaison between the Consultant, National Grid, and the subcontractors.

4.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

The overall QA objective for the project is to develop and implement procedures which will provide data of known, documented quality. Field and laboratory QA/QC requirements defined in the NYSDEC 2005 Analytical Services Protocol (ASP) and other applicable guidelines ensure acceptable levels of data quality will be maintained throughout the sampling and analysis program. For the purposes of this document, all references to ASP indicate the 2005 NYSDEC Analytical Services Protocol.

The QA/QC objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability. The samples to be collected (type and frequency of collection) are specified in the RDWP.

4.1 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), and relative range are common.

Measurement data for this project will include field data as well as laboratory analytical data. Laboratory precision will be performed according to the requirements described in the associated analytical methods.

The field measurement data may include organic vapor readings and current (velocity and direction) measurements. The objective for precision of field data collection methods is to take replicate (minimum of 2 for every 20 samples) measurements for field parameters to determine the reproducibility of the measurements.

The organic vapors will be measured using a photoionization detector (PID). Daily background and upwind readings of coring and sampling activities will be measured prior to commencing work and at periodic intervals throughout each day's activities. The natural variation/fluctuation in measurements at background or upwind locations will be used for baseline background values, and the variability will be noted. Current readings will be precise within the range specified by the manufacturer. Should readings fall outside this range, duplicate measurements or additional measurements will be collected to determine whether the difference is due to operator or instrument error.

4.2 Accuracy

Accuracy is a measure of 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 that are close to the detection limits are less accurate because they are affected by such factors as instrument

"noise." Higher concentrations will not be as affected by instrument or other variables and thus will be more accurate.

The accuracy of laboratory-measured data will be evaluated by determining the percent recovery of spike samples. For the measurement of organics by gas chromatography (GC) or GC/mass spectroscopy (MS), the recovery of a surrogate spiked into each sample will also be used to assess accuracy.

The objective for accuracy of field measurements is to achieve and maintain factory equipment specifications for the field equipment. Field measurements cannot be assessed for accuracy by spiking the medium with the analytical parameter and measuring the increase in response; therefore, these instruments can only be assessed for accuracy by the response to a known sample (such as a calibration standard) used to standardize them. All volatile organic detectors (such as the PID) will be calibrated to an appropriate standard daily prior to use.

4.3 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 that is most concerned with the proper design of the sampling program. 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. Decontamination of sampling devices and coring equipment will be performed as outlined in the SAP. Laboratory sample containers will be thoroughly cleaned in accordance with procedures outlined in Section 5.2.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of chain-of-custody procedures are presented in Section 6.0.

4.4 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid. The QC objective for completeness is generation of valid data for 100 percent of the analysis requested.

4.5 Comparability

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 by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Ensuring traceability of all analytical standards and/or source materials to USEPA or NIST;
- Verifying all calibrations with an independently prepared standard from a source other than that used for calibration; and

- Using standard reporting units and reporting formats including the reporting of QC data.

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.

5.0 SAMPLING PROCEDURES

5.1 Sampling Program

The purpose of the sampling program is to characterize the sediment for disposal, and to obtain water current measurements. Sampling and analysis will include waste characterization samples.

5.2 Sampling Procedures and Handling

Sample Container Preparation

Sample containers will be properly washed and decontaminated by the factory or laboratory prior to use. The types of containers and preservation techniques are shown in Table 1. Records of the sources of bottles will be kept by the analytical laboratory.

Methods of Sampling

As a minimum, sampling procedures will be in accordance with the most recent NYSDEC guidelines and/or regulations, as appropriate. Alternate techniques will be utilized when such guidelines and/or regulations are inappropriate or non-existent.

Referenced sampling procedures are listed below. All procedures will be the latest in effect as of the date of this QAPP.

- NYSDEC – "Technical Guidance for Site Investigation and Remediation, DER-10"

Sampling methods are explained in detail in the SAP.

6.0 SAMPLE TRACKING AND CUSTODY

Sample chain-of-custody (COC) will be initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples will be minimized. Personnel involved in the COC and transfer of samples will be trained on the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity will be 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. A sample will be 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.

In situ or on-site monitoring data will be controlled and entered in permanent logbooks.

6.1 Field Sample Custody

A COC record will accompany the sample from time of collection to receipt by the laboratory. If samples are split and sent to different laboratories, COC records will be sent with each sample. Figure 2 is a typical example of a chain-of-custody record. The “remarks” column will be used to record specific considerations associated with sample acquisition such as: sample type, container type, sample preservation methods, and analyses to be performed. Two copies of this record will be prepared in the field. One copy will accompany the samples to the laboratory, and will be maintained as a file copy by the laboratory. The second version will be retained by the Consultant.

Coolers, provided by the laboratory, will be used for shipping/couriering samples. All sample bottles within each cooler will be individually labeled and controlled.

The field sampler will indicate each individual sample designation/location number in the space provided on the appropriate COC form for each sample collected. The shipping container will then be appropriately packed and closed, and a seal provided by the laboratory affixed to the latch. This seal must be broken to open the container. Tampering may be indicated if the seal is broken before receipt at the laboratory. The laboratory will contact the Consultant’s PM or the FOL, and the associated samples will not be analyzed, if tampering is apparent.

The FOL will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped, as well as the anticipated date of arrival.

6.2 Laboratory Sample Custody

The laboratory sample program will meet the following criteria:

- The laboratory will designate a sample custodian who is responsible for maintaining custody of the samples and all associated records documenting that custody.

- Upon receipt of samples, the custodian will 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 any discrepancy in documentation, the laboratory will immediately contact the Consultant PM and/or PQAM 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. That assessment will be recorded as part of the incoming COC procedure.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking form will accompany the laboratory report and will become a permanent part of the project records.

6.3 Sample Tracking System

A sample tracking system will be implemented to monitor the status of laboratory analysis. Sample numbers, types, analytical parameters, sampling dates, and required due dates for receipt of analytical results will be entered into the system. The PM will use the tracking system to monitor the project sampling schedules and the status of analytical reports.

A description of the sample tracking system follows:

1. For each day that samples are collected, the FOL or designee will complete a COC form listing all appropriate samples.
2. The FOL or designee will retain the client copy of the COC, and forward the laboratory copy of the COC with the sample shipment.
3. The FOL or designee will fax copies of the completed COC form to the PM. The PM or a designated employee will confirm sample shipment with the laboratory and resolve any sample transfer issues.
4. The status of analytical results will be tracked by the PM or designee using the information provided on the completed COC form. The information may be summarized in a computerized database, as warranted.

Upon receipt of the analytical results from the laboratory, the PM or designee will review the data package for completeness and contract compliance.

The PM or a designated representative will maintain day-to-day contact with the laboratory concerning specific samples and analyses.

6.4 Sample Identification

Samples collected for the will be identified for dewatering studies will be bulk samples, identified by the numerical order in which they are collected and the date. Each sample identifier will be preceded by TOU3, representing Troy (Smith Avenue) Site Operable Unit No. 3.

For example, the first bulk sediment sample collected will be assigned the identifier TOU3-1-X/XX/XX, where X/XX/XX will represent the date the sample was collected.

For the Waste characterization samples, the identifier will consist of the Site designation, WC for Waste Characterization, an identifier for the media, a numerical indicating the order in which they are collected and the date.

For example, the first sediment waste classification sample collected for analysis will be numbered TOU3-WC-SED1-X/XX/XX. The first liquid waste classification sample collected for analysis will be numbered TOU3-WC-LIQ1-X/XX/XX.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 Field Instrumentation Calibration

The FOL will be responsible for ensuring that instrumentation are of the proper range, type and accuracy for the test being performed, and that all of the equipment are calibrated at their required frequencies, according to their specific calibration protocols/procedures.

All field measurement instruments must be calibrated according to the manufacturer's instructions prior to the commencement of the day's activities. Exceptions to this requirement will be permitted only for instruments that have fixed calibrations pre-set by the equipment manufacturer. Calibration information will be documented on instrument calibration and maintenance log sheets or in a designated field logbook. The calibration information (log sheet or logbook) will be maintained at the Site during the on-site investigation and, once the field work is completed, will be placed in the project files. Information to be recorded includes the date, the operator, and the calibration standards (concentration, manufacturer, lot number, expiration date, etc.). All project personnel using measuring equipment or instruments in the field will be trained in the calibration and usage of the equipment, and are personally responsible for ensuring the equipment has been properly calibrated prior to its use.

In addition, all field instruments will undergo response verification checks at the end of the day's activities and at any other time that the user suspects or detects anomalies in the data being generated. Verification checks may also be performed at the request of National Grid or NYSDEC representatives. The checks consist of exposing the instrument to a known source of analyte (e.g., the calibration gas), and verifying a response. If an unacceptable instrument response is obtained during the check (i.e., not within specifications), the data will be labeled suspect, the problem documented in the Site logbook, and appropriate corrective action taken.

Any equipment found to be out of calibration will be re-calibrated. When instrumentation is found to be out of calibration or damaged, an evaluation will be made to ascertain the validity of previous test results since the last calibration check. If it is necessary to ensure the acceptability of suspect items, the originally required tests will be repeated (if possible), using properly calibrated equipment, to acquire replacement data for the measurement in question.

Any instrument consistently found to be out of calibration will be repaired or replaced within 24 hours, or field work will be terminated until the malfunctioning equipment is repaired/replaced.

7.2 Laboratory Instrumentation Calibration

Personnel at the laboratory will be responsible for ensuring that analytical instrumentation are of the proper range, type and accuracy for the test being performed, and that all of the equipment are calibrated at their required frequencies, according to specific protocols/procedures.

Off-site laboratory equipment shall be calibrated using certified/nationally recognized standards and according to the applicable methodologies and the laboratory Standard Operating Procedures (SOPs). In addition, these methods/procedures specify the appropriate operations to follow during calibration or when any instrument is found to be out of calibration.

8.0 ANALYTICAL PROCEDURES

Off-site laboratory samples will be analyzed according to the methods provided in Table 2 and Exhibit D of the NYSDEC ASP as applicable. QA/QC procedures given in Exhibits E and I of the ASP will be followed as applicable. Regardless of the method used, all analytical and extraction holding times must meet the NYSDEC ASP requirements for that analytical group. Holding times will be calculated from verified time of sample receipt at the laboratory. For NYSDEC ASP, samples must be received at the laboratory within 48 hours of sample collection. The breakdown of investigative samples is detailed in the RDWP.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the ASP.

The data package provided by the laboratory will contain all items specified in the ASP, as appropriate to the analyses performed. Category B reporting will be used.

9.1 Chain-of-Custody Records

Completed copies of the COC records accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the report of analytical testing.

9.2 Data Handling

One bound hard copy and one electronic version (PDF or other appropriate format) of the complete analytical data report will be provided by the laboratory. The PM will immediately arrange for filing of the complete package, after the QA/QC reviewer checks the package to ensure all deliverables have been provided. In addition, an electronic version of the analytical results will be provided by the laboratory in a mutually-agreed upon database format (i.e., an Electronic Database Deliverable, or EDD). The EDD will be used to generate summary tables sorted by classes of constituents and by sample matrix. Each individual table will present the following information:

- Sample matrix, designations, and locations;
- Sample dates;
- Analytical results, including units; and
- Data qualifiers provided by the laboratory.

The PM will maintain close contact with the QA/QC reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA/QC review has been completed, the PM will direct the QA/QC reviewer or designee to finalize the analytical data assessment and update the data summary tables if required.

9.3 Data Validation

Data validation is not anticipated to be performed for the waste characterization data during the pre-design investigation.

10.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

10.1 Quality Assurance Batching

Each set of samples will be analyzed concurrently with calibration standards and QC check samples (if required by the protocol).

10.2 Laboratory Quality Control Samples

The QC samples included are detailed below:

Method Blanks/Preparation Blanks - Analyses for organic compounds (method blank) and inorganics (preparation blank) include a blank analysis of the laboratory reagent water. The blank is analyzed with each set of samples or more often as required to verify that contamination has not occurred during the analytical process.

Matrix Spike/Matrix Spike Duplicate Analysis - This analysis is used to determine the effects of matrix interference on analytical results. Spikes of analytes are added to aliquots of sample matrix in the manner specified in the ASP. Selected samples are spiked to determine accuracy as a percent recovery of the analyte from the sample matrix and precision as RPD between the MS and MSD samples. The MSD is prepared in the same manner as the MS sample.

Analytical/Matrix Replicate Samples - Replicate samples are aliquots of a single sample that are split on arrival at the laboratory, or upon analysis. Significant differences between two replicates, split in a controlled laboratory environment, will result in flagging the affected analytical results.

Surrogate Spike Analyses - Surrogate spike analyses are used to determine the efficiency of recovery of organic analytes in the sample preparations and analyses. Calculated percentage recovery of the spike is used as a measure of the accuracy of the total analytical method.

11.0 PREVENTIVE MAINTENANCE

11.1 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 repair/maintenance logbook will be kept for each piece of equipment/instrument, as applicable, and this log will be available on-site during field activities and, at the completion of the investigation, be placed in the project files. Entries include the date of service, type of problem encountered, corrective action taken, and initials and affiliation of the person providing the service.

Laboratory analytical instruments will be serviced at intervals recommended by the manufacturer. Instrument use logbooks will be monitored by the analysts to detect any degradation of instrument performance. Changes in response factors or sensitivity are used as indications of potential problems. These are brought to the attention of the laboratory supervisor and preventive maintenance or service is scheduled to minimize down time. Back-up instrumentation and an inventory of critical spare parts are maintained to minimize delays in completion of analyses.

Use of equipment in need of repair will not be allowed in the field or laboratory, and work will be terminated until the malfunction is repaired or the instrument replaced.

11.2 Schedules

Written procedures, where applicable, will identify the schedule for servicing critical items in order to minimize the downtime of the measurement system. It will be the responsibility of the operator to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. Service to the equipment, instruments, tools, gauges, etc. shall 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 and by the data and sample control personnel when and if equipment, instruments, tools, and gauges are used at the sites. The PM or the PQAM may audit these records to verify complete adherence to these procedures.

11.4 Spare Parts

Where appropriate, a list of critical spare parts will be identified by the operator in consultation with the equipment manufacturer. These spare parts will be stored for availability and use in order to reduce the downtime. In lieu of maintaining an inventory of spare parts, a service contract for rapid instrument repair or backup instruments will be available.

12.0 ASSESSMENT PROCEDURES FOR DATA ACCEPTABILITY

Procedures used to assess data precision and accuracy will be in accordance with the appropriate laboratory methods (Table 2). Data validation is not anticipated to be performed for the waste characterization data during the remediation activities, although a data review for completeness will be performed by the QA/QC reviewer (see Section 9.2).

12.1 Completeness

Completeness is the measure of the amount of valid data obtained from a measurement system compared to the total amount expected to be obtained under ideal conditions. A target of 100 percent completeness, calculated for each analysis method, has been established as the overall project objective.

$$PC = \frac{NA}{NI} \times 100$$

where:

PC = Percent completeness
NA = Actual number of valid analytical results obtained
NI = Theoretical number of results obtainable under ideal conditions

13.0 CORRECTIVE ACTION

The following procedures have been established to assure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

When a significant condition adverse to quality is noted on-site, at the laboratory, or at a subcontractor location, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the FOL, the PM, and involved subcontractor 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.

At a minimum, corrective actions may be initiated:

- When predetermined acceptance standards are not attained
- When a procedure or compiled data are determined deficient
- When equipment or instrumentation is found faulty
- When samples and test results are questionably traceable
- When QA requirements have been violated
- When designated approvals have been circumvented
- As a result of a system and/or performance audit
- As a result of a management assessment
- As a result of laboratory/inter-field comparison studies
- As required by National Grid
- As required by NYSDEC ASP, 2005

Procedure Description

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, will monitor on-going work performance in the normal course of daily responsibilities.

During the field investigation, any changes to the program outlined in the RDWP and this QAPP must be documented on a Field Change Request (FCR) form (Figure 3). FCRs will be numbered serially, starting with the number "01." A copy of the FCR must be maintained at the Site during the investigation and in the project management files. All project personnel may identify a noncompliance; however, the FOL is responsible for documenting, numbering, logging, and verifying the closeout action. It is the PM's responsibility to verify all recommended corrective actions are produced, accepted, and received in a timely manner.

Work may be audited at the office, site, laboratory, and subcontractor locations by the PQAM and/or designated auditor. Items, activities, or documents ascertained to be in noncompliance with quality assurance requirements will be documented and corrective actions mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the PQAM.

Technicians assigned QA functions will also control noncompliance corrective actions by having the responsibility of issuing and controlling the appropriate Corrective Action Request Form (Figure 4). All project personnel may identify a noncompliance; however, the technician is responsible for documenting, numbering, logging, and verifying the closeout action. It is the PM's responsibility to verify that all recommended corrective actions are produced, accepted, and received in a timely manner.

The Corrective Action Request (CAR) identifies the adverse condition, reference document(s), and recommended corrective action(s) to be administered. The issued CAR is directed to the responsible manager in charge of the item or activity for action. The individual to whom the CAR is addressed returns the requested response promptly to the technician in charge, affixing his signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The technician maintains the log for status control of CARs and responses, confirms the adequacy of the intended corrective action, and verifies its implementation. The technician will issue and distribute CARs to specified personnel, including the originator, responsible project management involved with the condition, the PM, involved subcontractor, and the FOL, at a minimum. CARs are also transmitted to the project file for the records.

14.0 QUALITY ASSURANCE REPORTS

Quality assurance reports to management may consist of the reports on audits, FCRs, CARs, and/or a final QA report on field sampling activities.

At the end of the project, the PQAM may submit a lessons learned report to the PM that discusses the QA activities. That report may include discussions of any conditions adverse or potentially adverse to quality, such as responses to the findings of any field or laboratory audits; any field, laboratory, or sample conditions which necessitated a departure from the methods or procedures specified in this QAPP; field sampling errors; and any missed holding times or problems with laboratory QC acceptance criteria; and the associated corrective actions undertaken. This report will not preclude immediate notification to project management of such problems when timely notice can reduce the loss or potential loss of quality, time, effort, or expense.

These reports, if prepared, will be reviewed by the PM for completeness and the appropriateness of any corrective actions, and they will be retained in the project files.

In the final investigative report, laboratory and field QC data will be presented, including a summary of QA activities and any problems and/or comments associated with the analytical and sampling effort. Any corrective actions taken in the field, results of any audits, and any modifications to laboratory protocols will be discussed.

TABLES

TABLE 1
SAMPLE CONTAINERIZATION

Analysis	Container Type	Preservation	Holding Time
Sediment Samples – Waste Characterization Analyses			
TCLP Volatiles	500 ml wide mouth glass w/ teflon cap	4ºC	14 days (to TCLP extraction); 14 days (to analysis)
TCLP Semivolatiles	Wide mouth glass w/ teflon cap [1]	4ºC	14 days (to TCLP extraction); 7 days (to preparative extraction); 40 days (to analysis)
TCLP Pesticides	Wide mouth glass w/ teflon cap [1]	4ºC	14 days (to TCLP extraction); 7 days (to preparative extraction); 40 days (to analysis)
TCLP Herbicides	Wide mouth glass w/ teflon cap [1]	4ºC	14 days (to TCLP extraction); 7 days (to preparative extraction); 40 days (to analysis)
TCLP Metals	Wide mouth glass w/ teflon cap [1]	4ºC	180 days (to TCLP extraction); 180 days (to analysis) [mercury at 28 and 28 days]
Corrosivity	Wide mouth glass w/ teflon cap [1]	NA	NA
Reactivity	Wide mouth glass w/ teflon cap [1]	NA	NA
Ignitability	Wide mouth glass w/ teflon cap [1]	NA	NA
TPH	Wide mouth glass w/ teflon cap [1]	4ºC	28 Days
% Solids	Polyethylene or glass [1]	NA	NA
Water Samples – Waste Characterization Analyses			
TCLP Volatiles	3 VOA vials	4ºC	14 days (to TCLP extraction); 14 days (to analysis)
TCLP Semivolatiles	Amber glass w/ teflon cap [2]	4ºC	14 days (to TCLP extraction); 7 days (to preparative extraction); 40 days (to analysis)
TCLP Pesticides	Amber glass w/ teflon cap [2]	4ºC	14 days (to TCLP extraction); 7 days (to preparative extraction); 40 days (to analysis)
TCLP Herbicides	Amber glass w/ teflon cap [2]	4ºC	14 days (to TCLP extraction); 7 days (to preparative extraction); 40 days (to analysis)
TCLP Metals	Polyethylene or glass	4ºC	180 days (to TCLP extraction); 180 days (to analysis) [mercury at 28 and 28 days]
Corrosivity	Polyethylene or glass	NA	NA
Reactivity	Polyethylene or glass	NA	NA
Toxicity	Amber glass w/ teflon cap	4ºC	28 Days

Ignitability	Polyethylene or glass	NA	NA
TPH	Amber glass w/ teflon cap	4ºC, H_2SO_4 or HCl to pH<2	28 Days

NOTE

1. Sized appropriately for the analytical method; analyses may be combined.
2. Analyses may be combined.

TABLE 2
LABORATORY ANALYSIS PROGRAM

Matrix	Parameter	Analytical Method
Sediment & Water	TCLP Volatiles	1311/8260B
Sediment & Water	TCLP Semivolatiles	1311/8270C
Sediment & Water	TCLP Pesticides	1311/8081A
Sediment & Water	TCLP Herbicides	1311/8151A
Sediment & Water	TCLP Metals	1311/6010B
Sediment & Water	Corrosivity	9040C/9045D and SM4500-H B-00
Sediment & Water	Reactivity	9030B/9012B
Sediment & Water	Toxicity	9020
Sediment & Water	Ignitability	1030 (Solid)/1010A (Aqueous)
Sediment & Water	TPH	EPA 1664
Water	% Solids	SM 2540 B

NOTE

1. If site-specific requirements dictate a change in analytical requirements, the Remediation Work Plan (which will include this information) will take precedence.

FIGURES

Path: T:\GIS\National_Grid\Troy_SmithAve_OU1\Spatial\MXD\Remedial_Design_Workplan\Figure_1_Quality_Assurance.mxd

OU-3

OU-1

OU-2

NOTES:

2007 Natural color ortho imagery:
NYS GIS Clearinghouse

OU-3 consists of the Hudson River sediments in the vicinity of the Troy (Smith Avenue) Site.

0 100 200
Feet

Legend

OPERABLE UNITS

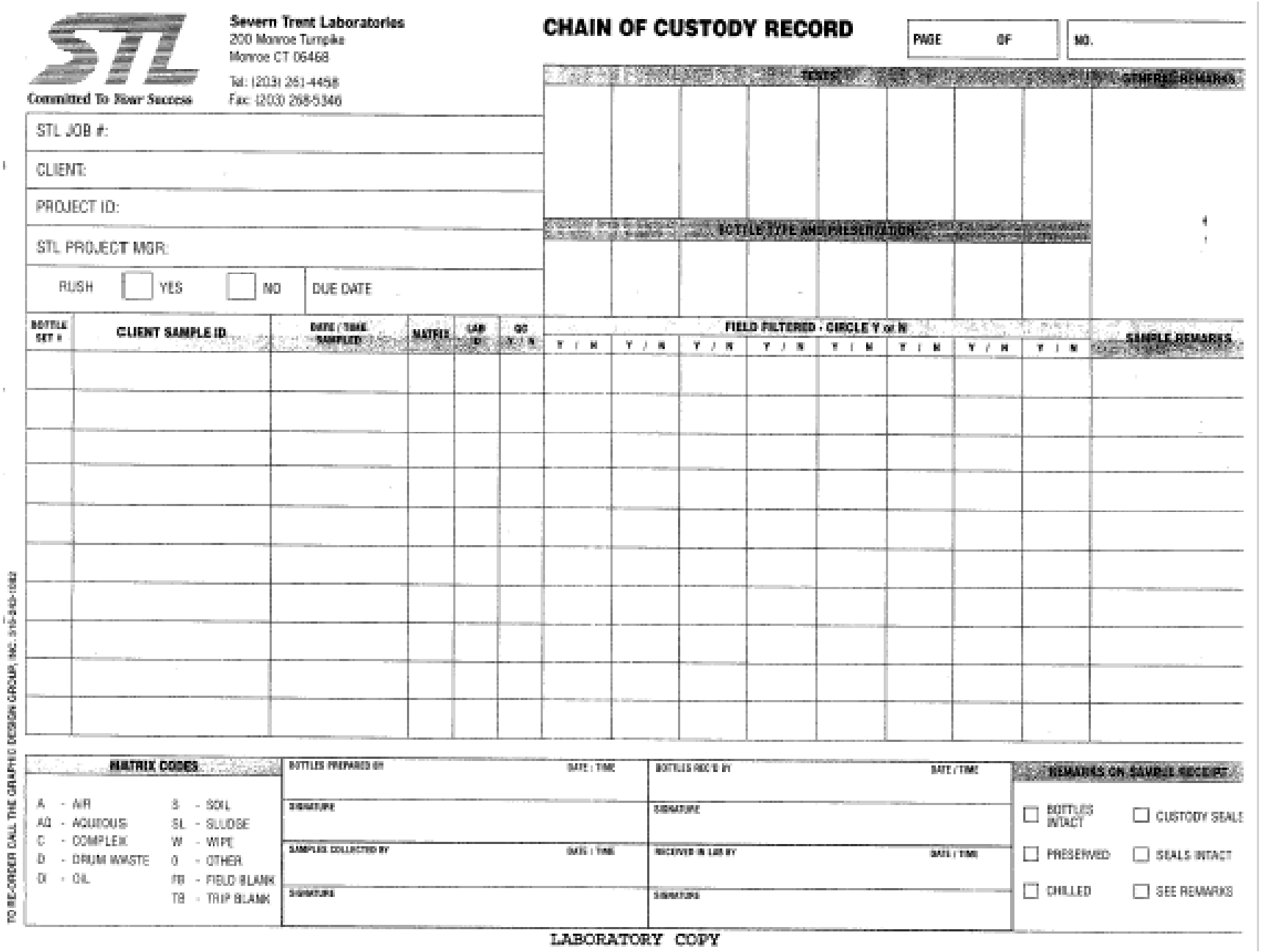
TETRA TECH

FIGURE 1

QUALITY ASSURANCE WORK PLAN
SITE MAP

TROY (SMITH AVE.) OU-3
TROY, NY

FIGURE 2 – TYPICAL CHAIN OF CUSTODY RECORD



Severn Trent Laboratories
200 Monroe Turnpike
Monroe CT 06468
Tel: (203) 261-4458
Fax: (203) 268-5346

Committed To Your Success

CHAIN OF CUSTODY RECORD

PAGE OF

NO.

STL JOB #:

CLIENT:

PROJECT ID:

STL PROJECT MGR:

RUSH ☐ YES ☐ NO DUE DATE

TESTS

OTHER REMARKS

BOTTLE TYPE AND PRESERVATION

BOTTLE SET #	CLIENT SAMPLE ID	DATE / TIME SAMPLED	MATRIX	LAB ID	QC Y / N	FIELD FILTERED - CIRCLE Y or N	SAMPLE REMARKS
						Y / N	
						Y / N	
						Y / N	
						Y / N	
						Y / N	
						Y / N	
						Y / N	
						Y / N	
						Y / N	
						Y / N	

MATRIX CODES

A - AIR
AQ - AQUEOUS
C - COMPLEX
D - DRUM WASTE
O - OIL
S - SOIL
SL - SLUDGE
W - WIPE
O - OTHER
FB - FIELD BLANK
TB - TRIP BLANK

BOTTLES PREPARED BY — DATE / TIME — SIGNATURE

BOTTLES REC'D BY — DATE / TIME — SIGNATURE

SAMPLES COLLECTED BY — DATE / TIME — SIGNATURE

RECEIVED IN LAB BY — DATE / TIME — SIGNATURE

REMARKS ON SAMPLE RECEIPT

☐ BOTTLES INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT
☐ CHILLED ☐ SEE REMARKS

LABORATORY COPY

TO RE-ORDER CALL THE GRAPHIC DESIGN GROUP, INC. 516-349-1030

FIGURE 3 - FIELD CHANGE REQUEST FORM

FCR Number: _____

Field Change Request Title: _____

To: _____ **Location:** _____

Date: _____

Description:

_____

_____

Reason for Change:

_____

_____

Recommended Disposition:

_____

_____

Field Operations Lead (or designee) [print name]	Signature	Date

I have reviewed the above change request, and

[ ] approve the modification.

[ ] do not approve the modification.

The above change request has been discussed with National Grid personnel:

[ ] Yes (see below).

[ ] No. The change is minor and does not need EPA concurrence.

Project Manager [print name]	Signature	Date

I have reviewed the above change request, and

[ ] concur with the modification.

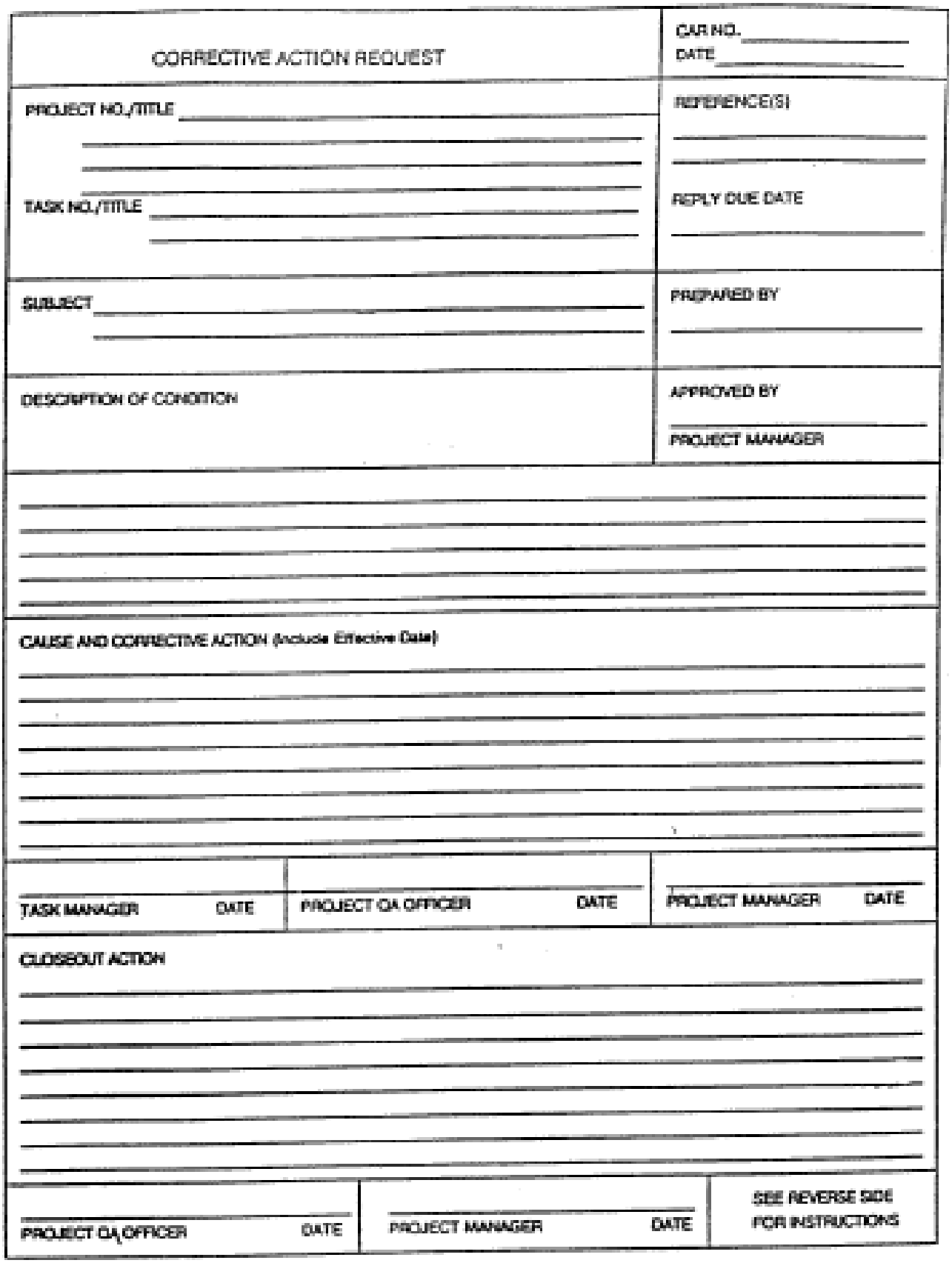
[ ] do not concur with the modification.

National Grid Project Manager [print name]	Signature	Date

Distribution:

National Grid Project Manager
Project Manager
PQAM
Field Operations Lead
Project File
Other:

FIGURE 4 – CORRECTIVE ACTION REQUEST FORM



CORRECTIVE ACTION REQUEST

CAR NO. _____

DATE _____

PROJECT NO./TITLE _____

TASK NO./TITLE _____

REFERENCE(S)

REPLY DUE DATE

SUBJECT _____

PREPARED BY

DESCRIPTION OF CONDITION

APPROVED BY

PROJECT MANAGER

CAUSE AND CORRECTIVE ACTION (Include Effective Date)

TASK MANAGER DATE

PROJECT QA OFFICER DATE

PROJECT MANAGER DATE

CLOSEOUT ACTION

PROJECT QA OFFICER DATE

PROJECT MANAGER DATE

SEE REVERSE SIDE FOR INSTRUCTIONS

APPENDIX D

HEALTH AND SAFETY PLAN (HASP)

Example Health and Safety Plan Template

for the

Troy (Smith Avenue) Site – OU-3

Pre-Design Investigation

Troy, Rensselaer County, New York

Prepared for

nationalgrid

Prepared by

TETRA TECH EC, INC.

September 2011

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APPROVALS

By their signature, the undersigned hereby certify that this Site-Specific Health and Safety Plan has been reviewed and approved for use for the Pre-Design Investigation at the Troy Smith Avenue Site.

Project Manager	Date
Project Environmental and Safety Manager	Date
Environmental and Safety Supervisor/FOL	Date

1.0 INTRODUCTION

1.1 PURPOSE

This Health and Safety Plan (HASP) addresses the health and safety practices that will be employed by all site workers participating in the OU-3 pre-design investigation at the Troy-Smith Avenue Site (Site) in Troy, New York. This plan address the work planned for 2012 and will be amended, as necessary for the subsequent activities. The HASP takes into account the hazards inherent to investigation activities at former MGP sites. This HASP also presents procedures to be followed by the Consultant, its subcontractors, and all other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards.

Activities performed under this HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926, and the Consultant's Environmental Health and Safety (EHS) Program. Modifications to the HASP may be made with the approval of the Project Environmental and Safety Manager (PESM) and the National Grid representative using the Field Change Request Form found in Appendix A. Copies of this plan will be kept at the Site at all times.

1.2 SITE BACKGROUND AND DESCRIPTION

The Site is located in Troy, Rensselaer County, New York (see Figure 1 – Site Location Map). More detailed information on the site location can be found in the OU-1 Remedial Design Work Plan.

The subject of this document is the sediment of the Hudson River adjacent to the former manufactured gas plant area at Smith Avenue. The reach of the Hudson River adjacent to the former manufactured gas plant area has been designated Operable Unit No. 3. An operable unit represents a portion of the Site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. OU-1 consists of the upland portion of the Site, and occupies a total of approximately five acres comprising portions of two properties, one owned by National Grid (NG) and the other by the USACE. Ingalls Avenue has been designated as OU-2. OU-2 consists mostly of a former canal that was filled in the early 20th century, and is located south of the Troy (Smith Avenue) Site.

Hudson River submarine utility crossings and associated metering stations that have been identified to-date in the proposed survey area consist of one submarine natural gas line, extending southwest to northeast across the Hudson River, to a point at OU-1 south of the lock approach.

nationalgrid TETRA TECH EC, INC.	TITLE: Site Location Map Remedial Design Work Plan Troy (Smith Avenue) Site	DWN: EAG	DES.: CTS	PROJECT NO.:
		CHKD:	APPD:	FIGURE NO.: 1
		DATE: 04/29/08	REV.: 0	

1.3 SCOPE

This HASP has been developed to address health and safety concerns, which may be encountered during pre-design investigation activities at the Site. The HASP and detailed Scope of Work will be maintained on site during the entire course of the activities. Further details are provided in the OU-3 Remedial Design Work Plan.

The following activities are associated with the sediment sampling and current measurement effort:

- Pre-Mobilization meeting;
- Installing sediment borings and collecting sediment samples;
- Deployment and retrieval of current meters, and ;
- Visual documentation.

If additional field activities are proposed, this HASP will be amended as necessary.

1.4 APPLICATION

The HASP applies to all personnel involved in site tasks who wish to gain access to active work areas, including but not limited to:

- Client representatives
- Federal, state or local representatives
- The Consultant's employees and subcontractors.

1.5 SUMMARY OF MAJOR RISKS

- Injury from working with or around sediment coring equipment;
- Working on the water (on barge in the river), and;
- Contact with submarine utilities.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section outlines the Project Organization and responsibilities for the site activities.

2.1 NATIONAL GRID REPRESENTATIVE

The National Grid Representative is the point of contact for the Site and solely represents National Grid interests. He is not required to fulfill the role or perform the duties of any Contractor/Subcontractor.

2.2 PROJECT MANAGER (PM)

It is the responsibility of the Project Manager to:

- Provide the major point of control to ensure that the program's technical, financial and scheduling objectives are achieved.
- Ensure that the program meets National Grid's objectives and quality standards
- Coordinate problem resolution/corrective action implementation.
- Ensure implementation of this program through coordination with the responsible Project Environmental and Safety Manager (PESM).
- Conduct periodic inspections.
- Participate in all incident investigations.
- Ensure the HASP has all of the required approvals before any site work is conducted.
- Ensure that the PESM or Environmental and Safety Supervisor (ESS) is informed of project changes which require modifications of the HASP.
- Have overall project responsibility for Project Health and Safety.
- Implement (or have a designee implement) the emergency procedures listed in the Float Plan if he/she (or the PM's designee) does not receive notification from the ESS at the specified expected time of return to shore is exceeded.

2.3 PROJECT ENVIRONMENTAL AND SAFETY MANAGER (PESM)

The PESM is a senior Health & Safety staff member with experience in hazardous and non-hazardous waste site investigations, remediation, and mitigation activities. The PESM responsibilities include the following:

- Provide for the development and approval of the HASP.
- Serve as the primary contact to review health and safety matters that may arise.
- Approve revised or new safety protocols for field operations.
- Approve individuals who are assigned ESS responsibilities.
- Approve ESS to fulfill other project roles.
- Coordinate revisions of this HASP with field personnel.
- Coordinate upgrading or downgrading of personal protective equipment with the ESS.
- Assist in the investigation of all accidents.

2.4 ENVIRONMENTAL AND SAFETY SUPERVISOR/FIELD OPERATIONS LEAD (ESS/FOL)

The ESS/FOL is a person knowledgeable in appropriate safety and health regulations with at least one year of experience or specialized training in serving in a health and safety (H&S) staff role on hazardous waste or non-hazardous sites. The ESS has the following responsibilities:

- Works as a member of the project team to ensure implementation of the HASP.
- Ensures that all health and safety activities identified in the HASP are conducted and/or implemented.
- Performs air monitoring.
- Identifies operational changes which require modifications to health and safety procedures and the health and safety plan, and ensures that the procedure modifications are implemented and documented through changes to the HASP.
- Directs and coordinates health and safety monitoring activities.
- Ensures that proper personal protective equipment is utilized by field teams.
- Assists in conducting and documenting daily safety briefings.
- Monitors compliance with this HASP.
- Notifies PESM of all incidents.
- Coordinates with the Project Manager in any incident investigation.
- Maintains Incident Report Forms.
- Determines upgrades or downgrades of personal protective equipment (PPE) based on site conditions.
- Reports to PESM to provide summaries of field operations and progress.
- Maintains health and safety field log books.
- Send a copy of the Float Plan shall be sent to the Project Manager or his/her designee before activities on barge starts.

2.5 SITE PERSONNEL

Site personnel include all other persons entering the site for the purpose of assisting in the completion of the project. This includes but is not limited to client representatives, subcontractors, regulatory personnel, and site workers. It is the responsibility of all site personnel to:

- Report any unsafe or potentially hazardous conditions to the ESS and/or SS.
- Maintain knowledge of the information, instructions and emergency response actions contained in the HASP.
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions.
- Prevent admittance to work sites by unauthorized personnel.
- Inspect all tools and equipment daily, including PPE, prior to use.

3.0 POTENTIAL HAZARDS OF THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the site activities at the Troy-Smith Avenue former MGP Site.

3.1 CHEMICAL HAZARDS

Compounds that typically may be encountered at any former MGP Site include polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethyl benzene and xylene (BTEX); and cyanide salts. Specific compounds and their relevant properties are shown in Table 3-1.

Based on previous subsurface investigations at the Site, PAHs and BTEX have been detected in both the surface and subsurface soils. Cyanide was not detected in any of the subsurface soils, but was detected at very low concentrations in surface soils. Metals, including arsenic, chromium, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, thallium and vanadium, were detected at the site. Detected concentrations were below guidance values and/or background values in most cases, with the exceptions of arsenic, cadmium, and chromium.

Phenolic compounds are a constituent of coal tars, tar hydrocarbon sludges, and wastewater sludges that were generated by gas manufacturing. Phenols are predominantly an exposure hazard via skin contact and through inhalation of particulate matter containing phenols. Acute exposure symptoms may include irritation of the eyes, nose and throat; and skin rash/burns.

In addition to the compounds on-site, chemicals used in the processing of samples and for the decontamination of equipment are potentially hazardous to human health if not used properly. Prior to working with these materials on-site, MSDSs shall be obtained and reviewed by all potentially affected personnel. A copy of all MSDSs shall be available at the Site location.

3.2 BIOLOGICAL HAZARDS

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals, insects and plants. The Activity Hazard Analysis found in Appendix B will include specific hazards and control measures for each task.

3.2.1 Animals

During site operations, animals such as dogs, cats, mice and snakes may be encountered. Workers shall use discretion and avoid all contact with animals. If these animals present a problem, efforts will be made to remove these animals from the Site by contacting a licensed pest control technician.

3.2.2 Insects and Other Arthropods

The ESS will instruct the field crew in the recognition and procedures for encountering insects at the site. Additionally, any individuals who have been bitten or stung by an insect will notify the ESS. The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and as often as needed throughout the work shift. Apply DEET (vapor-active repellent) to any exposed skin surface (except eyes and lips) as needed.
- Wear proper protective clothing (work boots, socks and pants).
- Field personnel who may have insect allergies will provide this information to the ESS prior to commencing work, and shall have allergy medication on site.

Mild insect bites should be treated by applying a baking soda paste or ice wrapped in a wet cloth. Bee stingers should be gently scraped off the skin, working from the side of the stinger. The suction device in commercially available snakebite kits can also be used to remove the stinger. If insect bites become red or inflamed or symptoms such as nausea, dizziness, shortness of breath, etc., appear, medical care will be sought. Immediate care is needed if a person is allergic to insect bites/stings. If an allergic person receives a spider bite or insect bite/sting, seek immediate medical attention, keep the victim calm, and check vital signs frequently. Rescue breathing should be given if necessary to supply oxygen to the victim.

3.2.2.1 Ticks

Lyme disease is caused by bites from infected ticks that are common in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma up to about one-quarter inch. When embedded into the skin, they may resemble a small freckle. Tick season extends from spring through summer, but may extend year-round in areas without significant cold weather.

3.2.2.1.1 Lyme Disease

Lyme disease is caused by infection from a deer and lone star ticks that carries a spirochete. Deer ticks range in size from approximately one-eighth inch to one-quarter inch and can be black or brick red in color. Lone star ticks are larger and chestnut brown in color. During the painless tick bite, the spirochete may be transmitted into the bloodstream, which could lead to the worker contracting Lyme disease. Lyme disease may cause a variety of medical conditions including arthritis, which can be treated successfully if the symptoms are recognized early and medical attention is received. Treatment with antibodies has been successful in preventing more serious symptoms from developing. The effects of the disease vary from person to person, which often makes it difficult to diagnose. Typically, the incubation period ranges from two days to two weeks. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems as well as a disabling type of arthritis.

Symptoms can include a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. This flu-like illness is out of season, commonly happening between May and October when ticks are most active. A large expanding skin rash usually develops around the area of the bite. More than one rash may occur. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It's easy to miss the rash and the connection between the rash and a tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash. Joint or muscle pain may be an early sign of Lyme disease.

These aches and pains may be easy to confuse with the pain that comes with other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

TABLE 3-1
Chemical Data

COMPOUND	CAS#	ACGIH TLV	OSHA PEL	ROUTE OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Benzene	71-43-2	0.5 ppm, (Skin)(Ca.) 2.5 ppm STEL	1.0 ppm, (Skin) 5 ppm STEL	Inhalation Ingestion Absorption Skin Contact	Irritates eyes, skin, nose, resp. syst.; giddiness; headache, nausea, staggered gait; fatigue, lassitude; dermatitis	Eyes, skin, blood, CNS, bone marrow, respiratory system	Liquid with an aromatic odor VP= 75 mm IP= 9.24eV
PAHs as Coal tar pitch volatiles (CTPV)	65996-93-2	0.2 mg/m3 (Ca.)	0.2 mg/m^3	Inhalation Skin contact	Irritant to eyes, swelling, acne contact dermatitis,	Resp. System, CNS, liver, kidneys, skin, bladder	Colorless/ pale green, solid, faint aromatic odor
Cyanide	74-90-8 592-01-8 151-50-8 143-33-9	5 mg/m^3 4.7 ppm (skin) (C)	10 ppm (skin)	Ingestion, Inhalation, Skin contact	Irritated eyes, skin, noise, throat, dizziness, nausea	Eyes, skin, resp. sys, CNS, skeleton, kidneys	Variable
Ethyl benzene	100-41-4	100 ppm	100 ppm	Inhalation Skin Contact Ingestion	Irritates eyes, skin, mucous membranes; headache; dermatitis; narcosis, coma.	Eyes, skin, resp. system, CNS	VP= 7 mm, aromatic odor, IP= 8.76 eV
Naphthalene	91-20-3	10 ppm	10 ppm	Inhalation, Absorption, Ingestion, Contact	Irritate eyes, headache, confusion, nausea, vomiting, abdominal pain, profuse sweating; dermatitis	Eyes, skin, blood, liver, kidneys, CNS	Strong oxidizer Combustible solid IP=8.12eV LEL: 0.9% UEL: 5.9% Fl.P: 174°F
Phenol	108-95-2	5 ppm	5 ppm	Inhalation Absorption Ingestion Contact	Irritated mucous membranes	Skin, eyes, throat, liver	Crystalline solid at STP. Commercially available as a liquid. Aromatic odor, Fl.P.:>175 F; IP:8.5ev LEL: 1.7%; UEL: 8.6%; IP:
Toluene	108-88-3	50 ppm (skin)	200 ppm 300 ppm (C) 500 ppm (10 min max peak)	Inhalation Absorption Ingestion Skin Contact	Irritates eyes and nose, fatigue, weakness, confusion, euphoria, dizziness; headache, dilated pupils, lacrimation, nervousness, muscular fatigue, insomnia dermatitis,	Liver, eyes kidneys, resp syst. skin, CNS	Colorless liquid with a sweet, pungent, benzene like odor. VP= 21 mm IP= 8.82eV

COMPOUND	CAS#	ACGIH TLV	OSHA PEL	ROUTE OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Xylene	1330-20-7	100 ppm, 150 ppm (STEL)	100 ppm	Inhalation Absorption Ingestion Skin Contact	Irritates eyes, nose, throat, and skin; dizziness, drowsiness, staggered gait, vomiting, abdominal pain, dermatitis	Eyes, skin, resp. system, GI tract, CNS, blood, liver, kidneys	Colorless liquid with an aromatic odor VP = 79 mm IP= 8.56 eV

Abbreviations

C = ceiling limit, not to be exceeded
Ca. = Carcinogen (Cancer Causing)
CNS = Central Nervous System
CVS= Cardiovascular System
eV = electron volt
FP = Flash point
IP = Ionization Potential
mm = millimeter
ppm = parts per million
Skin = significant route of exposure
STEL = Short-term exposure limit (15 minutes)

Lyme disease can affect the nervous system. Symptoms include stiff neck, severe headache, and fatigue usually linked to meningitis. Symptoms may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease may also mimic symptoms of multiple sclerosis or other types of paralysis. Lyme disease can also cause serious but reversible heart problems, such as irregular heartbeat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Often, the effects of Lyme disease may be confused with other medical problems.

3.2.2.1.2 Prevention

Control measures to prevent contracting Lyme disease include:

- Avoid dense or high brush, when possible.
- Wear light colored clothing.
- Spray DEET on your skin and Permethrin on clothing and work boots.
- Tuck pant legs into socks and shirts into gloves, if possible.
- Self/Buddy check of neck, hairline, groin, and body after working in areas that may contain deer ticks. Shower immediately after returning home from the job site.

If a tick is found biting an individual, the ESS will be contacted immediately. The tick can be removed by grasping the tick with tweezers as close to the skin as possible, and pulling gently or using a tick removal system (e.g., Pro-Tick, www.scs-mall.com/store/). The affected area should then be disinfected with alcohol or similar antiseptic. If personnel feel sick or have signs similar to those above, they will notify the ESS immediately. Additionally, employees finding engorged ticks on their body will be given a medical examination.

3.2.3 Poisonous Plants

The potential for contact with poisonous plants (i.e., poison ivy, poison oak, and poison sumac) exists when performing fieldwork in disturbed and wooded areas. Poison ivy can be found as vines on tree trunks or as upright bushes. Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring. Poison oak resembles poison ivy, but the leaflets are less notched and rounded at the ends. Both poison oak and poison ivy have white berries and red or yellow foliage in the fall of the year. Poison sumac can be present in the form of a flat-topped shrub or tree. It has fern-like leaves, which are velvety dark green on top and pale underneath. The branches of immature trees have a velvety "down." Poison sumac has white, hairy berry clusters.

Contact with poison ivy may lead to a skin rash in susceptible individuals. A rash results from a toxin found in the sap that is extruded from the leaves and contained in the stems and roots. The rash is characterized by reddened, itchy, blistering skin that needs first aid treatment. If you believe you have contacted one of these plants, immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.

Avoidance of plant/sap contact is the only effective means of preventing the poisoning. A person experiencing symptoms of poisoning should remove contaminated clothing; wash all

exposed areas thoroughly with soap and water, taking care not to touch your face or other body parts. Apply calamine or other poison ivy lotion if the rash is mild. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity. Employees will be trained in the identification of these species and will be advised to wear protective clothing such as gloves and long sleeve shirts when working conditions permit. Employees should also consider applying barrier lotions (e.g. Ivy Block) to skin that has the potential to contact these species. Clorox Wipes and Technu can be used to decontaminate skin and reusable clothing to prevent exposure to poison ivy. Gloves should be worn when removing and decontaminating clothing potentially exposed to poison ivy. These products can be obtained by calling (800) 421-1223.

3.2.4 Bloodborne Pathogens

Bloodborne pathogens enter the human body and blood circulation system through punctures, cuts or abrasions of the skin or mucous membranes. They are not transmitted through ingestion (swallowing), through the lungs (breathing), or by contact with whole, healthy skin. However, under the principle of universal precautions all blood should be considered infectious, and all skin and mucous membranes should be considered to have possible points of entry for pathogens.

There are a number of infections that are transmitted by insects and arthropods where the infection cycle includes the human blood system. Examples include malaria and Lyme disease, which are transmitted by mosquitoes and ticks, respectively. These diseases are serious, and the possibility for infection should be considered. However, these diseases cannot be transmitted through personal contact with human blood, and are not covered by the OSHA Bloodborne Pathogen Standard. Potential bloodborne pathogen exposure include:

- Medical emergency response operations such as administering First Aid or cardiopulmonary resuscitation (CPR).
- Contact with human wastes such as domestic sewage.
- Two primary bloodborne pathogens include Hepatitis B and Acquired Immune Deficiency Syndrome (AIDS).
- To reduce the risk of contracting a bloodborne pathogen, take the following precautions:
- Avoid contact with blood and other bodily fluids.
- Use protective equipment when giving First Aid/CPR, such as disposable gloves and breathing barriers.
- Thoroughly wash your hands with soap and water immediately after giving care.
- When cleaning up blood or other bodily fluids:
- Clean up the spill immediately or as soon as possible after the spill occurs.
- Use disposable gloves and other PPE when cleaning spills.
- Wipe up the spill with paper towels or other absorbent materials.
- After the area has been wiped up, flood the area with a solution of ¼ cup of liquid chlorine bleach to 1 gallon of fresh water and allow it to stand for at least 20 minutes.

- Dispose of the contaminated material used to clean up the spill in a labeled biohazard container.

The ESS should be notified of any potential contact with blood or bodily fluids resulting from first aid or CPR administered on the job.

3.3 PHYSICAL HAZARDS

Most safety hazards are discussed in the Activity Hazard Analyses (AHA) in Appendix B.

3.3.1 Fire and Explosion

The use of a boat engine, Vibracore, and tools that are gasoline powered presents the possibility of encountering fire and explosion hazards. Prior to the start of any work, all underground utilities and piping that may pose a potential hazard will be identified and located. The One Call center will be called and underground utilities will be located and marked. In the event a pipe or line is struck, work will stop and the emergency response plan will be implemented. Additionally, diesel fuel and gasoline shall be stored in metal cans equipped with self-closing lids and flash arrestors.

3.3.2 Steam, Heat, and Splashing

Exposure to steam/heat/splashing hazards can occur during steam cleaning operations and sampling activities. Exposure to steam/heat/splashing can include scalding/burns, eye injury, and puncture wounds. PPE will include ANSI approved safety glasses, face shield whenever splashing is involved and Tyvek or Poly/Saran coveralls.

3.3.3 Heat Stress/Cold Stress

There is a potential for injuries related to exposure to temperature extremes during work activities.

3.3.3.1 Heat Stress

Specific potential hazards include:

- Heat rash.
- Heat cramps.
- Fainting.
- Heat Exhaustion.
- Heat Stroke.

Sweating does not cool the body unless the sweat evaporates. Heat stress related problems include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. Heat rash occurs because sweat is not evaporating, causing irritation and vesicular inflammation. Standing erect and immobile in the heat allows blood to pool in the lower extremities. As a result, blood does not return to the heart to be pumped back to the brain and fainting may occur. Heat cramps are painful spasms of the muscles due to excessive water and salt loss from profuse sweating.

Similarly, heat exhaustion occurs due to the large fluid and salt loss from profuse sweating. Heat exhaustion is characterized by clammy and moist skin, nausea, dizziness, headaches, and low blood pressure.

Heat stroke occurs when the body's temperature regulatory system has failed. Skin is hot, dry, red, and spotted. The affected person may be mentally confused, delirious, and convulsions may occur. A person exhibiting signs of heat stroke should be removed from the work area and moved to a shaded area immediately. The injured person should be soaked with water and fanned to promote evaporation. Medical attention must be obtained immediately. EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.

Early symptoms of heat stress related problems include the following:

- Decline in task performance.
- Lack of coordination.
- Decline in alertness.
- Unsteady walk.
- Excessive fatigue.
- Muscle cramps.
- Dizziness.

Proper training and preventive 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 illnesses. To avoid heat stress, the following steps, as necessary, will be implemented:

Adjust work schedules.

- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day, if possible, or at night if adequate lighting can be provided.
- Perform physiological monitoring.
- 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 the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, e.g. 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 8 ounces (0.23 kilograms (kg)) of weight loss. The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature at 50° to 60°F (10°-16.6°C).
- Provide small disposable cups that hold about 4 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 illnesses.
- Rotate personnel and alternate job functions.
- Utilize cooling vests when impermeable clothing is worn.

3.3.3.2 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, poor judgment and unauthorized procedural changes. The following are the main elements of the Health and Safety Program:

- PPE (i.e. hard hat liners, boot and glove liners, insulated coveralls);
- Engineering controls (i.e. heaters, wind shields, covered metal handles);
- Administrative controls (i.e. work/warm up schedule, acclimatization);
- Recognition of Cold Stress Related Injury (frostbite and hypothermia);
- Warm rest area; and Employee training.

3.3.4 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators. A general field rule is to wear hearing protection if you cannot hear normal conversation within an arm length of the person talking. Hearing protection must be worn while Geoprobe is in operation.

3.3.5 Hand and Power Tools

In order to complete the various tasks for the project, personnel may utilize hand and power tools. Hand and power tools can present many hazards including: flying objects and particles, cuts and punctures, having a body part caught in or between, electrocution, noise, fire and explosion, and exposure to vapors, aerosols, and dusts from exhaust.

The following protective measures will be implemented to minimize exposure to the hazards presented by the use of hand and power tools:

- Daily inspections of each tool prior to use.
- Remove broken or damaged tools.
- Use of personal protective equipment.
- Use in accordance with the Operator's Manual.
- Use the tool for its intended purpose.

- Ensure proper guards are in place and not removed or bypassed.
- Turn off tools while fueling.
- All electrical tools Underwriters Laboratory (UL) listed or double insulated.
- Inspect all cords for frays or worn sections.
- Do not use electric cords to lower or hoist tools.
- Protect cords from traffic areas and water.
- Use a ground fault circuit interrupter (GFCI) outside at all times.

3.3.6 Slips, Trips, and Falls

Slips, trips and falls are a leading cause of injuries in field-related work settings, therefore, a concerted effort to identify, control, and eliminate these hazards and the measures needed to reduce or eliminate the possibility of injury will be communicated to all site personnel.

Site personnel will be instructed to look for these potential safety hazards and immediately inform the ESS or the Site Superintendent about any new hazards. If the hazard cannot be immediately removed, action must be taken to warn site workers about the hazard. Proper housekeeping (tools, equipment, and material will be picked up and stored) must be maintained on site, particularly in vehicle and pedestrian traffic routes and adjacent to office and decontamination trailers. Small holes and pits along high foot traffic areas should be covered or barricaded to prevent injury.

3.3.7 Manual Lifting

Manual lifting may be required. Failure to follow proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted time, and long treatment and recovery periods. Basic lifting and material handling techniques will be reviewed with all personnel prior to the on-site activities. All tasks will be evaluated on site prior to commencement or during activities in order to evaluate the potential for injury. Controls may include engineering controls, reducing weight of objects that are carried, distance of carrying, or reducing loss potential by rotating workers.

Individual employees are not to lift loads greater than 50 pounds. This limit may be less depending on worker's stature & level of fitness, per the ESS. The following procedure should be used to lift anything, particularly heavier loads, safely:

- Make sure the path of travel is clear.
- Size up the load as to its weight, size and shape.
- Place the feet about a foot apart and close to the object for good balance.
- Bend the knees to a comfortable position and get a good handhold.
- Using both leg and back muscles, lift the load straight up, smoothly and evenly. Pushing with the legs, keep the load close to the body.
- Lift the object into carrying position, avoiding twisting movements until the lift is completed.
- Turn the body with changes of foot position. Do not twist at the waist when lifting.

- Using both leg and back muscles, comfortably lower the load by bending the knees. When the load is securely in place, release the grip. Setting down the load is just as important as picking it up.

The same steps apply to team lifting, with the emphasis on coordination. All should start and finish the lift action at the same time and perform turning movements together.

3.3.8 Working On Water

This phase of investigation will require Vibracore operation from a self-propelled lift barge in the Hudson River. Due to the hazards of falling into water all workers on the barge will be required to wear personal floatation devices such as US Coast Guard approved life jackets, vests, and/or Mustang Survival Suits at all times.

Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations.

At least one motorized lifesaving skiff shall be immediately available at or near each barge. A skiff is considered "immediately available" if:

- The skiff is in the water or capable of being quickly launched by one person.

- There is at least one person present in the immediate area at all times when work is being performed. That individual must be specifically designated to respond to water emergencies. Other tasks can be assigned as long as the tasks do not interfere with the ability to quickly reach the skiff and get it underway.

The Coast Guard will be notified, and a Notice to Mariners will be published to notify boaters of activities near the Troy Lock. Sampling personnel will monitor marine channel 13 to maintain communications with boat traffic. The barge will be situated in such a manner as to allow pleasure craft to pass. Should a larger barge or cruise ship require access to the lock area, the sampling barge will be temporarily relocated. Communication will be maintained at all times with the ACOE personnel responsible for operation of the lock.

Refer to Section 5.0 for additional information.

4.0 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards and the methods to avoid, control and mitigate those hazards. AHAs are included in Appendix B of this HASP. AHAs have been developed for the following phases of work:

- General Site Hazards;
- Mobilization/Demobilization of the Barges;
- Boarding & Working on Barge;
- Drilling activities from Barge for Sediment Sample Collection;
- Handling of Investigation Derived Wastes;
- Sediment Sampling from Barge on Water; and
- Equipment Decontamination.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment specified in Table 5-1 represents the initial level of PPE selection for each activity required by 29 CFR 1910.132. Specific information on the selection rationale for each activity can be found in the Activity Hazard Analyses in Appendix B.

Personal protective equipment selection shall be made by the ESS and approved by the PESM. Additional tasks not included in Table 5-1 shall be reviewed by the ESS and PESM. Any additional PPE requirements will be incorporated into the HASP by completing the field change request form found in Appendix A. All field change request forms and PPE selection will require approval by the PESM and National Grid Responsible Person.

Modifications for initial PPE selection may also be made by the ESS in consultation with the PESM using the same form. A written justification for downgrade will be provided to the PESM for approval on a field change request form.

5.1 UPGRADE CONDITIONS

Due to the nature of the activities it is not anticipated that upgrading to Level C or B will be required during the closure of the Remedial Investigation. Level D or modified Level D is anticipated for all site work but the ESS has the responsibility for monitoring site and work conditions and deciding the appropriate level of protection based on indications of potential exposure.

5.2 HAZARD ASSESSMENT FOR SELECTION OF PERSONAL PROTECTIVE EQUIPMENT

The initial levels of protection were selected by performing a hazard assessment taking into consideration the following:

- Potential site physical hazards present or suspected.
- Work operations to be performed.
- Potential routes of exposure.
- Characteristics, capabilities and limitations of PPE, and any hazards that the PPE presents or magnifies.

TABLE 5-1
Personal Protective Equipment Selection

TASK	HEAD	EYE/ FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization/demobilization	HH	SG	STB	LWG	Work	EP as needed	Level D
Vibracore activities on barge/deployment of current meters	HH	SG	STB	Nit/Surg	Work, PFD Type II or higher	EP as needed	Level D*
Sediment Sampling from Barge in Water	HH	SG	STB,OB	Nit/Surg	Work, PFD Type II or higher	EP as needed	Level D*
Equipment decontamination	HH	PFS with SG or Sp. Gog.	STB, OB	Nit, Sur	Poly	EP as needed	Level D

HEAD PROTECTION HH = Hard Hat HEARING PROTECTION EP = ear plugs RESPIRATORY PROTECTION Level D = No respiratory protection required Level C = Full face air purifying respirator with OV/R-100 cartridges	EYE/FACE PROTECTION PFS = Plastic Face Shield SG = ANSI approved safety glasses with side shields Sp. Gog. = Splash Goggles BODY PROTECTION Poly = Polyethylene coated Tyvek coveralls PFD = Personal Flotation Device	FOOT PROTECTION OB = Overboot STB = Leather work boots with steel toe. HAND PROTECTION LWG = Leather Work Gloves Nit = Nitrile Sur = Surgical

6.0 AIR MONITORING

The following sections contain information describing the types, frequency and location of real time air monitoring.

The same hazard assessment considerations that were used to determine the types and levels of PPE (Section 5.2, Hazard Assessment for Selection of Personal Protective Equipment) were used to determine the types, frequency, and locations of real-time air monitoring described in this section.

6.1 WORK AREA MONITORING

The following monitoring instruments will be used during all field operations:

- A MultiRAE with a Photoionization Detector (PID), 10.6 eV lamp or equivalent, LEL sensor, CN sensor, CO, and O2 sensors.
- Colorimetric detector tubes & pump for Benzene and Phenol;

All air monitoring equipment will be calibrated and maintained in accordance with manufacturer's requirements.

Organic vapor concentrations shall be measured using the PID during sampling activities. During sampling, readings shall be taken as each sample core is exposed or at least once every 15 minutes. The ESS will interpret monitoring results using professional judgment.

If the PID indicates VOC concentration greater than 0.5 ppm, pull a colorimetric tube for Benzene and Phenol.

Colorimetric detector tubes shall be used to determine the potential presence of benzene and phenol when action levels found in Table 6-1 have been exceeded.

TABLE 6-1
REAL-TIME AIR MONITORING ACTION LEVELS

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
PID	Breathing Zone	>0.5 ppm*	Use detector tube for benzene and phenol	Potential for benzene and/or phenol to be present. Benzene PEL=1 ppm; Phenol PEL=5 ppm
PID/detector tubes	Breathing Zone	>0.5 ppm – 10 ppm* with Benzene present or >5 ppm*- 50 ppm with Phenol present	Level C	Max. allowable concentration for full face respirator is 10 ppm benzene and 50 ppm phenol without quantitative fit test
PID/detector tubes	Breathing Zone	0 - 10 ppm, no Benzene*or Phenol present	No respiratory protection is required	Does not exceed action level
		>10 - 100 ppm, no Benzene* or Phenol present	Level C	Exceeds PEL for naphthalene of 10 ppm
		>100 ppm, no Benzene*	Stop work, withdraw from work area; notify PESM	Level B conditions present
HCN Monotox unit (or detector tube)	Breathing Zone	< 3 ppm	No respiratory protection required	Does not exceed action level
		Alarm at 3 ppm or greater	Stop work, withdraw from work area; notify PESM	Level B conditions present
Oxygen meter	Breathing Zone	< 19.5%	Stop work; withdraw from work area; notify PESM.	Low oxygen
		> 22%	Stop work; withdraw from work area; notify PESM.	Oxygen enriched atmosphere; explosion hazard
CGI	Sample	< 10 % LEL	Investigate possible causes, allow to ventilate; use caution during procedures.	Potential for ignition of vapors
		> 10% LEL	Stop work; allow to ventilate to < 10% LEL; if ventilation does not result in a decrease to < 10% LEL, withdraw from work area; notify PESM.	Increasing potential for ignition of vapors

* Non-transient (sustained reading of greater then 1 minute)

6.2 CALIBRATION

Monitoring instrument calibration will be documented and included in a dedicated safety and health log book or on separate calibration pages. All monitoring instruments must be calibrated before and after each shift's use of the equipment. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

6.3 OPERATIONS

All instruments will be operated in accordance with the manufacturer's specifications. Manufacturer's literature, including an operations manual for each piece of monitoring equipment, will be maintained on-site by the ESS for reference.

6.4 DATA REVIEW

The ESS will interpret all monitoring data based on action levels listed in Table 6-1 and his/her professional judgment. The ESS shall review the data with the PESM to evaluate the potential for worker exposure, and upgrades/downgrades in PPE. The previous days monitoring results, both positive and negative readings, will be discussed with all site personnel at the tailgate safety meeting prior to commencing work activities for that day.

7.0 MATERIAL HANDLING AND DECONTAMINATION

7.1 MATERIAL HANDLING

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on-site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for off-site disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as non-hazardous solid waste.

Non-hazardous wastes will be managed in accordance with NYSDEC regulations for solid waste. IDW will be containerized, characterized and disposed within ninety days in accordance with applicable regulations. If RCRA hazardous wastes are generated which require off-site disposal, they will be managed in accordance with RCRA and NYSDEC regulations and this HASP will be amended to include all applicable requirements for hazardous waste management.

7.2 DECONTAMINATION

7.2.1 Equipment Decontamination

Equipment used in the Exclusion Zone must be decontaminated before leaving the Site or taken into a clean area. Equipment may be decontaminated by removing gross contamination and/or pressure washing with water. Verification that equipment/vehicles leaving the Site have been adequately decontaminated is the responsibility of the ESS.

7.2.2 Personnel Decontamination

Dry decontamination procedures (removal and disposal of gloves and boot covers, no re-use of PPE, etc.) will be implemented. However, if MGP residuals are encountered, the following decontamination procedures will be implemented:

<u>Level D and modified Level D decontamination</u>

Whenever leaving the Exclusion Zone:

- Scrub off excess soil and wash off boots before moving into a clean area.
- Decontaminate small equipment before it is taken to a clean area or place equipment on a plastic bag or container for later decontamination.

If going to lunch or leaving the Site;

- Wash and rinse boot covers and gloves if they will be reused.
- Remove and dispose of Tyvek suit in plastic-lined container or plastic bag.
- Remove boot covers and gloves; dispose in plastic-lined containers or plastic bags if not to be reused. Place in “Decontaminated PPE” container or area if to be used again.

- Wash face and hands before leaving the Site, eating food, smoking, or placing chewing tobacco or gum in the mouth. Wash hands before using the restroom.

Level C Decontamination

Whenever leaving the Exclusion Zone:

- Scrub off excess soil and wash off boots before moving into a clean area.
- Decontaminate small equipment before it is taken to a clean area or place equipment on a plastic bag or container for later decontamination.

If going to lunch or leaving the Site:

- Wash and rinse boot covers and gloves if they will be reused.
- Remove and dispose of Tyvek suit in plastic-lined container or plastic bag.
- Remove boot covers; dispose in plastic-lined containers or plastic bags if not to be reused. Place in "Decontaminated PPE" container or area if to be used again.
- Wash and rinse gloves.
- Remove respirator and place in designated container or area for later cleaning.
- Remove and dispose of gloves or wash gloves again and place in "Decontaminated PPE" container or area if they are to be used again.
- Wash face and hands before leaving the Site, eating food, smoking, or placing chewing tobacco or gum in the mouth. Wash hands before using the restroom.

The ESS is responsible for monitoring the effectiveness of decontamination procedures and modifying the procedures as necessary to ensure proper decontamination.

8.0 ZONES AND COMMUNICATION

8.1 SITE ZONES

Site zones are intended to control the potential hazards throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A two-zone approach will be utilized. It shall include an Exclusion Zone (EZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

Exclusion Zone – The barge will be considered the exclusion zone during sampling activities. In the event that volatile organics are detected in the breathing zone as discussed in Section 6, all personnel within the exclusion zone must don Level C protection. Exclusion zones will also be established during any activity when Level C protection is established as a result of conditions discussed in Section 6.0.

All personnel within the exclusion zone will be required to use the specified level of protection. No eating, drinking, or smoking will be allowed in the exclusion or decontamination zones.

Support Zone – The support zone will include the upland areas of the job site. Break areas, operational direction and support facilities (to include supplies, equipment storage and maintenance areas) will be located in this area. No equipment or personnel will be permitted to enter the support zone from the exclusion zone without passing through the personnel or equipment decontamination station. Eating, smoking, and drinking will be allowed only in this area.

8.2 COMMUNICATION

Cell Phones - Cell phones will be available by supervising personnel for communication with emergency support services/facilities.

Hand Signals - the field team along with the buddy system shall use Hand signals. The entire field team shall know them before operations commence.

SIGNAL	**MEANING**
Hand gripping throat	Out of air, can't breathe
Grip on a partner's wrist or placement of both hands around a partner's waist.	Leave the area immediately, no debate.
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand.
Thumbs down	No, negative.

Audio Signals - In the event of an emergency or a need to evacuate the site, an air horn or vehicle horn will be sounded to provide three bursts in order to obtain the attention of everyone on site. Site personnel should follow the Emergency Site Evacuation Routes and Procedures (Section 11.7).

Additional communication requirements for work on the barge in the river:

- Marine channel 13 will be monitored at all times.
- Contact will be maintained via cell phone with the ACOE (operators of the river lock).
- Table 11-1 provides all contact phone numbers.

9.0 MEDICAL SURVEILLANCE PROCEDURES

All personnel performing field work where potential exposure to contaminants exist are required to have passed a medical surveillance examination in accordance with 29 CFR 1910.120(f).

9.1 MEDICAL DATA SHEET

A medical data sheet is provided in Appendix A. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. It is intended to provide basic information that would be useful to professional medical personnel if medical treatment or transport to emergency medical facilities is required. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

10.0 SAFETY CONSIDERATIONS

10.1 GENERAL HEALTH AND SAFETY WORK RULES

A list of work rules and general safe work practices has been included in this plan. At a minimum, the work rules and general site work practices will be reviewed with site personnel during their initial site briefing.

10.2 General Hazards

Information regarding the hazards below is provided in the attached Activity Hazard Analyses.

- Hand and Power Tool Usage;
- Drum moving;
- Fire Hazards;
- Electrical Equipment;
- Slips/Trips/Falls;
- Punctures/Cuts; and
- Lifting/Materials Handling.

10.3 High Loss Potential Hazards

Information regarding the hazards below is provided in the attached Activity Hazard Analyses.

- Drum and Container Handling;
- Boating.

Dig Safely NY will be contacted to mark utility locations, and further identification of utilities will be achieved through a geophysical investigation of the Site. The gas main crossing the river has been identified and marked by Aqua Survey during previous investigations. National Grid will confirm that the configuration or location of this main has not been altered..

11.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures are addressed and include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, accident/incident reporting, and emergency site evacuation procedures.

11.1 RESPONSIBILITIES

11.1.1 Project Environmental and Safety Manager (PESM)

The PESM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The PESM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

11.1.2 Environmental and Safety Supervisor (ESS/FOL)

The ESS/FOL is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The ESS is required to immediately notify the PESM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the PESM can notify OSHA within the required time frame. The PESM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of $500 within 24 hours. The ESS also serves as the Emergency Coordinator.

The ESS/FOL shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the ESS/FOL will inform interested parties about the nature and duration of work expected on the site and possible health or safety effects of emergencies. ESS/FOL shall locate emergency phone numbers and identify hospital and local routes prior to beginning work on site. The ESS/FOL shall make necessary arrangements to be prepared for any emergencies that could occur.

The ESS/FOL shall implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

11.1.3 Site Personnel

The contents and requirements of the project-specific Emergency Response/Contingency plan will be reviewed, at a minimum, with all on-site personnel during their initial briefing and during daily briefings as necessary. Site personnel are responsible for knowing how to initiate emergency response actions and their respective responsibilities in the event the Emergency Response/Contingency Plan must be implemented. Personnel are expected to notify the EC of situations that could constitute a site emergency or result in the occurrence of a site emergency.

11.1.4 Vessel Captain

The captain of the river vessel is responsible for piloting the boat and compliance with United States Coast Guard rules, regulations and policies.

11.2 COMMUNICATION

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

11.2.1 Cell Phone

Cell phones will be the primary sources of communication in the field. The locations of cell phones will be with supervising personnel.

11.2.2 Audio Signals

Audio signals will be utilized in the event of an emergency or a need to evacuate the site. Three bursts will be sounded on an air horn or vehicle horn to obtain the attention of site personnel.

11.2.3 Radio Communication - Barges

Due to the close proximity of all workers on board the barges, the primary communication will be verbal.

The primary form of communication from barge to shore during an emergency will be radio and/or mobile phone communications. During an emergency situation, the lines will be kept clear so that instructions can be received by all teams. Marine channel 13 will be used on the two way radio.

11.2.4 Air Horns - Barges

Air horns will be used to alert site personnel of emergencies. The following signals will be used:

- One continuous blast - Barge evacuation
- Two short blasts - Shut down equipment, clear radio channels, await instructions; and
- Three short blasts - Injured employee, first-aid providers respond.

Air horns can be found on board the barges and with the ESS or designee.

The procedure to activate the air horns consists of depressing the air horn button or switch while pointing it in the direction of the area to be signaled. Air horns should be tested at least weekly to ensure that they are working properly.

11.2.5 Hand Signals - Barges

Hand signals will be employed from barge to shore where necessary for communication during emergency situations. Hand signals are found in this Health and Safety Plan in Section 8.2.

11.3 LOCAL EMERGENCY SUPPORT UNITS

In order to properly handle emergencies that may occur during remedial activities at the site, **Table 11-1 will be posted prominently on the barge** and in all places where telephone service is available.

Appendix C has a route map and driving directions from the site to the closest hospital:

Saint Mary's Hospital/Seton Health
1300 Massachusetts Avenue,
Troy, NY
518-268-5517

This map will be posted adjacent to the Table 11-1 emergency telephone numbers on the barge and in all places where telephone service is available. It should also be placed in all on-site vehicles. (Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance.)

In order to be able to deal with any emergency that might occur during activities at the Site, an emergency telephone number list (Table 11-1) will be posted in the field office and placed in all on-site vehicles. A hospital route map is provided in Appendix C for non-emergency trips to the hospital.

11.4 PRE-EMERGENCY PLANNING

Planning for removing an injured person from the barge will be done prior to work activities on the barges. An addendum will be added prior to boating activities.

A Float Plan (see Appendix F) shall be prepared prior to work activities on the barges. This plan includes information specific to the boat used during onsite activities, passenger and trip itinerary information, and summary safety precautions for boating practices. **A copy of the Float Plan shall be sent to an appropriate project representative who is not onboard the barge (such as the Project Manager or his/her designee) and who will implement the emergency procedures listed if the designee does not receive notification from the ESS at the expected time of return to shore specified on the plan is exceeded.**

The Consultant will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to hazards expected to be on the site. The PM will make a site visit to the clinic and discuss treatment options with the physician. Instructions for finding the hospital and emergency phone numbers will be posted conspicuously in the site office and in each site vehicle.

11.5 EMERGENCY MEDICAL TREATMENT

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the ESS/FOL and the PM immediately. First-aid equipment will be available on site at the following locations:

First Aid Kit:	**On Barges with ESS or designee**; Support Zone/Field Team Vehicle
ANSI Approved Emergency Eye Wash: (Meets ANSI Z.358.1-2004)	**On Barges with ESS or designee;** Support Zone/ Field Team Vehicle

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment.

When personnel are transported to the hospital, the ESS will provide a copy of the Medical Data Sheet to the paramedics and treating physician.

Only in **non-emergency** situations will an injured person be transported to the hospital by means other than an ambulance.

TABLE 11-1

Emergency Telephone Numbers

Contact	Firm or Agency	Telephone Number
Police	Troy, NY	911/518-270-4411
Fire	Troy, NY	911/518-270-4471
Hospital	Saint Mary's Hospital/Seton Health 1300 Massachusetts Avenue Troy, NY	518-268-5517
Ambulance	Troy, NY	911/518-270-4411
Program Manager	TBD	
Project Manager	TBD	
PESM	TBD	
National Grid Project Manager	TBD	
Work Care - Concentra	10B Madison Avenue Extension Albany, NY 12203	518-452-7030
Poison Control Center		(800) 962-1253
		(

11.6 EMERGENCY AND NON-EMERGENCY RESPONSE

11.6.1 Emergency Response

Some physical signs/symptoms that require emergency medical treatment and a call to 911/ambulance service include: chest pain, difficulty breathing, uncontrolled bleeding, bone fracture, loss of consciousness, severe head injury, poisoning, shock, loss of limb, and sudden and prolonged dizziness. In an emergency situation:

- Call 911 for initial employee evaluation and transport to the hospital. A designated employee shall accompany the injured worker to the hospital.
- Administer first aid to minimize the injury effects.
- Call the PESM, Project Manager, and National Grid representative.

11.6.2 Non-Emergency Response

In a non-emergency situation:

- Administer first aid to minimize the injury effects.
- Call the PESM, Project Manager, and National Grid Representative.
- You may transport the injured employee to the local clinic in a privately owned vehicle. A designated employee must accompany the injured worker to the local clinic.

11.6.3 After Emergency and Non-emergency Treatment

After emergency and non-emergency treatment:

- Obtain treatment and medical release records for the injured worker.
- Contact worker's compensation carrier within 24 hours of injury.
- Seek ways to ensure the worker can work, including alternate work.
- Regularly follow-up with WorkCare and ESIS case representatives.

11.7 EMERGENCY SITE EVACUATION ROUTES AND PROCEDURES

An emergency exit route map will be maintained on the barges. All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting **before boarding the barge.**

The ESS/FOL will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The ESS/FOL 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. At his/her discretion, the ESS/FOL also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including, but not limited to fire or explosion, an air horn will be sounded on the site. The horn will sound for three blasts, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All equipment will be shut down and all personnel will evacuate the work areas and assemble at the designated rally point, which shall be determined upon arrival at the site.

The ESS/FOL will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during and emergency. He/she will attend the site telephone specified by the ESS/FOL from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the ESS/FOL will check and verify that access roads are not obstructed. 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.

The ESS/FOL will remain at the Site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. Evacuation routes, meeting places, and location of emergency equipment and first aid supplies shall be discussed during the site-specific briefing.

11.7.1 Evacuation Drill from Barge

An evacuation drill on the barge will be conducted to test the emergency system; this drill will be conducted at least once during this project. **The drill will simulate situations that may be likely to occur on the barge.**

11.8 FIRE PREVENTION AND PROTECTION

A map of all fire extinguisher locations on the barge will be developed and posted on the barge at a location chosen by the ESS. The person responsible for the maintenance of fire prevention and/or control equipment is the ESS. The person responsible for the control of fuel source hazards is the ESS.

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- Smoking will be allowed only in designated areas appointed by ESS/FOL;
- No hot work without a properly executed hot work permit;

- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

11.9 CHEMICAL EXPOSURE

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

SKIN AND EYE CONTACT:	Use copious amounts of water. Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.
INHALATION:	Move to fresh air. Decontaminate and transport to hospital or local medical provider.
INGESTION:	Decontaminate and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION:	Decontaminate and transport to emergency medical facility.

11.10 ACCIDENT/INCIDENT REPORTING

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

1. The Consultant's Project Manager
2. The ESS Representative
3. The employer of any injured worker who is <u>not</u> a Consultant employee
4. The National Grid Representative

Incident reporting needs to occur to the Consultant and to the National Grid Representative immediately to assure that any injury is properly managed. Written confirmation of verbal reports are to be submitted within 24 hours. An accident/incident report will be completed by the employee(s) involved in the incident, and the ESS, Site Superintendent, or Project Manager. If the employee(s) involved is not a Consultant employee, his employer shall receive a copy of the report.

11.11 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the ESS/FOL, or designee, will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress/cold stress related injuries
- Treacherous weather-related working conditions (hurricane, tropical storm, hail, rain, high winds)
- Limited visibility (fog)
- Potential for electrical storms
- Other major incident

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The ESS/FOL will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

The ESS will determine the need to cease barge operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

11.12 SPILL CONTROL AND RESPONSE

Keep in mind **a spill on the barge may be more hazardous than a spill on land as it is difficult to maintain an upwind distance when your space is limited.**

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the Material Safety Data Sheets (MSDS) will be consulted to assist in determining the best means of containment and cleanup. 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 as hazardous waste. An exclusion zone of 50-100 feet 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.
- Make sure all unnecessary persons are removed from the spill area.
- Notify appropriate response teams and authorities and the PM and PESM. See Table 11-1 and 11-2.
- Use proper PPE in consultation with the ESS.
- 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.).
- If possible, try to stop the leak with appropriate material.
- Remove all surrounding materials that can react or compound with the spill.
- Protect storm drains and sewer manholes by surrounding them with sorbent materials or berms.

- Attempt to divert spilled liquids from entering streams, surface waters, or drainage ditches using berms or sorbent materials.
-

11.13 EMERGENCY EQUIPMENT

The following minimum emergency equipment shall be kept and maintained **on the barges**:

- Industrial first aid kit;
- Portable eye washes meeting the ANSI Z.358.1-2004 requirement for a 15 minute flush (**one per field team**);
- Air horns (**one per field team**);
- Fire extinguishers (**minimum one per barge**);
- **Two-way radios**; and
- Absorbent Material (**including boom in case of fuel/oil release to water**).

The following minimum emergency equipment will be kept and maintained on site:

- Industrial first aid kit.
- ANSI approved eye wash with capability of 15-minutes non-stop operation.
- Fire extinguisher (one per trailer/vehicle).
- Spill control equipment to include, but not limited to, absorbent booms, absorbent pads, and absorbent material, scoop or shovel and disposal container.

11.14 POSTINGS

The following information shall be **posted on the barge**:

- Emergency telephone numbers;
- Diagrams showing the location of fire extinguishers & emergency equipment;
- Emergency exits, evacuation routes & staging area.
- Float Plan (Appendix F of this report). The Float plan includes information specific to the boat used during onsite activities, passenger and trip itinerary information, and summary safety precautions for boating practices.

The following information will be posted at the Site:

- Emergency telephone numbers.
- Emergency evacuation routes and staging area.
- Route to Hospital and Work Care Clinic.

11.15 RESTORATION AND SALVAGE

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers;
- Refilling medical supplies;

- Recharging eyewashes and/or showers;
- Replenishing spill control supplies; and
- Replacing used air horns.

12.0 TRAINING

12.1 GENERAL HEALTH AND SAFETY TRAINING

Project personnel shall receive site training during initial site visit including review of this HASP.

12.2 SITE-SPECIFIC HEALTH AND SAFETY TRAINING

Prior to beginning any construction activities, the Consultant will schedule a site-specific training with all personnel who work on the site. During this meeting, the Consultant will review the site specific Health and Safety Plan. This meeting will be documented and signed by all parties attending the training. As work progresses, additional training may be required for new worker(s) entering the site. Personnel who have not received the site-specific training will not be allowed unescorted into the construction zone.

12.3 ON-SITE SAFETY BRIEFINGS

Project personnel and visitors will be given on-site health and safety briefings by the ESS/FOL to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. Prior to starting any new activity, a training session using the Activity Hazard Analysis (AHA) will be held for workers involved in the activity. A copy of the attendance sheet for these daily briefings in included in Appendix A.

12.4 FIRST AID AND CPR

The ESS/FOL will identify those individuals requiring first aid and CPR training in order to ensure that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the American Red Cross Association; OSHA 29 CFR 1910.1030, Bloodborne Pathogen Standard; and EHS 4-1.

12.5 HAZARD COMMUNICATION

Hazard communication training will be provided and documented. This training will be included, at a minimum, during the initial site briefing and additionally during daily site safety briefings as necessary or indicated.

13.0 LOGS, REPORTS AND RECORDKEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

13.1 FIELD CHANGE REQUEST

Field change requests are to be completed for initiating a change to the HASP. The PESM, Project Manager or designee, and National Grid Representative approval is required. The original will be kept in the project file. Approved changes will be reviewed with affected field personnel at a safety briefing. A field change request form is provided in Appendix A.

13.2 MEDICAL AND TRAINING RECORDS

Copies or verification of training for site-specific training will be maintained on site. Records for all subcontractor employees will also be kept on site. All employee medical records will be maintained by the Corporate Medical Consultant.

13.3 ON-SITE LOG

The ESS/FOL or designee will keep each day a log of personnel on site.

13.4 WEEKLY SAFETY REPORTS

The ESS/FOL shall complete and submit weekly/monthly safety reports to the PESM. The report is provided in Appendix A.

13.5 EHS INSPECTIONS

The Project Manager or designee will perform an EHS inspection. If the project duration extends over three months, the PESM will perform a quarterly inspection.

13.6 ACCIDENT/INCIDENT REPORTS

Incident reporting needs to occur immediately to assure that any injury is properly managed. Written confirmation of verbal reports are to be submitted within 24 hours.

13.7 HAZARD COMMUNICATION PROGRAM/MSDS

The hazard communication program will be maintained on site and training on the program information and requirements will be provided in accordance with 29 CFRs 1910.1200 and 1926.59, *Hazard Communication,* and 1910.1201, *Retention of DOT Markings, Placards and Labels.*

MSDSs will be obtained for applicable substances and included in the site hazard communication file. A copy of the MSDSs will be obtained and maintained in the file for all chemicals to which the requirements apply; this will apply to both the Consultant's personnel and any subcontractors for which the Consultant has responsibility and/or oversight

responsibilities. All chemical containers will be properly labeled in accordance with the requirements of the applicable standards.

14.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of the HASP. It is maintained on site by the ESS/FOL as a project record.

Each field team member shall sign this section after site-specific training is completed and before being permitted to work on site.

I have read, or have been informed of, the Health and Safety Plan for the Pre-Design Investigation of the Troy (Smith Avenue) Former MGP Site, and understand the information presented. I will comply with the provisions contained therein.

Name (Print and Sign)	***Date***

Name (Print and Sign)	*Date*

15.0 REFERENCES

American Conference of Governmental Industrial Hygienists, Inc., 1992, "Documentation of the threshold limit values and biological exposure indices;" 6th Edition, ACGIH, Cincinnati, Ohio.

American Conference of Governmental Industrial Hygienists, Inc., 1987, "Guidelines for the selection of chemical protective clothing;" Third Edition, ACGIH, Cincinnati, Ohio, February 1987.

American Conference of Governmental Industrial Hygienists, Inc., 2007, "Threshold limit values for chemical substances and physical agents in the work environment and biological exposure indices;" ACGIH, Cincinnati, Ohio.

Sax, N. Irving, 1992, "Dangerous properties of industrial materials," 8th Ed.; Van Nostrand Reinhold Co. Inc., New York, NY.

U.S. Department of Labor, Occupational Safety & Health Administration, 2007, 29 CFR 1910 - General Industry, and 29 CFR 1926 - Construction Industry Standards.

APPENDIX A

HEALTH AND SAFETY FORMS

HASP FIELD CHANGE REQUEST FORM

PROJECT:

TASK OR PHASE: _____

PROJECT LOCATION: _____

DESCRIPTION OF CHANGE: _____

REASON FOR CHANGE: _____

RECOMMENDED DISPOSITION:

PM:	_____	_____
	Signature	Date
Site Superintendent:	_____	_____
	Signature	Date
ESS:	_____	_____
	Signature	Date
PESM:	_____	_____
	Signature	Date

DISTRIBUTION:

PESM	_____
ESS	_____
Site Superintendent	_____
PM	_____

HASP FIELD CHANGE DOCUMENTATION

Field Change Number: _____ Date Effective: _____

Pen and ink changes to be made in the SSHP to alert the reader of this change:

_____

_____

_____

_____

Reason for the change to be incorporated into the SSHP:

_____

_____

_____

_____

_____

_____

TEXT OF CHANGE TO BE INCORPORATED:

HASP FIELD CHANGE RECORDS

Record of Field Changes:

Initial for attaching any Field Changes to this SSHP. Enter the Field Change Number and Date Issued. File the completed Field Changes to this SSHP at the end as attachments. Make PEN AND INK changes to the text to alert the reader to the changes that are required in the Field Change. As required, distribute revised text pages to holders of controlled copies of the SSHP and document on List of Changes/Additions.

Field Change No.	Date Entered	Synopsis of Change	Initials

MEDICAL DATA SHEET

The brief medical data sheet shall be completed by all on-site personnel and will be kept in the Support Zone by the ESS as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required.

Project: _____

Name: _____ Home Telephone: _____

Address: _____

Age: _____ Height: _____ Weight: _____ Blood Type: ____

Name and Telephone Number of Emergency Contact: _____

_____

Drug or Other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Provide A Check List Of Previous Illnesses: _____

_____

_____

What Medications Are You Presently Using? _____

_____

_____

_____

Do You Have Any Medical Restrictions? _____

_____

Name, Address, And Phone Number Of Personal Physician: _____

_____

_____

DAILY SAFETY BRIEFING

PROJECT NAME:_____ PROJECT MANAGER:_____

PROJECT NUMBER:_____ ESS:_____

DATE: _____ PERSON CONDUCTING MTG.: _____

WEATHER CONDITIONS: _____

_____

TOPIC: _____

_____

_____

TASK: _____

_____

HAZARDS: _____

_____

SAFETY COMMENTS: _____

PRINT NAME	**SIGNATURE**

WEEKLY HEALTH AND SAFETY REPORT

Project Name: _____
Location: _____

SITE INFORMATION
Week Ending _____

Hours Worked:
Craft: PS: Subs: _____

Level of Protection
For the Week: B __ C __ D __

INJURIES AND ILLNESSES
Yes _____ No _____

Describe:
_____
_____
_____
_____

MAJOR ACTIVITIES CONDUCTED THIS WEEK:
(drum handling, sampling, excavation, abatement/T&D, etc.)

_____
_____
_____

SIGNIFICANT EVENTS THIS WEEK:
(regulatory visits, equipment malfunctions, process start-up or shutdown):

_____
_____
_____

FUTURE ISSUES:
(schedule, manpower allocation, monitoring equipment, other resources needed)

_____
_____
_____
_____

SITE AUDIT/INSPECTIONS CONDUCTED Yes _____ No _____
(describe outstanding findings and attach results)

_____
_____
_____
_____

HIPO ACTIVITIES

Hot Work	Yes _____	No _____	Dates: _____
Lockout/Tagout	Yes _____	No _____	Dates: _____
Confined Space Entry	Yes _____	No _____	Dates: _____
Soils Analysis Classification	Yes _____	No _____	Dates: _____
Excavation Daily Check List	Yes _____	No _____	Dates: _____
Crane On-Site	Yes _____	No _____	Dates: _____
Critical Lift Plan Performed	Yes _____	No _____	Dates: _____

AIR MONITORING:
Real Time

Major Activity	Location(s)	Worker Occupation	FID/PID Range	CGI/O2 Range	PDM Range	Other

PERSONAL AIR MONITORING

Analyte	Activity Monitored	Occupation	Location	Result	Type of Sample*

SUBCONTRACTORS ON SITE

Company Name	Task or Function	Return to Site Next Week (Y/N)

ESS - Signature **Date**

E 6.1 - PERSONAL PROTECTIVE EQUIPMENT (PPE) SELECTION

ACTIVITY: _____

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR

APPENDIX B

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANAYLYSIS

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY**
Activity: General Site Hazards

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. General Site Hazards	a. Back Injuries and Strains	a. Back Injuries and Strains • Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc). • Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available. • An individual will not lift loads greater than 50 pounds. **This limit may be less depending on worker's stature & level of fitness, per the ESS.**
	b. Slips/Trips/Falls	b. Slips/Trips/Falls • Visually inspect work areas and mark, barricade, or eliminate slip, trip and fall hazards if feasible. • Maintain work areas safe and orderly. Unloading areas should be on even terrain. • Watch and prepare for uneven terrain, stumps, and vegetation in walk areas. • Replace work boots when worn out or the tread on the sole does not provide traction. • Tools and supplies/equipment will be properly stored.
	c. Dropped Objects	c. Dropped Objects • Steel toe boots meeting ANSI Standard Z41 will be worn as directed.
	d. Noise	d. Noise • Evaluate high noise operations to determine if hearing protective devices should be worn. • Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn during high noise operations. • All equipment will have manufacturer's required mufflers.

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY** **Activity: General Site Hazards**		
MAJOR STEPS	**POTENTIAL HAZARDS**	**PROTECTIVE MEASURES/CONTROLS**
	e. Vibracore Operation	e. Vibracore Operation • Supervisors and operators will ensure that the procedures in Section 3.3.1 of this document and the equipment manufacturers' instructions and recommendations are followed consistently. • All equipment will be initially inspected to certify safe to use onsite and before each days use. • Unsafe equipment will be taken out of service, tagged and will not be used until repaired. • Only operators trained and experienced with the specific equipment will operate that equipment. • Equipment will have guards, canopies or grills to protect from flying objects. • Spills and absorbent materials will be readily available. Drip pans, polyethylene sheeting or other means will be used for secondary containment. • Know hand signals. • All equipment will be equipped with backup alarms. • The use of headphones for entertainment purposes is prohibited. • Equipment will be shut down before and during fueling operations.
	f. Temperature Extremes	f. Temperature Extremes • Drink plenty of fluids. • Train personnel of signs/symptoms of heat/cold stress. • Monitor air temperatures when extreme weather conditions are present. • Stay in visual and verbal contact with your buddy. • Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.
	g. Vehicular Traffic	g. Vehicular Traffic • Spotters will be used when backing up trucks and heavy equipment. • Trucks and heavy equipment will be equipped with back up alarms. • Traffic cones and orange traffic vests will be used when working in areas of traffic, construction vehicles and near roadways. Implement traffic controls such as flag persons, warning devices, etc., as necessary. • Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.
		•

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY**
Activity: General Site Hazards

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	h. Eye Injuries	h. Eye Injuries • Safety glasses meeting ANSI Standard Z87 will be worn for all field operations where eye hazards exist. • A portable eye wash station will be located adjacent to work activities.
	i. Sharp Objects/punctures	i. Sharp Objects/punctures • Leather gloves (minimum) or cut resistant work gloves will be worn depending on the material working with. • All hand and power tools will be maintained in a safe condition. When possible, blunt all sharp objects. • First aid kits will be available by the work area.
	j. Fire	j. Fire • Reference Section 11.8. • Only use NFPA-approved fuel cans with a pouring spout or funnel. • Smoking and open flames are not permitted in fueling areas. • A properly rated fire extinguisher will be located in the refueling area and on site trucks. • All gasoline-powered equipment will be grounded and bonded.
	k. Spills	k. Spills • Reference Section 11.12. • Spill and absorbent materials will be readily available. • Contain, control and clean up the spill and affected area (soil, water). Manage and dispose of spill material appropriately. • All waste materials generated will be contained in a seal-able container appropriate for the size of the spill. • Fuel nozzles and hose will be secure in holder after use. • Fuel caps will be secured after fueling operations.
	l. Biological Hazards	Biological Hazards • Follow and train personnel on the procedures outlined in Section 3.2. • Wear insect repellent and long sleeved shirts as needed. Wear light colored clothing to highlight ticks. • Follow procedures for tick bites. Perform self and buddy checks frequently throughout the day. • Be aware of poisonous plants; poison ivy blocking lotion will be used. • Approach debris, rock piles, and other snake habitats with caution. • If allergic to bees/wasps, ensure an epinephrine (MSDS needed on site) kit is readily available and make sure the ESS is informed of the condition.

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY** **Activity: General Site Hazards**		
MAJOR STEPS	**POTENTIAL HAZARDS**	**PROTECTIVE MEASURES/CONTROLS**
	m. Hand and Power Tools	l. Hand and Power Tools • Reference Section 3.3.7. • The proper tools will be used for each task. • All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, "mushroom" head). • Tools will be used in accordance with manufacturer's instructions. • Modifications to tools are prohibited unless approved by the ESS. • GFCIs will be used with all electrical power tools.
	n. Chemicals brought on site	m. Chemicals brought on site • Identify all chemical hazards and receive training (Haz Com-Material Safety Data Sheets/MSDS) regarding safe handling and storage of chemicals. • The ESS maintains copies of all MSDS for chemicals that are on site. • A portable 15 minute eye wash station will be located by the work area.
	o. Adverse Weather	n. Adverse Weather • Follow the 30-second rule (time between lightning strike and thunder) for shutdown of operations, or as determined by the ESS. Seek shelter in building (preferred) or vehicle. • Immediately suspend operations when lightning is in the immediate vicinity and seek shelter. • Shut down operations when wind speed is greater than 30 mph sustained. Ensure that all debris/materials are secured.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Appropriate PPE 2. Hand and Power Tools 3. Portable Eyewash 4. First Aid Kits 5. Fire Extinguishers 6. GFCI	1. Inspect all vehicles daily. 2. Inspect all heavy equipment prior to use. 3. Inspect all hand and power tools prior to use. 4. Inspect all PPE prior to use. 5. Inspect portable eye washes and First Aid Kits weekly. 6. Inspect Fire Extinguishers weekly. 7. Check and Test GFCI's weekly.	1. All site personnel will read and comply with this HASP. 2. All site personnel will receive site specific training. 3. Qualified operators will be used for heavy equipment operation. 4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training. 5. Instruct personnel of proper use of fire extinguishers. 6. Personnel will be trained on the proper use of hand and power tools, including the steam cleaner.

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY** **Activity: Mobilization/Demobilization**		
MAJOR STEPS	**POTENTIAL HAZARDS**	**PROTECTIVE MEASURES/CONTROLS**
1. Mobilization/Demobilization	a. Back Injuries and Strains	a. Back Injuries and Strains • Refer to General Site Hazards. • Site personnel will be instructed on proper lifting techniques (keep back straight, lift with legs, limit twisting, etc). • Mechanical devices should be used to reduce manual handling of materials. Team lifting should be utilized if mechanical devices are not available. • An individual will not lift loads greater than 50 pounds. **This limit may be less depending on worker's stature & level of fitness, per the ESS.**
	b. Slips/Trips/Falls	b. Slips/Trips/Falls • Refer to General Site Hazards. • Maintain work areas safe and orderly. Unloading areas should be on even terrain. • Tools and supplies/equipment will be properly stored.
	c. Dropped Objects	c. Dropped Objects • Refer to General Site Hazards.
	d. Noise	d. Noise • Refer to General Site Hazards. • Hearing protection with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs) will be worn during high noise operations. • All equipment will have manufacturer's required mufflers.
	e. Temperature Extremes	e. Temperature Extremes • Drink plenty of fluids. • Train personnel of signs/symptoms of heat/cold stress. • Monitor air temperatures when extreme weather conditions are present. • Stay in visual and verbal contact with your buddy. • Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY** **Activity: Mobilization/Demobilization**		
MAJOR STEPS	**POTENTIAL HAZARDS**	**PROTECTIVE MEASURES/CONTROLS**
	f. Vehicular Traffic	f. Vehicular Traffic • Refer to General Site Hazards. • Spotters will be used when backing up trucks and heavy equipment. • Trucks and heavy equipment will be equipped with back up alarms. • Traffic cones and orange traffic vests will be used when working in areas of traffic, construction vehicles and near roadways. Implement traffic controls such as flag persons, warning devices, etc., as necessary. • Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.
	g. Overhead Hazards	g. Overhead Hazards • Refer to General Site Hazards. • All overhead hazards will be identified prior to commencing work operations.
	h. Eye Injuries	h. Eye Injuries • Safety glasses meeting ANSI Standard Z87 will be worn for all field operations where eye hazards exist. • A portable eye wash station will be located adjacent to work activities.
	i. Biological Hazards	i. Biological Hazards • Follow and train personnel on the procedures outlined in Section 4.2. • Wear insect repellent and long sleeved shirts as needed. Wear light colored clothing to highlight ticks. • Follow procedures for tick bites. Perform self and buddy checks frequently throughout the day. • Be aware of poisonous plants; poison ivy blocking lotion will be used. • Approach debris, rock piles, and other snake habitats with caution. • If allergic to bees/wasps, ensure an epinephrine (MSDS needed on site) kit is readily available and make sure the ESS is informed of the condition
	j. Hand and Power Tools	j. Hand and Power Tools • Refer to General Site Hazards. • The proper tools will be used for each task. • All tools will be inspected before each use. Damaged tools will be removed from service and tagged (splintered wood bases, missing guards, “mushroom” head). • Tools will be used in accordance with manufacturer’s instructions. • Modifications to tools are prohibited unless approved by the ESS. • GFCIs will be used with all electrical power tools.

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY** **Activity: Mobilization/Demobilization**		
MAJOR STEPS	**POTENTIAL HAZARDS**	**PROTECTIVE MEASURES/CONTROLS**
	k. Caught In/Between	k. Caught In/Between • Do not allow personnel between a moving object and a stationary object. • Ensure all personnel within unloading and loading areas are accounted for and out of the way.
	l. Contact with Overhead Utilities	l. Contact with Overhead Utilities • If equipment is being operated, delivered, or off loaded in an area with overhead utilities, a spotter must be used.
	m. Chemicals brought on site	m. Chemicals brought on site • Refer to General Site Hazards. • Identify all chemical hazards and receive training (Haz Com-Material Safety Data Sheets/MSDS) regarding safe handling and storage of chemicals. • The ESS maintains copies of all MSDS for chemicals that are on site.
	a. Fire	a. Fire • Reference Section 11.8. • Only use NFPA-approved fuel cans with a pouring spout or funnel. • Smoking and open flames are not permitted in fueling areas. • A properly rated fire extinguisher will be located in the refueling area and on site trucks. • All gasoline-powered equipment will be grounded and bonded. • Equip all heavy equipment with 20A:B:C-type fire extinguishers.
	b. Spills	b. Spills • Refer to General Site Hazards. • Spill and absorbent materials will be readily available. • Employees will be instructed on proper fueling techniques. • Fuel nozzles and hose will be secure in holder after use. • Fuel caps will be secured after fueling operations.

Project: Troy (Smith Avenue) Pre-Design Investigation **Location: Troy, NY** **Activity: Mobilization/Demobilization**		
MAJOR STEPS	**POTENTIAL HAZARDS**	**PROTECTIVE MEASURES/CONTROLS**
	c. Adverse Weather	c. Adverse Weather • Follow the 30-second rule (time between lightning strike and thunder) for shutdown of operations, or as determined by the ESS. Seek shelter in building (preferred) or vehicle. • Immediately suspend operations when lightning is in the immediate vicinity and seek shelter. • Shut down operations when wind speed is greater than 30 mph sustained. Ensure that all debris/materials are secured.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Heavy Equipment 2. Appropriate PPE 3. Hand and Power Tools 4. Portable Eyewash 5. First Aid Kits 6. 20A:B:C Fire Extinguisher 7. GFCI	1. Inspect all heavy equipment prior to use. 2. Inspect all hand and power tools prior to use. 3. Inspect all PPE prior to use. 4. Inspect portable eye washes and First Aid Kits weekly. 5. Inspect Fire Extinguishers weekly. 6. Check and Test GFCI's weekly.	1. All site personnel will read and comply with this HASP. 2. All site personnel will receive site specific training. 3. Qualified operators will be used for heavy equipment operation. 4. At least two individuals on-site will have current CPR, First Aid, and Bloodborne pathogen training. 5. Instruct personnel of proper use of fire extinguishers. 6. Personnel will be trained on the proper use of hand and power tools, including the steam cleaner.

Project: **Troy (Smith Avenue) Pre-Design Investigation** Location: Troy, NY
Activity: **Sediment Sampling from Barge**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Mobilization/demobilization of Equipment and Barge.	a. Overexertion b. Struck by drilling equipment c. Exposure to sun. d. Exposure to contaminated soil. e. Fall Same Level f. Fall to Water	a. Overexertion ♦ Site personnel will be instructed on proper lifting techniques; ♦ Mechanical devices shall be used to reduce manual handling of materials; ♦ Team lifting should be utilized if mechanical devices are not available; and ♦ Instruct personnel on proper lifting techniques. b. Struck by drilling equipment ♦ Spotters will be used when backing up vehicle and when moving equipment. ♦ Drivers will maintain people on foot in sight at all times, if you lose sight of anyone, Stop! c. Exposure to sun. ♦ A sunblock of at least SPF 15 shall be used where sun exposure is a problem. d. Exposure to contaminated soil ♦ Wear proper PPE as per Table 5-1 in HASP. e. Fall Same Level ♦ Barge decks shall be maintained free of clutter and debris and kept as dry as possible. f. Fall to Water ♦ All workers will wear a personal floatation device such as a life jacket or vest. ♦ Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet. ♦ At least one lifesaving skiff shall be immediately available near the barge.

Project: **Troy (Smith Avenue) Pre-Design Investigation** Location: Troy, NY
Activity: **Sediment Sampling from Barge**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
2. Boarding and Working on Barge	a. Overexertion b. Struck by tools or equipment c. Fall to Water	a. Overexertion ♦ Workers will be trained in knowing their limits and ergonomic positions to reduce exertion. b. Struck by tools or equipment ♦ Workers will maintain an adequate free space at their work station to avoid striking another worker while operating. c. Fall to Water ♦ A boarding plank with handrails and mid-rails will be used for boarding barge if distance from dock to barge is greater than 18". ♦ All workers will be provided with a life jacket or vest. ♦ Life jackets and vests shall be inspected before and after each use.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
• Barge • Drilling equipment • Appropriate PPE • First Aid Kits • Personal Floatation devices, life jackets/vests. • Motorized rescue skiff • Buoy line	1. Inspections will be performed on barge daily. 2. Inspections will be performed on equipment prior to each use. 3. Inspections will be performed on PPE prior to each use. 4. Weekly inspections will be performed on first aid kits. 5. Personal Floatation Devices/life jackets/vests will be inspected both before and after each wearing. 6. Rescue skiff will be inspected prior to each use. 7. Buoy line will be inspected daily.	1. Personnel have read and comply with HASP provisions. 2. Site specific training. 3. Qualified operators will be used for barge operation. 4. At least one individuals on barge will have current CPR, First aid and bloodborne pathogen training. 5. Workers on barge will be trained in donning/use of personal floatation devices/life jackets/vests. 6. Rescue skiff will be operated only by qualified personnel. 7. All personnel on barge will be instructed in proper use of buoy line for rescue purposes.
3. Handling Investigation Derived Wastes	a. Exposure to contaminated soil b. Fall to Water c. Caught in/on drilling equipment	c. Exposure to contaminated soil ♦ Minimize handling of soil cores. ♦ Wear appropriate PPE as per Table 5-1. ♦ Place soil cores in drum as soon as possible after determination that an adequate sample has been collected. d. Fall to Water ♦ Maintain wearing of life jackets/vests, follow same precautions as previous steps 1 & 2. ♦ Use body harness and lanyard, tie off to barge when working near the edge. e. Caught in/on drilling equipment ♦ Workers will keep clear of drilling equipment while operating.

Project: **Troy (Smith Avenue) Pre-Design Investigation** Location: Troy, NY
Activity: **Sediment Sampling from Barge**

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. See first page of AHA	1. See page of AHA	1. See first page of AHA

Project: **Troy (Smith Avenue) Pre-Design Investigation** Location: Troy, NY
Activity: Sediment Sampling from Barge

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
5. Drilling activities for sediment collection	a. Struck by drill equipment b. Fall to deck	a. Struck by drill equipment. ♦ Workers will maintain clear space around the drilling equipment sampler. b. Fall to deck ♦ Barge deck near drilling machine to be maintained as free of debris and mud/water as possible.
6. Decontamination of all equipment	a. Contact with contaminated equipment	a. Contact with contaminated equipment ♦ Wear proper PPE as per Table 5-1.
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. See first page of AHA	1. See first page of AHA	1. See first page of AHA

Project: **Troy (Smith Avenue) Pre-Design Investigation** Location: Troy, NY
Activity: Vibra Core Drilling

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Vibra Core Drilling Activities from Barge	a. Struck by Drill equipment or tools b. Fall to deck	a. Struck by Drill equipment or tools. ♦ See 5 (a) above. b. Fall to deck ♦ Maintain deck as clutter free and mud free as possible. ♦ Use plastic sheeting for placing soil samples. Place plastic sheeting away from work/walking area. ♦ Keep plastic sheeting away from welding/hot work area.

Project: **Troy (Smith Avenue) Pre-Design Investigation** Location: Troy, NY
Activity: Vibra Core Drilling

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	c. Fall to Water	c. Fall to Water ♦ All workers will wear a personal floatation device such as a life jacket or vest. ♦ Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet. ♦ At least one lifesaving skiff shall be immediately available near the barge. ♦ Use body harness and lanyard, tie off to barge when working near the edge.
2. Decontamination of all equipment	a. Contact with contaminated equipment b. Struck by high pressure water stream	a. Contact with contaminated equipment ♦ Wear proper PPE as per Table 5-1. b. Struck by high pressure water stream ♦ Never point the nozzle of a pressure washer at anyone. ♦ Trigger controls will NOT be locked open. ♦ DO NOT hold items to be decontaminated with hands or feet. ♦ Washer must have functioning deadman's switch
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. High Pressure Washer.	1. High pressure washer will be inspected daily prior to use.	1. Workers to operate high pressure washer will be trained using the Manufacturer's Manual.

Project: Troy (Smith Avenue OU-1 Pre-Design Investigation **Location: Troy, NY**
Activity: Equipment Decontamination

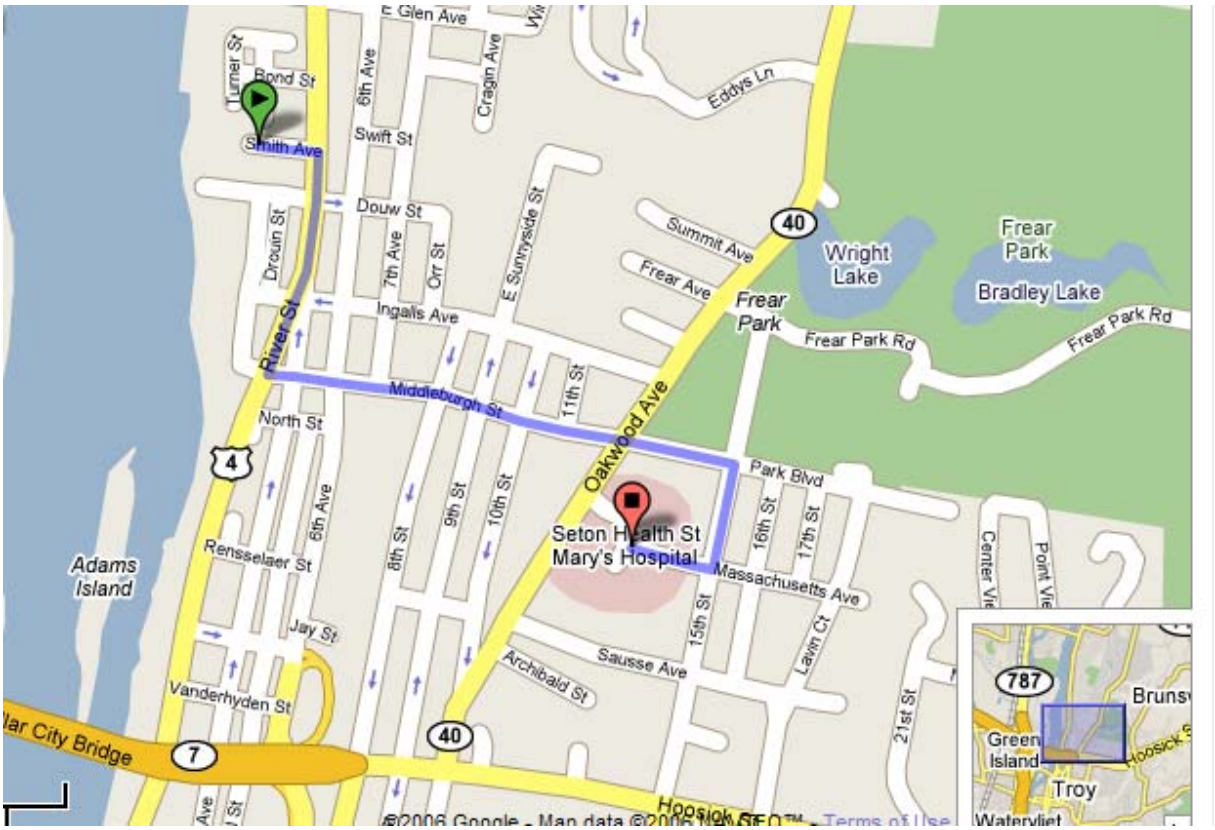
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
3. Decon drilling equipment	Contact with contaminated equipment d. Contact with contaminated equipment	c. Contact with contaminated equipment • Wear proper PPE per HASP.
	c. Struck by high pressure water stream	d. Struck by high pressure water stream • Never point the nozzle of a pressure washer at anyone. • Trigger controls will NOT be locked open. • DO NOT hold items to be decontaminated with hands or feet. • Washer must have functioning deadman's switch
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
2. High Pressure Washer.	2. High pressure washer will be inspected daily prior to use.	2. Workers to operate high pressure washer will be trained using the Manufacturer's Manual.

APPENDIX C

HOSPITAL ROUTE MAP

ROUTE TO HOSPITAL

1. Head **east** on **Smith Avenue** towards River Street.
2. Turn **right** on to **River Street** – go 0.3 miles.
3. Turn **left** on to **Middleburgh Street** – go 0.5 miles.
4. Turn **right** on to **15th Street** – go 0.1 miles.
5. Turn **right** on to **Massachusetts Avenue** – go <0.1 miles.
6. Arrive at **1300 Massachusetts Avenue**, Troy, NY.



APPENDIX D

MATERIAL SAFETY DATA SHEETS

****** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ******

MSDS Name: Benzene, 99%
Catalog Numbers:
AC296880000, AC296880010, AC296880025, AC296880250, AC610231000
Synonyms:
Benzol; Benzole; Benzolene; Carbon oil; Coal naphtha;
Cyclohexatriene; Mineral naphtha; Phenyl hydride; Pyrobenzol;
Pyrobenzole
Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

****** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ******

CAS#	Chemical Name	%	EINECS#
71-43-2	Benzene	99.0	200-753-7

Hazard Symbols: T F
Risk Phrases: 11 45 48/23/24/25

****** SECTION 3 - HAZARDS IDENTIFICATION ******

EMERGENCY OVERVIEW
Appearance: colorless liquid. Flash Point: -11 deg C.
Danger! Extremely flammable liquid. Aspiration hazard if swallowed.
Can enter lungs and cause damage. May cause central nervous system
effects. Causes eye and skin irritation. Causes digestive and
respiratory tract irritation. May cause reproductive and fetal
effects. Cancer hazard. May cause blood abnormalities. Harmful or
fatal if swallowed.
Target Organs: Blood, central nervous system, eyes, bone marrow,
immune system.

Potential Health Effects
Eye: Causes severe eye irritation. May cause slight transient injury.
Skin:Causes moderate skin irritation. May be absorbed through the skin in
harmful amounts. Direct contact with the liquid may cause erythema
(redness) and vesiculation (blistering). Prolonged or repeated
contact has been associated with the development of a dry scaly
dermatitis or with secondary infections.
Ingestion: Aspiration hazard. May cause central nervous system depression,
characterized by excitement, followed by headache, dizziness,
drowsiness, and nausea. Advanced stages may cause collapse,
unconsciousness, coma and possible death due to respiratory failure.
May cause effects similar to those for inhalation exposure.
Aspiration of material into the lungs may cause chemical
pneumonitis, which may be fatal.
Inhalation: Causes respiratory tract irritation. May cause adverse central

nervous system effects including headache, convulsions, and possible death. May cause drowsiness, unconsciousness, and central nervous system depression. Central nervous system effects may include confusion, ataxia, vertigo, tinnitus, weakness, disorientation, lethargy, drowsiness, and finally coma. Exposure may lead to irreversible bone marrow injury. Exposure may lead to aplastic anemia. May be absorbed through the lungs.
Chronic: Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated exposure may cause adverse reproductive effects. May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and other blood cell abnormalities. Chronic exposure has been associated with an increased incidence of leukemia and multiple myelomas. Immunodepressive effects have been reported. Animal studies have reported fetotoxicity (growth retardation) and teratogenicity (exencephaly, angulated ribs, dilated brain ventricles).

****** SECTION 4 - FIRST AID MEASURES ******

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.
Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

****** SECTION 5 - FIRE FIGHTING MEASURES ******

General Information:
Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Vapors can travel to a source of ignition and flash back. Extremely flammable. Material will readily ignite at room temperature. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Vapors may form an explosive mixture with air.
Extinguishing Media:
Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water. For large fires,

use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.
Autoignition Temperature:561 deg C (1,041.80 deg F)
Flash Point: -11 deg C (12.20 deg F)
Explosion Limits, lower:1.3 vol %
Explosion Limits, upper:7.1 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Reactivity: 0

****** SECTION 6 - ACCIDENTAL RELEASE MEASURES ******

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Use water spray to dilute spill to a non-flammable mixture. Avoid runoff into storm sewers and ditches which lead to waterways. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as saw dust.

****** SECTION 7 - HANDLING and STORAGE ******

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Do not ingest or inhale. Use only in a chemical fume hood. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage:
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

****** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ******

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

Chemical Name		NIOSH	
Benzene	0.5 ppm;	0.1 ppm TWA;	10 ppm TWA

ACGIH 0.5 ppm; 2.5 ppm STEL; skin - potential for cutaneous absorption
NIOSH 0.1 ppm NIOSH Potential Occupational Carcinogen - see Appendix A segments
OSHA - Final PELs (apply only to exempt industry)10 ppm; C 25 ppm; 1 ppm TWA;

OSHA Vacated PELs:
Benzene:
10 ppm TWA (unless specified in 1910.1028); 50 ppm STEL (10 min) (unless specified in 1910.1028); C 25 ppm (unless specified in 1910.1028)

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 a respirator's use.

****** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ******

Physical State: Liquid
Appearance: colorless liquid
Odor: sweetish odor - aromatic odor
pH: Not available.
Vapor Pressure: 74.3 mm Hg @ 20 deg C
Vapor Density: 2.7 (Air=1)
Evaporation Rate: 2.8 (Ether=1)
Viscosity: 0.647mPa @ 20 deg C
Boiling Point: 80 deg C
Freezing/Melting Point: 6 deg C
Decomposition Temperature: Not available.
Solubility in water: Slightly soluble.
Specific Gravity/Density: 0.874
Molecular Formula: C6H6
Molecular Weight: 78.042

****** 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:
Chlorine, oxygen, ozone, permanganates, sulfuric acid, peroxides, parachlorates, nitrating agents, nitric acid, chromic acid anhydride, chromium trioxide, iodine pentafluoride, iodine heptafluoride, dioxygenyl tetrafluoroborate, dioxygen difluoride + hydrogen fluoride, sodium peroxide, uranium hexafluoride, bromine pentafluoride, chlorine trifluoride, nitryl perchlorate, aresenic pentafluoride, potassium methoxide, permanganic acid, peroxodisulfuric acid, liquid oxygen, peroxomonosulfuric acid, metal perchlorates, strong oxidizing agents.
Hazardous Decomposition Products:
Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported.

****** SECTION 11 - TOXICOLOGICAL INFORMATION ******

CAS# 71-43-2: CY1400000
LD50/LC50:
CAS# 71-43-2: Dermal, guinea pig: LD50 = >9400 uL/kg; Draize test, rabbit, eye: 88 mg Moderate; Draize test, rabbit, eye: 2 mg/24H Severe; Draize test, rabbit, skin: 20 mg/24H Moderate; Inhalation, mouse: LC50 = 9980 ppm; Inhalation, rat: LC50 = 10000 ppm/7H; Oral, mouse: LD50 = 4700 mg/kg; Oral, rat: LD50 = 930 mg/kg; Skin, rabbit: LD50 = >9400 uL/kg.
Carcinogenicity:
Benzene -
ACGIH: A1 - Confirmed Human Carcinogen
California: carcinogen; initial date 2/27/87
NIOSH: occupational carcinogen
NTP: Known carcinogen
OSHA: Select carcinogen
IARC: Group 1 carcinogen
Epidemiology:
IARC has concluded that epidemiological studies have established the relationship between benzene exposure and the development of acute myelogenous leukemia, and that there is sufficient evidence that benzene is carcinogenic to humans. Animal studies have demonstrated fetoxicity (growth retardation) and teratogenicity (exencephaly, angulated ribs, dilated brain ventricles).
Teratogenicity:
Inhalation, rat: TCLO = 50 ppm/24H (female 7-14 day(s) after conception) Effects on Embryo or Fetus - extra-embryonic structures (e.g., placenta, umbilical cord) and Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).;
Inhalation, mouse: TCLo = 5 ppm (female 6-15 day(s) after conception) Effects on Embryo or Fetus - cytological changes (including somatic cell genetic material) and Specific Developmental Abnormalities - blood and lymphatic systems (including spleen and marrow).
Reproductive Effects:
Inhalation, rat: TCLO = 670 mg/m3/24H (female 15 day(s) pre-mating and female 1-22 day(s) after conception) female fertility index (e.g. # females pregnant per # sperm positive females; # females

pregnant per # females mated).; Oral, mouse: TDLo = 12 gm/kg (female 6-15 day(s) after conception) Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).
Neurotoxicity:
No information available.
Mutagenicity:
DNA Inhibition: Human, Leukocyte = 2200 umol/L.; DNA Inhibition: Human, HeLa cell = 2200 umol/L.; Mutation Test Systems - not otherwise specified: Human, Lymphocyte = 5 umol/L.; Cytogenetic Analysis: Inhalation, Human = 125 ppm/1Y.; Cytogenetic Analysis: Human, Leukocyte = 1 mmol/L/72H.; Cytogenetic Analysis: Human, Lymphocyte = 1 mg/L.
Other Studies:
Standard Draize Test(Skin, rabbit) = 20 mg/24H (Moderate) Standard Draize Test: Administration into the eye (rabbit) = 2 mg/24H (Severe).

****** SECTION 12 - ECOLOGICAL INFORMATION ******

Ecotoxicity:
If benzene is released to soil, it will be subject to rapid volatilization near the surface and that which does not evaporate will be highly to very highly mobile in the soil and may leach to groundwater. If benzene is released to water, it will be subject to rapid volatilization. It will not be expected to significantly adsorb to sediment, bioconcentrate in aquatic organisms or hydrolyze. It may be subject to biodegradation.

****** SECTION 13 - DISPOSAL CONSIDERATIONS ******

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 71-43-2: waste number U019; (Ignitable waste, Toxic waste).

****** SECTION 14 - TRANSPORT INFORMATION ******

US DOT
Shipping Name: RQ, BENZENE
Hazard Class: 3
UN Number: UN1114
Packing Group: II
Canadian TDG

Shipping Name: BENZENE
Hazard Class: 3(9.2)
UN Number: UN1114

****** SECTION 15 - REGULATORY INFORMATION ******

US FEDERAL
TSCA
CAS# 71-43-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 71-43-2: final RQ = 10 pounds (4.54 kg); receives an adjustable R
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 71-43-2: acute, chronic, flammable.
Section 313
This material contains Benzene (CAS# 71-43-2, 99 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
CAS# 71-43-2 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 71-43-2 is listed as a Hazardous Substance under the CWA.
CAS# 71-43-2 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 71-43-2 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Benzene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with

the California Safe Drinking Water Act:
WARNING: This product contains Benzene, a chemical known to the state of California to cause cancer.
WARNING: This product contains Benzene, a chemical known to the state of California to cause birth defects or other reproductive harm.
California No Significant Risk Level:
CAS# 71-43-2: no significant risk level = 7 ug/day
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: T F
Risk Phrases:
R 11 Highly flammable.
R 45 May cause cancer.
R 48/23/24/25 Toxic : danger of serious damage to health by prolonged exposure through inhalation, contact with skin and if swallowed.
Safety Phrases:
S 53 Avoid exposure - obtain special instructions before use.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
WGK (Water Danger/Protection)
CAS# 71-43-2: 3
United Kingdom Occupational Exposure Limits

****** SECTION 16 - ADDITIONAL INFORMATION ******

MSDS Creation Date: 6/11/1999 Revision #2 Date: 8/02/2000

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 way will 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.

TECHNOLOGY CHEMICAL INC -- COAL TAR CREOSOTE

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MSDS Safety Information

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FSC: 6840
NIIN: 00-286-0446
MSDS Date: 02/04/1993
MSDS Num: BPWXF
Product ID: COAL TAR CREOSOTE
MFN: 01
Responsible Party
Cage: 2U663
Name: TECHNOLOGY CHEMICAL INC
Address: 3718 GRAND AVE
Box: 13268
City: OAKLAND CA 94661
Info Phone Number: 510-339-3066
Emergency Phone Number: 510-339-3066
Preparer's Name: DGSC-SSH 804-279-4371
Review Ind: Y
Published: Y

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Preparer Co. when other than Responsible Party Co.

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Cage: 2U663
Name: TECHNOLOGY CHEMICAL INC
Address: 3718 GRAND AVE
Box: 13268
City: OAKLAND CA 94661

==========

Contractor Summary

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Cage: 2U663
Name: TECHNOLOGY CHEMICAL INC
Address: 3718 GRAND AVE
Box: 13268
City: OAKLAND CA 94661
Phone: 510-339-3066

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Item Description Information

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Item Manager: S9G
Unit of Issue: DR
Quantitative Expression: 00000000055GL
UI Container Qty: 1
Type of Container: DRUM

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Ingredients

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Cas: 8001-58-9
RTECS #: GF8615000
Name: CREOSOTE (SARA III)
% Wt: UNKNOWN
Other REC Limits: 0.2 MG/M3 COAL TAR
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
EPA Rpt Qty: 1 LB

DOT Rpt Qty: 1 LB

Cas: 95-13-6
RTECS #: NK8225000
Name: INDENE
% Wt: <10
Other REC Limits: NONE SPECIFIED
OSHA PEL: 10 PPM
ACGIH TLV: 10 PPM; 9192

Cas: 91-20-3
RTECS #: QJ0525000
Name: NAPHTHALENE (SARA III)
% Wt: <15
Other REC Limits: NONE SPECIFIED
OSHA PEL: 10 PPM/15 STEL
ACGIH TLV: 10 PPM/15 STEL; 9192
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 92-52-4
RTECS #: DU8050000
Name: DIPHENYL (BIPHENYL) (SARA III)
% Wt: <5
Other REC Limits: NONE SPECIFIED
OSHA PEL: 0.2 PPM
ACGIH TLV: 0.2 PPM; 9192
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Cas: 71-43-2
RTECS #: CY1400000
Name: BENZENE (SARA III)
% Wt: <1
Other REC Limits: NONE SPECIFIED
OSHA PEL: 1PPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9192
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Name: ALKYL NAPHTHALENE
% Wt: <10
Other REC Limits: NONE SPECIFIED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
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Health Hazards Data
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LD50 LC50 Mixture: LD50 (ORAL RAT) IS 1,700 MG/KG
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: NO
Carcinogenicity Inds - NTP: YES
IARC: YES
OSHA: YES
Effects of Exposure: ACUTE-EYE:MAY CAUSE MODERATE IRRITATION. SKIN:CAN RESULT IN SEVERE IRRITATION WHICH WHEN ACCENTUATED BY SUNLIGHT MAY RESULT IN

PHOTOTOXIC SKIN REACTION.INHALATION:IRRITATION,CNS EFFECTS,SUCH AS HEADAC HE,DIZZINESS,COMA AND POSSIBLE DEATH.INGESTION:IRRITATION,NAUSEA, VOMITING & ABDOMINAL PAIN.CHRONIC-MAY CAUSE CANCER.

Explanation Of Carcinogenicity: BENZENE. IARC LISTS CREOSOTE AS A POSSIBLE CARCINOGENIC AGENT TO HUMAN.

Signs And Symptions Of Overexposure: MAY BE FATAL IF SWALLOWED., NAUSEA, VOMITING. IRRITATION OF RESPIRATORY TRACT, COUGHING AND CHOKING. EYE AND SKIN IRRITATION.

Medical Cond Aggravated By Exposure: PERSONS WITH PRE-EXISTING DISEASE INVOLVING THE SKIN OR BLOOD-FORMING ORGANS MAY BE AT A GREATER RISK OF DEVELOPING ADVERSE HEALTH EFFECTS WHEN EXPOSED TO THIS MATERIAL.

First Aid: SEEK MEDICAL AID.EYE:FLUSH WITH WATER FOR 15 MINUTES.SKIN:WIPE MATERIAL OFF.WASH THOROUGHLY WITH SOAP & WATER/WATERLESS HAND CLEANER.INHALATION:REMOVE TO FRESH AIR.GIVE CPR/OXYGEN IF NEEDED. INGESTION :GIVE 1-2 GLASSES OF WATER/MILK IF CONSCIOUS.INDUCE VOMITING USING IPECAC SYRUP.THEN,GIVE A SLURRY OF 100 G OF ACTIVATED CHARCOAL IN 8 OZ OF WATER.

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Handling and Disposal

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Spill Release Procedures: STOP LEAK IF NO RISK INVOLVED. STAY UPWIND. SOLIDIFIED SPILL:SHOVEL INTO DRY CONTAINERS AND COVER. FLUSH AREA WITH WATER.SMALL WET SPILL:TAKE UP WITH SAND. FLUSH AREA WITH WATER. DIKE LARGE SPILLS FOR LATER DISPOSAL.CONTAIN RUNOFF FROM FIRE CONTROL.

Waste Disposal Methods: CONSULT LOCAL AUTHORITIES;DISPOSAL MUST BE IN ACCORDANCE WITH LOCAL,STATE AND FEDERAL REGULATIONS. THIS PRODUCT RELEASED INTO THE ENVIRONMENT MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER (800-424 -8802). WHEN SPILLED,REPORTABLE QUANTITY IS 1 LB.

Handling And Storage Precautions: STORE IN COOL, DRY AND WELL VENTILATED AREA. KEEP CONTAINER CLOSED WHEN NOT IN USE.

Other Precautions: AVOID PROLONGED/REPEATED BREATHING OF VAPORS,MISTS/ FUMES.AVOID PROLONGED/REPEATED CONTACT WITH SKIN/EYES.APPLICATION OF CERTAIN PROTECTIVE CREAMS (SUN SCREENS FOR COAL TAR PRODUCTS) BEFORE WORKING/SE VERAL TIMES DURING WORK MAY BE BENEFICIA

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Fire and Explosion Hazard Information

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Flash Point Method: CC

Flash Point Text: >200F,>93C

Extinguishing Media: USE WATER FOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL. WATER OR FOAM MAY CAUSE FROTHING, IF MOLTEN.

Fire Fighting Procedures: WEAR COMPLETE FIRE SERVICE PROTECTIVE EQUIPMENT,INCLUDING FULL-FACE MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS.USE WATER TO COOL CONTAINERS BY FIRE.

Unusual Fire/Explosion Hazard: TOXIC VAPORS/DECOMPOSITION PRODUCTS MAY BE RELEASED FORMING FLAMMABLE/EXPLOSIVE MIXTURES IN AIR. CLOSED CONTAINERS MAY EXPLODE WHEN EXPOSED TO EXTREME HEAT.

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Control Measures

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Respiratory Protection: NONE NORMALLY REQUIRED.IF EXPOSURES ARE ABOVE TLV(PEL),USE NIOSH APPROVED UNITS AS PER CURRENT 29 CFR 1910.134 AND MANUFACTURERS' "INSTRUCTIONS" AND "WARNINGS". COMBINATION FILTER/ORGANIC VAPOR CARTRI DGES OR CANISTER MAY BE USED.

Ventilation: PROVIDE SUFFICIENT GENERAL/LOCAL EXHAUST VENTILATION TO CONTROL INHALATION EXPOSURE < EXPOSURE LIMITS.
Protective Gloves: IMPERVIOUS
Eye Protection: SAFETY GLASSES/GOGGLES
Other Protective Equipment: IMPERVIOUS PROTECTIVE GARMENTS SUCH AS HEAD/ NECK COVER,APRONS,JACKETS,PANTS,BOOTS,ETC.EYE-WASH FACILITIES,SAFETY SHOWER
Work Hygienic Practices: AVOID CONTACT WITH EYES AND SKIN;DO NOT BREATHE VAPORS/MIST.WASH THOROUGHLY AFTER EACH USE.
Supplemental Safety and Health: MSDS IS NOT AVAILABLE FROM MFR. INFORMATION PRESENTED HEREIN IS ACCURATE AND RELIABLE TO THE BEST OF OUR KNOWLEDGE AND BELIEF BUT IS NOT GUARANTEED TO BE SO. IT IS THE USER'S RESPONSIBILITY TO TAKE AL L SAFETY PRECAUTIONS AS MAY BE NECESSARY. WE HEREBY DISCLAIM ALL LIABILITY WITH RESPECT TO IT'S USE.

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Physical/Chemical Properties

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HCC: T6
B.P. Text: >355F,>179C
M.P/F.P Text: UNKNOWN
Decomp Text: UNKNOWN
Vapor Pres: 1 @ 30C
Vapor Density: >1
Spec Gravity: 1.050
Evaporation Rate & Reference: SLOW (N-BUTYL ACETATE=1)
Solubility in Water: SLIGHT
Appearance and Odor: BROWN TO BLACK LIQUID WITH CREOSOTE OR TARRY ODOR
Corrosion Rate: UNKNOWN

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Reactivity Data

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Stability Indicator: YES
Stability Condition To Avoid: HIGH TEMPERATURES AND OPEN FLAMES
Materials To Avoid: OXIDIZING AGENTS
Hazardous Decomposition Products: OXIDES OF CARBON, SUFUR.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NONE

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Toxicological Information

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Ecological Information

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MSDS Transport Information

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Regulatory Information

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Other Information

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Transportation Information

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Responsible Party Cage: 2U663
Trans ID NO: 66557
Product ID: COAL TAR CREOSOTE

MSDS Prepared Date: 02/04/1993
Review Date: 11/17/1999
MFN: 1
Tech Entry NOS Shipping Nm: CONTAINS CREOSOTE AND INDENE AND NAPHTHALENE
Net Unit Weight: 481 LBS
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: DR
Container QTY: 1
Type Of Container: DRUM
Additional Data: NOTE: THE MAXIMUM ALLOWED BY PASSENGER/CARGO AIR: 5L / 60L.

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Detail DOT Information

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DOT PSN Code: QKN
Symbols: G
DOT Proper Shipping Name: TOXIC LIQUIDS, ORGANIC, N.O.S.
Hazard Class: 6.1
UN ID Num: UN2810
DOT Packaging Group: II
Label: POISON
Special Provision: B110,T14
Packaging Exception: NONE
Non Bulk Pack: 202
Bulk Pack: 243
Max Qty Pass: 5 L
Max Qty Cargo: 60 L
Vessel Stow Req: B
Water/Ship/Other Req: 40

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Detail IMO Information

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IMO PSN Code: OTX
IMO Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. o
IMDG Page Number: 6270-1
UN Number: 2810
UN Hazard Class: 6.1
IMO Packaging Group: I/II/III
Subsidiary Risk Label: -
EMS Number: 6.1-02
MED First Aid Guide NUM: T

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Detail IATA Information

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IATA PSN Code: YIE
IATA UN ID Num: 2810
IATA Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. *
IATA UN Class: 6.1
IATA Label: TOXIC
UN Packing Group: II
Packing Note Passenger: 609
Max Quant Pass: 5L
Max Quant Cargo: 60L
Packaging Note Cargo: 611
Exceptions: A4

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Detail AFI Information

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AFI PSN Code: YGF
AFI Symbols: *
AFI Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S.
AFI Hazard Class: 6.1
AFI UN ID NUM: UN2810
AFI Packing Group: II
Special Provisions: P4
Back Pack Reference: A10.5
==========
HAZCOM Label
==========
Product ID: LABEL COVERED UNDER EPA REGS - HAZCOM LABEL NOT AUTHORIZED
==========
Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

SODIUM CYANIDE

1. Product Identification

Synonyms: Hydrocyanic acid, sodium salt; Cyanogran
CAS No.: 143-33-9
Molecular Weight: 49.01
Chemical Formula: NaCN
Product Codes:
J.T. Baker: 3662, 3663
Mallinckrodt: 7616

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Cyanide	143-33-9	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CONTACT WITH ACIDS LIBERATES POISONOUS GAS. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS BLOOD, CARDIOVASCULAR SYSTEM, CENTRAL NERVOUS SYSTEM AND THYROID.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

In most cases, cyanide poisoning causes a deceptively healthy pink to red skin color. However, if a physical injury or lack of oxygen is involved, the skin color may be bluish. Reddening of the eyes and pupil dilation are symptoms of cyanide poisoning. Cyanosis (blue discoloration of the skin) tends to be associated with severe cyanide poisonings.

Inhalation:
Corrosive to the respiratory tract. The substance inhibits cellular respiration and may cause blood, central nervous system, and thyroid changes. May cause headache, weakness, dizziness, labored breathing nausea and vomiting, which can be followed by weak and irregular heart beat, unconsciousness, convulsions, coma and death.
Ingestion:
Highly Toxic! Corrosive to the gastro-intestinal tract with burning in the mouth and esophagus, and abdominal pain. Larger doses may produce sudden loss of consciousness and prompt death from respiratory arrest. Smaller but still lethal doses may prolong the illness for one or more hours. Bitter almonds odor may be noted on the breath or vomitus. Other symptoms may be similar to those noted for inhalation exposure.
Skin Contact:
Corrosive. May cause severe pain and skin burns. Solutions are corrosive to the skin and eyes, and may cause deep ulcers which heal slowly. May be absorbed through the skin, with symptoms similar to those noted for inhalation.
Eye Contact:
Corrosive. Symptoms may include redness, pain, blurred vision, and eye damage.
Chronic Exposure:
Prolonged or repeated skin exposure may cause a "cyanide" rash and nasal sores.
Aggravation of Pre-existing Conditions:
Workers using cyanides should have a preplacement and periodic medical exam. Those with history of central nervous system, thyroid, skin, heart or lung diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

IN CASE OF CYANIDE POISONING, start first aid treatment immediately, then get medical attention. A cyanide antidote kit (amyl nitrite, sodium nitrite and sodium thiosulfate) should be available in any cyanide work area. Actions to be taken in case of cyanide poisoning should be planned and practiced before beginning work with cyanides. Oxygen and amyl nitrite can be given by a first responder before medical help arrives. Allow victim to inhale amyl nitrite for 15-30 seconds per minute until sodium nitrite and sodium thiosulfate can be administered intravenously (see Note to Physician). A new amyl nitrite ampule should be used every 3 minutes. If conscious but symptoms (nausea, difficult breathing, dizziness, etc.) are evident, give oxygen. If consciousness is impaired (non-responsiveness, slurred speech, confusion, drowsiness) or the patient is unconscious but breathing, give oxygen and amyl nitrite by means of a respirator. If not breathing, give oxygen and amyl nitrite immediately by means of a positive pressure respirator (artificial respiration).

Inhalation:
If inhaled, remove to fresh air. Administer antidote kit and oxygen per pre-planned instructions if symptoms occur. Keep patient warm and at rest. Do not give mouth to mouth resuscitation.
Ingestion:
If ingested, antidote kit and oxygen should be administered per above. If the patient is conscious, immediately give the patient activated charcoal slurry. Never give anything by mouth to an unconscious person. Do not induce vomiting as it could interfere with resuscitator use.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse. Administer antidote kit and oxygen per preplanned instructions if symptoms occur.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
If patient does not respond to amyl nitrite, inject intravenously with 10mL of a 3% solution of sodium nitrite at a rate of not more than 2.5 to 5 mL per minute.Once nitrite administration is complete, follow directly with 50 mL of a 25% solution of sodium thiosulfate at the same rate by the same route. Give victim oxygen and keep under observation. If exposure was severe, watch victim for 24-48 hours. If signs of cyanide poisoning persist or reappear, repeat nitrite and thiosulfate injections 1 hour later in 1/2 the original doses. Cyanocabalamin (B12), 1 mg intramuscularly, may speed recovery. Moderate cyanide exposures need be treated only by supportive measures such as bed rest and oxygen.

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5. Fire Fighting Measures

Fire:
Not combustible, but upon decomposition or contact with acids, this material releases highly flammable and toxic hydrogen cyanide gas.
Explosion:
Not considered an explosion hazard, but upon heating with chlorates or nitrites to 450C (842F) may cause an explosion. Violent explosion occurs if melted with nitrite salt. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do Not use carbon dioxide. Carbon dioxide can react with this material in the presence of moisture to produce hydrogen cyanide. Water spray may be used to keep fire exposed containers cool. Reacts slowly with water to form hydrogen cyanide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained

breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Spills: Ventilate area of leak or spill. Allow only qualified personnel to handle spill. Clean-up personnel require protective clothing and respiratory protection from vapors. Collect material and place in a closed container for recovery or disposal. Do not flush to sewer! Decontaminate liquid or solid residues in spill area with sodium or calcium hypochlorite solution.

US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Separate from incompatibles. Workers must carefully follow good hygienic practices, including no eating, drinking, or smoking in workplace. Proper use and maintenance of protective equipment is essential. Workers using cyanide need preplacement and annual medical exams. Special training should be given to workers using cyanide. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product. Do not store near combustibles or flammables because subsequent fire fighting with water could lead to cyanide solution runoff. Do not store under sprinkler systems. All persons with the potential for cyanide poisoning should be trained to provide immediate First Aid using oxygen and amyl nitrite. A cyanide anitdote kit (amyl nitrite, sodium nitrite, and sodium thiosulfate) should be readily available in cyanide workplaces. The antidotes should be checked annually to ensure they are still within their shelf-lives. Identification of community hospital resources and emergency medical squads in order to equip and train them on handling cyanide emergencies is essential.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
5 mg/m3 skin (TWA) (as CN)
-ACGIH Threshold Limit Value (TLV):
5 mg/m3 (STEL) Ceiling, skin, as CN
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures

below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134).

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:

White deliquescent granular solid.

Odor:

Almond odor. Bitter almonds.

Solubility:

48 g/100 cc @ 10C (50F)

Specific Gravity:

1.60 @ 25C/4C

pH:

Aqueous solutions are strongly alkaline.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

1496C (2725F)

Melting Point:

564C (1047F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

1 @ 817C (1503F)

Evaporation Rate (BuAc=1):

No information found.

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10. Stability and Reactivity

Stability:
Very stable when dry. Moisture will cause slow decomposition, releasing poisonous hydrogen cyanide gas.
Hazardous Decomposition Products:
Emits toxic fumes of cyanide and oxides of nitrogen when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Acid. nitrates, nitrites, chlorates, fluorine, magnesium, and strong oxidizers. Reacts with acids to liberate toxic and flammable hydrogen cyanide gas. Water or weak alkaline solutions can produce dangerous amounts of hydrogen cyanide in confined areas. Reacts with carbon dioxide in air to form hydrogen cyanide gas.
Conditions to Avoid:
Heat, moisture, incompatibles.

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11. Toxicological Information

Oral rat LD50: 6440 ug/kg. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Cyanide (143-33-9)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
This material is expected to be very toxic to aquatic life. This material is expected to be very toxic to terrestrial life.

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13. Disposal Considerations

Cyanides must be oxidized to harmless waste before disposal. An alkaline solution (pH about l0) is treated with chlorine or commercial bleach in excess to decompose cyanide. When cyanide-free, it can be neutralized. Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste

facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, SODIUM CYANIDE, SOLID
Hazard Class: 6.1
UN/NA: UN1689
Packing Group: I
Information reported for product/size: 12KG

International (Water, I.M.O.)

Proper Shipping Name: SODIUM CYANIDE, SOLID
Hazard Class: 6.1
UN/NA: UN1689
Packing Group: I
Information reported for product/size: 12KG

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sodium Cyanide (143-33-9)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Cyanide (143-33-9)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313---- List	Chemical Catg.

```
  Sodium Cyanide (143-33-9)                  10    100     No    Cyanide comp

  --------\Federal, State & International Regulations - Part 2\--------------
-
                                                                 -RCRA-    -TSCA-
  Ingredient                                 CERCLA     261.33     8(d)
  ------------------------------------------  ------     ------    ------
  Sodium Cyanide (143-33-9)                  10         P106       No


Chemical Weapons Convention:  Yes    TSCA 12(b):  Yes    CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Solid)
```

Australian Hazchem Code: 4X
Poison Schedule: S7
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **1**
Label Hazard Warning:
DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CONTACT WITH ACIDS LIBERATES POISONOUS GAS. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS BLOOD, CARDIOVASCULAR SYSTEM, CENTRAL NERVOUS SYSTEM AND THYROID.
Label Precautions:
Do not breathe dust.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
IN ALL CASES, GET MEDICAL ATTENTION IMMEDIATELY. KEEP A CYANIDE ANTIDOTE KIT (amyl nitrite, sodium nitrite and sodium thiosulfate) in area of product use or storage. First-aiders must take precautions to avoid contact with cyanide substance. If ingested, administer antidote kit and oxygen per pre-planned instructions. If the patient is conscious, immediately give the patient activated charcoal slurry. Never give anything by mouth to an unconscious person. Do not induce vomiting as it could interfere with resuscitator use. If inhaled, remove to fresh air. Administer antidote kit and oxygen per pre-planned instructions if symptoms occur. Keep patient warm and at rest. Do not give mouth to mouth resuscitation. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Administer antidote kit and oxygen per preplanned instructions if symptoms occur.
Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Ethyl Benzene
Catalog Numbers:
O2751 1, O2751-1, O27511
Synonyms:
Ethylbenzol, phenylethane
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
100-41-4	Ethylbenzene	100	202-849-4

Hazard Symbols: XN F
Risk Phrases: 11 20

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Appearance: clear, colorless. Flash Point: 21 deg C.
Warning! Flammable liquid and vapor. Causes skin irritation. Causes eye irritation. May cause central nervous system depression. Aspiration hazard if swallowed. Can enter lungs and cause damage. May be absorbed through intact skin. Causes digestive and respiratory tract irritation.
Target Organs: Central nervous system.

Potential Health Effects
Eye:
Causes moderate eye irritation. Vapors may cause eye irritation.
Skin:
Causes skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis. May be absorbed through the skin. Contact with the liquid may cause erythema (redness), exfoliation and vesiculation (blistering).
Ingestion:
May cause irritation of the digestive tract. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation:

Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. Vapors may cause dizziness or suffocation.
Chronic:
Chronic inhalation may cause effects similar to those of acute inhalation.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
Skin:
Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:
Treat symptomatically and

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Containers can build up pressure if exposed to heat and/or fire. 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. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.
Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out.
Autoignition Temperature:Not available.
Flash Point: 92 deg C (197.60 deg F)
Explosion Limits, lower:0.8
Explosion Limits, upper:6.7
NFPA Rating: (estimated) Health: 3; Flammability: 4; Reactivity: 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. Remove all sources of ignition. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage:
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Ethylbenzene	100 ppm; 125 ppm STEL	100 ppm TWA; 435 mg/m3 TWA 800 ppm IDLH (10 percent lower explosive limit)	100 ppm TWA; 435 mg/m3 TWA

OSHA Vacated PELs:
Ethylbenzene:
100 ppm TWA; 435 mg/m3 TWA; 125 ppm STEL; 545 mg/m3 STEL

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 and clothing to prevent skin exposure.
Clothing:
Wear appropriate protective gloves and clothing to prevent skin exposure.
Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Liquid
Appearance: clear, colorless
Odor: aromatic odor
pH: Not available.
Vapor Pressure: 7.1 mm Hg @ 20 C
Vapor Density: 3.7
Evaporation Rate: <1 (butyl acetate=1)
Viscosity: 0.63 mPa s 20 C
Boiling Point: 277 deg F
Freezing/Melting Point: -139 deg F
Decomposition Temperature: Not available.
Solubility in water: Insoluble.
Specific Gravity/Density: 0.9
Molecular Formula: C8H10
Molecular Weight: 106.07

**** 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:
Oxidizing agents.
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 100-41-4: DA0700000
LD50/LC50:
CAS# 100-41-4: Draize test, rabbit, eye: 500 mg Severe; Oral, rat: LD50 = 3500 mg/kg; Skin, rabbit: LD50 = 17800 uL/kg.
Carcinogenicity:
Ethylbenzene -
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology:

No information available.
Teratogenicity:
No information available.
Reproductive Effects:
No information available.
Neurotoxicity:
No information available.
Mutagenicity:
Mutation in mammalian somatic cells (Rodent,mouse) Lymphocyte = 80 mg/L.
Other Studies:
Standard Draize Test: Administration into the eye (rabbit) = 500 mg (Severe). Standard Draize Tes (Rabbit, Skin) = 15 mg/L; Mild.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Shrimp (mysidoposis bahia), LC50=87.6 mg/L/96hr. Sheepshead minnow LC50=275 mg/L/96hr. Fathead minnow LC50=42.3 mg/L/96hr in hard water &48.5 mg/L/96hr in softwater.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: ETHYLBENZENE
Hazard Class: 3
UN Number: UN1175
Packing Group: II
Canadian TDG
Shipping Name: ETHYL BENZENE
Hazard Class: 3(9.2)
UN Number: UN1175
Other Information: FLASHPOINT 15C

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 100-41-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 100-41-4: Effective Date: June 19, 1987; Sunset Date: June 19, 19 97
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 100-41-4: final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 100-41-4: acute, chronic, flammable.
Section 313
This material contains Ethylbenzene (CAS# 100-41-4, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
CAS# 100-41-4 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 100-41-4 is listed as a Hazardous Substance under the CWA.
CAS# 100-41-4 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 100-41-4 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Ethylbenzene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN F
Risk Phrases:
R 11 Highly flammable.
R 20 Harmful by inhalation.
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 24/25 Avoid contact with skin and eyes.
S 29 Do not empty into drains.
WGK (Water Danger/Protection)
CAS# 100-41-4: 1
United Kingdom Occupational Exposure Limits
CAS# 100-41-4: OES-United Kingdom, TWA 100 ppm TWA; 441 mg/m3 TWA
CAS# 100-41-4: OES-United Kingdom, STEL 125 ppm STEL; 552 mg/m3 STEL
Canada
CAS# 100-41-4 is listed on Canada's DSL List.
This product has a WHMIS classification of B2, D2B, D2A.
CAS# 100-41-4 is listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 100-41-4: OEL-AUSTRALIA:TWA 100 ppm (435 mg/m3);STEL 125 ppm (545 mg/m3)

OEL-BELGIUM:TWA 100 ppm (434 mg/m3);STEL 125 ppm (543 mg/m3)
OEL-CZECHOSLOVAKIA:TWA 200 mg/m3;STEL 1000 mg/m3
OEL-DENMARK:TWA 50 ppm (217 mg/m3)
OEL-FINLAND:TWA 100 ppm (435 mg/m3);STEL 150 ppm (655 mg/m3)
OEL-FRANCE:TWA 100 ppm (435 mg/m3)
OEL-GERMANY:TWA 100 ppm (440 mg/m3);Skin
OEL-HUNGARY:TWA 100 mg/m3;STEL 200 mg/m3;Skin
OEL-JAPAN:TWA 100 ppm (430 mg/m3)
OEL-THE NETHERLANDS:TWA 100 ppm (435 mg/m3)
OEL-THE PHILIPPINES:TWA 100 ppm (435 mg/m3)
OEL-POLAND:TWA 100 mg/m3
OEL-RUSSIA:TWA 100 ppm;STEL 50 mg/m3
OEL-SWEDEN:TWA 50 ppm (200 mg/m3);STEL 100 ppm (450 mg/m3)
OEL-SWITZERLAND:TWA 100 ppm (435 mg/m3);STEL 500 ppm
OEL-TURKEY:TWA 100 ppm (435 mg/m3)
OEL-UNITED KINGDOM:TWA 100 ppm (435 mg/m3);STEL 125 ppm
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 4/28/1999 Revision #2 Date: 8/02/2000

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 way 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.

TOSCO -- GASOLINE MID-GRADE UNLEADED

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MSDS Safety Information

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FSC: 9130
MSDS Date: 10/02/1996
MSDS Num: CFLWY
LIIN: 00N079570
Product ID: GASOLINE MID-GRADE UNLEADED
MFN: 01
Responsible Party
Cage: JO521
Name: TOSCO
Address: 72 CUMMINGS POINT RD
City: STAMFORD CT 06901
Info Phone Number: 360-384-1011
Emergency Phone Number: 510-228-1220
Published: Y

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Contractor Summary

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Cage: JO521
Name: TOSCO
Address: 72 CUMMINGS POINT RD
City: STAMFORD CT 06901
Phone: 360-384-1011
Cage: TXSCX
Name: TOSCO REFINING CO
Address: 2300 CLAYTON RD
City: CONCORD CA 94520
Phone: 800-424-9300 (CHEMTREC)

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Ingredients

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Cas: 108-88-3
RTECS #: XS5250000
Name: TOLUENE (SARA 313) (CERCLA)
% Wt: 2-8
OSHA PEL: 200 PPM
ACGIH TLV: 50 PPM, S
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 71-43-2
RTECS #: CY1400000
Name: BENZENE (SARA 313) (CERCLA)
% Wt: 0-3
OSHA PEL: SEE 1910.1028
ACGIH TLV: 10 PPM; A2
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Cas: 95-63-6
RTECS #: DC3325000
Name: BENZENE, 1,2,4-TRIMETHYL-; (1,2,4-TRIMETHYLBENZENE) (SARA 313)

% Wt: 0-2
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM

Cas: 100-41-4
RTECS #: DA0700000
Name: BENZENE, ETHYL-; (ETHYL BENZENE) (SARA 313)
% Wt: 0-2
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM/125 STEL
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 110-82-7
RTECS #: GU6300000
Name: CYCLOHEXANE (SARA 313) (CERCLA)
% Wt: 0-1
OSHA PEL: 300 PPM
ACGIH TLV: 300 PPM
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 64-17-5
RTECS #: KQ6300000
Name: ETHYL ALCOHOL (ETHANOL)
% Wt: 0-11
OSHA PEL: 1000 PPM
ACGIH TLV: 1000 PPM

Cas: 8006-61-9
RTECS #: LX3300000
Name: GASOLINE (CONTAINING INGREDIENTS 1-6; 8-10)
% Wt: 89-100
OSHA PEL: 300 PPM
ACGIH TLV: 300 PPM/500 STEL

Cas: 1634-04-4
RTECS #: KN5250000
Name: ETHER, TERT-BUTYL METHYL-; (METHYL TERT-BUTYL ETHER) (SARA 313) (CERCLA)
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Cas: 637-92-3
RTECS #: KN4730200
Name: ETHER, TERT-BUTYL ETHYL; (ETHYL TERT-BUTYL ETHER)
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Cas: 1330-20-7
RTECS #: ZE2100000
Name: XYLENE (SARA 313) (CERCLA)
% Wt: 5-10
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM/150 STEL

EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Name: EXPLAN OF CARCIN:OSHA REG:CFR 29 1910.1028. HUMAN:BLOOD. GASOLINE:IARC MONO, VOL 45, PG 159, 1989:GROUP 2B. ANIMAL:SKIN.

Name: EFTS OF OVEREXP: SECONDARY INFECTION. HIGH PRESS SKIN INJECTIONS ARE SERIOUS MED EMER. REQUIRE IMMED MED ATTN.

Name: ING 12: EYE: TRANSIENT IRRIT. INHAL: IRRIT. HARMFUL CNS EFTS. EXCITATION, EUPHORIA, HDCH, DIZZ, DROW, BLURRED

Name: ING 13: VISION, FATG, TREMORS, CONVLS, LOSS OF CONSCIOUSNESS, COMA, RESP ARREST & DEATH. ANEMIA & IRREG HEART

Name: ING 14: RHYTHM. BEHAVIORAL CHANGES. CHRONIC:ING 1:LONG-TERM CHRONIC BRONCH, IRRIT, INCRD SPUTUM, TIGHTNESS OF

Name: ING 15: CHEST, WHEEZING, DECRD ENDURANCE, DMG TO KIDNEYS & LIVER. ING 2:AFFECTS HEMATOPOIETIC SYS, BLOOD

Name: ING 16: DISORDERS, ANEMIA & PANCYTOPENIA. ING 5:CHRONIC BRONCH, INCRD SPUTUM, TIGHT CHEST, WHEEZING, DECRD

Name: ING 17: ENDURANCE. ING 10:DISTURB OF GI TRACT, DMG TO KIDNEYS & LIVER, EXPT REPRO HAZ & TERATOGEN. TOLUENE

Name: ING 18: APPEARS ON THE NAVY OCCUP CHEM REPRO HAZ LIST. SEEK CONSULT FROM APPROP HLTH PROFESSIONALS CONCERNING

Name: ING 19: LATEST HAZ LIST INFO & SAFE HNDLG & EXPOS INFO (FP N). CONTACT NEHC FOR MORE SPECIFIC INFORMATION (FP N).

Name: FIRST AID PROC: SKIN BARRIER IS MOST PROT. IN GEN, THERE IS NO SPECIFIC TREATMENT FOR HYDROCARBON EXPOS.

Name: ING 21: TREATMENT IS SUPPORTIVE. INHAL EXPOS TO GASOLINE VAP MOST COMMONLY OCCURS DURING INAPPROP USE OF

Name: ING 22: GASOLINE AS DEGREASER/SOLV. THIS EXPOS MAY BE EXACERBATED BY WORK IN CONFINED SPACE. GASOLINE COMPONENTS

Name: ING 23: HAVE BOTH IRRIT & ANESTH PROPERTIES. AT HIGH CONCS, IT CAN ACT AS SIMPLE ASPHY. GEN, INDIVIDUALS ACUTELY

Name: ING 24: EXPOSED TO ANESTH LEVELS OF EXPOS CAN REQUIRE RESUSCITATION & RESP SUPPORT. CONT NEHC FOR MORE INFO (FP N).
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Health Hazards Data
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LD50 LC50 Mixture: LD50 (ORAL RAT): 18.75 ML/KG.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: YES
IARC: YES

OSHA: YES

Effects of Exposure: ACUTE:INGS 1 & 10:IRRIT OF LUNGS, THROAT & AIRWAYS. SEV EYE IRRIT. CNS DEPRESS. ING 2:HARMFUL/FATAL. IRRIT TO SKIN & EYE. CNS DEPRESS. ING 3:IRRIT, CNS DEPRESS, BONE MARROW DEPRESS & ANEMIA. ING 4:IRRIT, PULM EDEMA, SENSE OF CONSTRICTION IN CHEST. DMG TO KIDNEYS & LIVER. EXPT TERATOGEN. ING 5:IRRIT. (EFTS OF OVEREXP)

Explanation Of Carcinogenicity: BENZENE: IARC MONO, VOL 7, PG 120, 1987: GROUP 1. NTP 7TH ANNUAL RPT ON CARCINS, 1994: KNOWN TO BE CARCIN.

Signs And Symptions Of Overexposure: HLTH HAZ: ING 6:IRRIT, CNS DEPRESS, REPRO & TERATOGENIC EFTS. ING 7:INHAL CAUSES DROW. CNS DEPRESS. ING 8:IRRIT, CNS DEPRESS, DMG TO LIVER & KIDNEYS, REPRO HAZ & TERATOGEN. INGEST: ASPIR MAY CAUSE PNEUMIT. GI DISTURB. IRRIT, NAUS, VOMIT, DI ARR. CNS SYMPS SIMILAR TO THOSE LISTED UNDER INHAL. SKIN: DERM & POSS

Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.

First Aid: EYE:FLUSH W/POTABLE WATER FOR AT LEAST 15 MIN. SEE MD (FP N). SKIN:FLUSH W/COPIOUS AMTS OF WATER. SEE MD (FP N). INHAL:REMOVE TO FRESH AIR. SUPPORT BRTHG (GIVE OXYGEN/ARTF RESP) (FP N). INGEST:CALL MD IMMED (FP N). NOTE TO MD:MOST IMPORTANT SOURCE OF EXPOS IS VIA INHAL. SEVERAL HYDROCARBON COMPONENTS RAPIDLY PASS THRU ALVEOLAR LINING. STOM MUCOSA PROVIDES GREATER BARRIER TO ABSORPTION &

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Handling and Disposal

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Spill Release Procedures: STOP LEAK. CAUTION. CONTACT CHEMTREC & LOCAL FIRE DEPARTMENT. KEEP AWAY. ISOLATE, DENY ENTRY. STAY UPWIND. VENTILATE. SHUT OFF IGNITION SOURCES. USE WATER SPRAY TO DISPERSE VAPORS. CONTACT NEHC FOR MORE SPECIFIC INFORMATION (FP N).

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS (FP N).

Handling And Storage Precautions: STORE GASOLINE ONLY IN NFPA APPRVD, CLEARLY LABELED CONTRS, TIGHTLY CLSD. NEVER STORE IN GLASS/UNAPPRVD PLASTIC CONTRS. AVOID EYE & SKIN CONT.

Other Precautions: STOR LOCATION MUST BE COOL, DRY, ISOLATED, WELL-VENTD &AWAY FROM HEAT, IGNIT SOURCES & INCOMPATIBLE MATLS. USE GROUNDING WIRES &EQUIP DURING PROD TRANSFER TO REDUCE POSS OF STATIC SPK CAUSED FIRE/EXPLO.CONT NEHC FOR MORE INFO (FP N).

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Fire and Explosion Hazard Information

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Flash Point Text: -35F,-37C

Lower Limits: 1.4%

Upper Limits: 7.6%

Extinguishing Media: USE DRY CHEMICAL, ALL PURPOSE AFFF, ALCOHOL FOAM OR CARBON DIOXIDE.

Fire Fighting Procedures: WEAR NIOSH APPRVD SCBA & FULL PROT EQUIP (FP N). WATER MAY BE INEFFECTIVE FOR EXTING FIRE BUT MAY BE USED TO COOL FIRE-IMPINGED/EXPANDED CONTRS & (SUP DAT)

Unusual Fire/Explosion Hazard: DANGEROUS WHEN EXPOS TO HEAT/FLAME. VAPS FORM FLAM/EXPLO MIXS W/AIR AT ROOM TEMP, MAY SPREAD TO DIST IGNIT SOURCES & FLASH BACK. CONT NEHC FOR MORE INFO (FP N).

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Control Measures

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Respiratory Protection: IF EXPOSURE LIMITS ARE EXCEEDED OR IF IRRITATION IS EXPERIENCED, NIOSH APPROVED RESPIRATORY PROTECTION SHOULD BE WORN.

Ventilation: VENTILATION AND OTHER FORMS OF ENGINEERING CONTROLS ARE THE RPEFERRED MEANS FOR CONTROLLING CHEMICAL EXPOSURES.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: ANSI APPROVED EMERGENCY EYEWASH AND DELUGE SHOWER (FP N). FACESHIELD, APRON, ARMCOVERS, ETC.
Work Hygienic Practices: WASH WORK CLTHG REGULARLY. DO NOT WEAR CONTAM CLTHG NEAR SOURCES OF IGNIT SUCH AS SPKS/OPEN FLAME, LAUNDER BEFORE REUSE.
Supplemental Safety and Health: FIRE FIGHT PROC: STRUCTURES. WATER MAY BE USED TO PROT PERS & KEEP MATL AWAY FROM IGNIT SOURCES. IF LEAK/SPILL HAS NOT IGNITED, VENT AREA & USE WATER SPRAY TO DISPERSE GAS/VAP & TO PROT PERS. FOAM BLANKETS MAY ALSO BE USED TO REDUCE VAPS & PROT RESPONDING PERS. KEEP MATL OUT OF PUBLIC SEWERS & WATERWAYS.

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Physical/Chemical Properties

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B.P. Text: >80F,>27C
Vapor Pres: 760 @ 100F
Vapor Density: 1.2
Spec Gravity: 0.72-0.74
Evaporation Rate & Reference: >1
Solubility in Water: NEGLIGIBLE
Appearance and Odor: CLEAR TO AMBER LIQUID WITH A STRONG HYDROCARBON ODOR
Percent Volatiles by Volume: 100

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Reactivity Data

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Stability Indicator: YES
Stability Condition To Avoid: NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: AVOID CONTACT WITH STRONG OXIDIZERS.
Hazardous Decomposition Products: COMBUSTION MAY PRODUCE CARBON MONOXIDE, CARBON DIOXIDE, AND REACTIVE HYDROCARBONS.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT.

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Toxicological Information

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Ecological Information

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MSDS Transport Information

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Regulatory Information

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Other Information

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HAZCOM Label

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Product ID: GASOLINE MID-GRADE UNLEADED
Cage: JO521
Assigned IND: Y
Company Name: TOSCO

Street: 72 CUMMINGS POINT RD
City: STAMFORD CT
Zipcode: 06901
Health Emergency Phone: 510-228-1220
Label Required IND: Y
Date Of Label Review: 10/21/1997
Status Code: C
Label Date: 10/21/1997
Origination Code: G
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Severe
Contact Hazard: Moderate
Fire Hazard: Severe
Reactivity Hazard: None
Hazard And Precautions: EXTREMELY FLAMMABLE. ACUTE: IRRITATING TO LUNGS, THROAT AND AIRWAYS. SEVERE EYE IRRITATION. CENTRAL NERVOUS SYSTEM DEPRESSION. HARMFUL OR FATAL. IRRITATING TO SKIN. BONE MARROW DEPRESSION AND ANEMIA. PULMONARY EDEMA, SENSE OF CONSTRICTION I N CHEST. DAMAGE TO KIDNEYS AND LIVER. INGESTION: MAY CAUSE ASPIRATION HAZARD-PNEUMONITIS, GASTROINTESTINAL DISTURBANCES, NAUSEA, VOMITING, DIARRHEA. CHRONIC: CANCER HAZARD. CONTAINS BENZENE WHICH IS LISTED AS A HUMAN BLOOD CARCINOGEN, AND G ASOLINE WHICH IS LISTED AS AN ANIMAL SKIN CARCINOGEN (FP N). TERATOGEN. KIDNEY AND LIVER DAMAGE.

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TOLUENE

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane
CAS No.: 108-88-3
Molecular Weight: 92.14
Chemical Formula: C6H5-CH3
Product Codes:
J.T. Baker: 5375, 5584, 5809, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476
Mallinckrodt: 4483, 8091, 8092, 8604, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.
Ingestion:
Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.
Skin Contact:
Causes irritation. May be absorbed through skin.
Eye Contact:
Causes severe eye irritation with redness and pain.
Chronic Exposure:
Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

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4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 7C (45F) CC
Autoignition temperature: 422C (792F)
Flammable limits in air % by volume:
lel: 3.3; uel: 19
Flammable liquid and vapor!
Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

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7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking

type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Toluene:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).
- ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) skin, A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Aromatic benzene-like.

Solubility:
0.05 gm/100gm water @ 20C (68F).

Specific Gravity:

0.86 @ 20C / 4 C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

111C (232F)

Melting Point:

-95C (-139F)

Vapor Density (Air=1):

3.14

Vapor Pressure (mm Hg):

22 @ 20C (68F)

Evaporation Rate (BuAc=1):

2.24

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10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Toxicological Data:

Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m3/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Has shown some evidence of reproductive effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Toluene (108-88-3)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II

Information reported for product/size: 390LB

15. Regulatory Information

```
  --------\Chemical Inventory Status - Part 1\-------------------------------
-
  Ingredient                                      TSCA  EC   Japan
Australia
  ----------------------------------------------  ----  ---  -----  --------
-
  Toluene (108-88-3)                               Yes  Yes   Yes      Yes

  --------\Chemical Inventory Status - Part 2\-------------------------------
-
                                                         --Canada--
  Ingredient                                      Korea  DSL   NDSL  Phil.
  ----------------------------------------------  -----  ---   ----  -----
  Toluene (108-88-3)                               Yes   Yes   No     Yes

  --------\Federal, State & International Regulations - Part 1\--------------
-
                                          -SARA 302-    ------SARA 313----
-
  Ingredient                              RQ    TPQ     List  Chemical
Catg.
  --------------------------------------  ---   -----   ----  ------------
-
  Toluene (108-88-3)                      No    No      Yes        No

  --------\Federal, State & International Regulations - Part 2\--------------
-
                                                      -RCRA-    -TSCA-
  Ingredient                              CERCLA      261.33     8(d)
  --------------------------------------  ------      ------    ------
  Toluene (108-88-3)                      1000        U220       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**

Label Hazard Warning:

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: PARA-XYLENE

MANUFACTURER/SUPPLIER:

Amoco Chemical Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735
EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)
OTHER PRODUCT SAFETY INFORMATION:
(312) 856-3907

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
P-Xylene	106-42-3	100

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Warning! Flammable. Causes eye and skin irritation. Can be harmful if high concentrations are inhaled. Harmful or fatal if liquid is aspirated into lungs.
POTENTIAL HEALTH EFFECTS:
EYE CONTACT: Causes eye irritation.
SKIN CONTACT: Causes skin irritation.
INHALATION: Can be harmful if high concentrations are inhaled. See "Toxicological Information" section (Section 11.0).
INGESTION: Harmful or fatal if liquid is aspirated into lungs. See "Toxicological Information" section (Section 11.0).
HMIS CODE: (Health:2) (Flammability:3) (Reactivity:0)
NFPA CODE: (Health:2) (Flammability:3) (Reactivity:0)

4.0 FIRST AID MEASURES

EYE: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.
SKIN: Wash exposed skin with soap and water. Remove contaminated clothing and thoroughly clean and dry before reuse. Get medical attention if irritation develops.
INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.
INGESTION: If swallowed, do NOT induce vomiting. Get immediate medical attention.

5.0 FIRE FIGHTING MEASURES

FLASHPOINT: 81°F(27°C) ASTM D56
UEL: 7.0%
LEL: 1.1%
AUTOIGNITION TEMPERATURE: 924°F (496°C) (approximate)

FLAMMABILITY CLASSIFICATION: Flammable Liquid.
EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable liquid. Vapor may explode if ignited in enclosed area.
FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.
PRECAUTIONS: Keep away from sources of ignition (e.g., heat and open flames). Keep container closed. Use with adequate ventilation.
HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

6.0 ACCIDENTAL RELEASE MEASURES

Remove or shut off all sources of ignition. Remove mechanically or contain on an absorbent material such as dry sand or earth. Keep out of sewers and waterways.

7.0 HANDLING AND STORAGE

HANDLING: Keep away from ignition sources (e.g., heat, sparks, or open flames). Keep container closed. Use with adequate ventilation.
STORAGE: Store in flammable liquids storage area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed.

8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Do not get in eyes. Wear chemical goggles.
SKIN: Avoid skin contact. Wear protective clothing and gloves.
INHALATION: Do not breathe mist or vapor. Use with adequate ventilation. If ventilation is inadequate, use NIOSH/MSHA certified respirator that will protect against organic vapor and dust/mist.
ENGINEERING CONTROLS: Control airborne concentrations below the exposure guidelines.
EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits
P-Xylene	106-42-3	OSHA PEL: 100 ppm (1989)(1971) OSHA STEL: 150 ppm (1989); Not established. (1971) ACGIH TLV-TWA: 100 ppm ACGIH TLV-STEL: 150 ppm

9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Liquid. Clear. Sweet odor.
pH: Not determined.
VAPOR PRESSURE: 6.4 mm Hg at 20 °C
VAPOR DENSITY: 3.7

BOILING POINT: 282°F(139°C)
MELTING POINT: 56°F(13°C)
SOLUBILITY IN WATER: Negligible, below 0.1%.
SPECIFIC GRAVITY (WATER=1): 0.86

10.0 STABILITY AND REACTIVITY

STABILITY: Burning can be started easily.
CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).
MATERIALS TO AVOID: Avoid chlorine, fluorine, and other strong oxidizers.
HAZARDOUS DECOMPOSITION: Burning can produce carbon monoxide and/or carbon dioxide and other harmful products.
HAZARDOUS POLYMERIZATION: Will not occur.

11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.

SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.

DERMAL LD50: Testing not conducted. See Other Toxicity Data.

ORAL LD50: Testing not conducted. See Other Toxicity Data.

INHALATION LC50: Testing not conducted. See Other Toxicity Data.

OTHER TOXICITY DATA: In humans, overexposure to xylene can cause headache, fatigue, dizziness, listlessness, confusion, irritability, gastrointestinal disturbances (nausea and loss of appetite), flushing of the face, and a feeling of increased body heat. Exposure to xylene vapors above recommended exposure limits (100 ppm - TWA) can cause irritation of the eyes, nose and throat as well as tightening of the chest and staggering gait. Severe overexposure to xylene has been reported to cause irregular heartbeat or rapid incoordinate contractions of the heart, tremors, central nervous system depression, and unconsciousness. Lethality has resulted upon exposure to 10,000 ppm. The odor threshold for xylene is reported to be 1 ppm.
Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lung can occur while vomiting after ingestion of this product.
The oral LD50 for xylene is 4300 mg/kg (rat). The inhalation LC50 is 6350 ppm in rats exposed for 4 hours and 3907 ppm in mice exposed for 6 hours.
No significant treatment related effects were seen following inhalation exposure of rats and dogs exposed t0 810 ppm for 13 weeks, whereas liver damage and lung inflammation were reported in guinea pigs exposed to 300 ppm for a total of 64 exposures (4 hours der day, 6 days per week). Xylenes were not teratogenic in rats exposed via inhalation to 100 and 400 ppm, however, adverse effects upon the unborn have been reported at exposure levels producing toxicity in the mother. Xylenes have produced negative results in various genetic toxicity tests, including the AMES assay, mouse lymphoma assay in vitro, rat bone marrow cytogenetic assay in vivo, and a dominant lethal assay.

No component of this product present at levels greater than 0.1% as a carcinogen by NTP, IARC or OSHA.

12.0 ECOLOGICAL INFORMATION

Ecotoxicity Test Data:
Para-xylene (p-xylene, or 4-xylene) is toxic to fish and other aquatic life. Published test results of the acute toxicity of of p-xylene for several aquatic species show that concentrations of 2 to 10 mg/L are acutely toxic to most species tested. Acute toxicity endpoints ranged from 2 to 35 mg/L, with a geometric mean of 7 mg/L. The para-isomer appears to be slightly more toxic than the meta- and ortho-isomers.
Biodegradation Potential:
Xylenes have been shown to be readily biodegradable in water using standard protocols with inocula including sewage, activated sludge, and seawater. Field data indicates biodegradation in several situations. However, reports suggest that p-xylene may persist in some groundwater situations. Rates of degradation are expected to vary with environmental conditions and the extent of adaptation of the microbial population.
Bioconcentration Potential:
P-xylene is not expected to bioconcentrate or bioaccumulate. A bioconcentration factor of 138 to 158 is predicted using the estimated octanol-water partition coefficient (log Kow) of 3.12 to 3.2. A bioconcentration factor of 20 was reported for eels. Metabolism and excretion of xylenes has been demonstrated in several organisms, generally via production of toluic acid. Significant bioconcentrations is unlikely if bioconcentration factors are less than 1000 and the chemical is metabolized.
Other Ecological Information:
P-xylene is expected to volatilize from water and soil with a relatively high Henry's law constant of 0.32, yielding an estimated half-life in water of less than 1 week. Sorption to soil is low to moderate, with the Koc of ortho-xylene being 48-68. Abiotic degradation in air occurs through reaction with photochemically produced hydroxyl radicals, resulting in typical losses of 67-86% per day. Xylenes are likely to move with groundwater from soils and to volatilize from both soil and surface waters.
The potential for long-term ecological effects to intermittent environmental releases is expected to be minimal. However, repeated discharges may cause long-term adverse effects in the aquatic environment.

13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations. Residues and spilled material are hazardous waste due to ignitability.
The container for this product can present explosion or fire hazards, even when emptied! To avoid risk of injury, do not cut, puncture, or weld on or near this container. Since the emptied containers retain product residue, follow label warnings even after container is emptied.

14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name	Xylenes
Hazard Class	3
Identification Number	UN1307
Packing Group	III
RQ	RQ (Para-Xylene)

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name	Xylenes
Class	3.3
Packing Group	III
UN Number	UN1307

Air (ICAO/IATA)

Shipping Name	Xylenes
Class	3
Subsidiary Class	UN1307
Packing Group	III

European Road/Rail (ADR/RID)

Shipping Name	Xylenes
Class	3
Item	31°(C)

Canadian Transportation of Dangerous Goods

Shipping Name	Xylenes
Hazard Class	3.3
Subsidiary Class	9.2
UN Number	UN1307
Packing Group	III

15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is reportable under 40 CFR Part 302.4 because it contains the following substance(s):

Component/CAS Number	Weight %	Component Reportable Quantity (RQ)
P-Xylene 106-42-3	100	100 lbs.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.
SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370): This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).
SARA TITLE III SECTION 313 (40 CFR Part 372): This product contains the following substance(s), which is on the Toxic Chemicals List in 40 CFR Part 372:

Component/CAS Number	Weight Percent

P-Xylene 106-42-3	100

U.S. INVENTORY (TSCA): Listed on inventory.
OSHA HAZARD COMMUNICATION STANDARD: Flammable liquid. Irritant.
EC INVENTORY (EINECS/ELINCS): In compliance.
JAPAN INVENTORY (MITI): Not determined.
AUSTRALIA INVENTORY (AICS): Not determined.
KOREA INVENTORY (ECL): Not determined.
CANADA INVENTORY (DSL): Not determined.
PHILIPPINE INVENTORY (PICCS): Not determined.

16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department
Issued: March 28, 1997
Supersedes: February 27, 1996

This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.
This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: PAH Contaminated Soil
Catalog Numbers:
SRS103 100, SRS103100
Synonyms:
API separator sludge
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
50-32-8	Benzo(a)pyrene	0-2	200-028-5
56-55-3	1,2-Benzanthracene	0-2	200-280-6
83-32-9	Acenaphthene	0-2	201-469-6
85-01-8	Phenanthrene	0-2	201-581-5
86-73-7	Fluorene	0-2	201-695-5
87-86-5	Pentachlorophenol	0-2	201-778-6
91-20-3	Naphthalene	0-2	202-049-5
91-57-6	2-methylnaphthalene	0-2	202-078-3
120-12-7	Anthracene	0-2	204-371-1
129-00-0	Pyrene	0-2	204-927-3
132-64-9	Dibenzofuran	0-2	205-071-3
205-99-2	Benzo(b)fluoranthene	0-2	205-911-9

|----------------|--------------------------------------|----------|---------
--|
| 206-44-0 |Fluoranthene | 0-2 | 205-912-4 |
|----------------|--------------------------------------|----------|---------
--|
| 208-96-8 |Acenaphthylene | 0-2 | 205-917-1 |
|----------------|--------------------------------------|----------|---------
--|
| 218-01-9 |1,2-benzphenanthrene | 0-2 | 205-923-4 |
|----------------|--------------------------------------|----------|---------
--|
| Not available |Soil | 78-99 | unlisted |
+----------------+--------------------------------------+----------+---------
--+
Hazard Symbols: None Listed.
Risk Phrases: None Listed.

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Appearance: not available.
Caution! Causes skin irritation. Causes eye irritation. May cause allergic skin reaction. Causes digestive tract irritation. May cause digestive tract irritation with nausea, vomiting, and diarrhea. May cause cancer based on animal studies.
Target Organs: None.

Potential Health Effects
Eye:
May cause eye irritation.
Skin:
May cause skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion:
May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Naphthalene can cause cataracts, optical neuritis, and cornea injuries. Ingestion of large quantities may cause severe hemolytic anemia and
Inhalation:
Causes respiratory tract irritation. May cause effects similar to those described for ingestion.
Chronic:
May cause cancer according to animal studies. Prolonged exposure to respirable crystalline quartz may cause delayed lung injury/fibrosis (silicosis).

**** 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:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:
Treat symptomatically and

**** 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.
Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.
Autoignition Temperature:Not available.
Flash Point: Not available.
Explosion Limits, lower:Not available.
Explosion Limits, upper:Not available.
NFPA Rating: Not published.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash hands before eating. Use with adequate ventilation. Avoid contact with skin and eyes. Keep container tightly closed. Avoid ingestion and inhalation.
Storage:
Store in a cool, dry place.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzo(a)pyrene	0.2 mg/m3 (as	none listed	benzene soluble

	benzene solubles)		fraction: 0.2
	(listed under **		mg/m3 TWA
	no name **).		(includes
			anthracene, BaP,
			phenanthrene,
			acridine,
			chrysene, and
			pyrene) (listed
			under ** no
			name **).
1,2-Benzanthracene	none listed	none listed	none listed
Acenaphthene	none listed	none listed	none listed
Phenanthrene	0.2 mg/m3 (as	none listed	benzene soluble
	benzene solubles)		fraction: 0.2
	(listed under **		mg/m3 TWA
	no name **).		(includes
			anthracene, BaP,
			phenanthrene,
			acridine,
			chrysene, and
			pyrene) (listed
			under ** no
			name **).
Fluorene	none listed	none listed	none listed
Pentachlorophenol	0.5 mg/m3; skin -	0.5 mg/m3 TWA	0.5 mg/m3 TWA
	potential for	2.5 mg/m3 IDLH	
	cutaneous		
	absorption		
Naphthalene	10 ppm; 15 ppm	10 ppm TWA; 50	10 ppm TWA; 50
	STEL; skin -	mg/m3 TWA 250	mg/m3 TWA
	potential for	ppm IDLH	
	cutaneous		
	absorption		
2-methylnaphthalene	none listed	none listed	none listed
Anthracene	0.2 mg/m3 (as	none listed	benzene soluble
	benzene solubles)		fraction: 0.2
	(listed under **		mg/m3 TWA
	no name **).		(includes
			anthracene, BaP,
			phenanthrene,
			acridine,

			chrysene, and
			pyrene) (listed
			under ** no
			name **).
Pyrene	0.2 mg/m3 (as	none listed	benzene soluble
	benzene solubles)		fraction: 0.2
	(listed under **		mg/m3 TWA
	no name **).		(includes
			anthracene, BaP,
			phenanthrene,
			acridine,
			chrysene, and
			pyrene) (listed
			under ** no
			name **).
Dibenzofuran	none listed	none listed	none listed
Benzo(b)fluoranthen	none listed	none listed	none listed
e			
Fluoranthene	none listed	none listed	none listed
Acenaphthylene	none listed	none listed	none listed
1,2-benzphenanthren	0.2 mg/m3 (as	none listed	benzene soluble
e	benzene solubles)		fraction: 0.2
	(listed under **		mg/m3 TWA
	no name **).		(includes
			anthracene, BaP,
			phenanthrene,
			acridine,
			chrysene, and
			pyrene) (listed
			under ** no
			name **).

OSHA Vacated PELs:
Benzo(a)pyrene:
benzene soluble fraction: 0.2 mg/m3 TWA (anthracene, BaP, phenathrene, acridine, (listed under ** no name **)
1,2-Benzanthracene:
No OSHA Vacated PELs are listed for this chemical.
Acenaphthene:
No OSHA Vacated PELs are listed for this chemical.
Phenanthrene:
benzene soluble fraction: 0.2 mg/m3 TWA (anthracene, BaP,

phenathrene, acridine, (listed under ** no name **)
Fluorene:
No OSHA Vacated PELs are listed for this chemical.
Pentachlorophenol:
0.5 mg/m3 TWA
Naphthalene:
10 ppm TWA; 50 mg/m3 TWA; 15 ppm STEL; 75 mg/m3 STEL
2-methylnaphthalene:
No OSHA Vacated PELs are listed for this chemical.
Anthracene:
benzene soluble fraction: 0.2 mg/m3 TWA (anthracene, BaP, phenathrene, acridine, (listed under ** no name **)
Pyrene:
benzene soluble fraction: 0.2 mg/m3 TWA (anthracene, BaP, phenathrene, acridine, (listed under ** no name **)
Dibenzofuran:
No OSHA Vacated PELs are listed for this chemical.
Benzo(b)fluoranthene:
No OSHA Vacated PELs are listed for this chemical.
Fluoranthene:
No OSHA Vacated PELs are listed for this chemical.
Acenaphthylene:
No OSHA Vacated PELs are listed for this chemical.
1,2-benzphenanthrene:
benzene soluble fraction: 0.2 mg/m3 TWA (anthracene, BaP, phenathrene, acridine, (listed under ** no name **)

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 gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Solid
Appearance: not available
Odor: none reported
pH: Not available.
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: Not available.

Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility in water: Insoluble in water.
Specific Gravity/Density: Not available.
Molecular Formula: Mixture
Molecular Weight: 0

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
High temperatures.
Incompatibilities with Other Materials:
None reported.
Hazardous Decomposition Products:
No data available.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 50-32-8: DJ3675000
CAS# 56-55-3: CV9275000
CAS# 83-32-9: AB1000000
CAS# 85-01-8: SF7175000
CAS# 86-73-7: LL5670000
CAS# 87-86-5: SM6300000
CAS# 91-20-3: QJ0525000
CAS# 91-57-6: QJ9635000
CAS# 120-12-7: CA9350000
CAS# 129-00-0: UR2450000
CAS# 132-64-9: HP4430000
CAS# 205-99-2: CU1400000
CAS# 206-44-0: LL4025000
CAS# 208-96-8: AB1254000
CAS# 218-01-9: GC0700000
LD50/LC50:
Not available.
Not available.
Not available.
CAS# 85-01-8: Oral, mouse: LD50 = 700 mg/kg.
CAS# 86-73-7.
CAS# 87-86-5: Draize test, rabbit, eye: 100 uL/24 Mild; Inhalation, mouse: LC50 = 225 mg/m3; Inhalation, rat: LC50 = 355 mg/m3; Oral, mouse: LD50 = 36 mg/kg; Oral, rat: LD50 = 27 mg/kg; Skin, rat: LD50 = 96 mg/kg.
CAS# 91-20-3: Draize test, rabbit, eye: 100 mg Mild; Inhalation, rat: LC50 = >340 mg/m3/1H; Oral, mouse: LD50 = 533 mg/kg; Oral, rat: LD50 = 490 mg/kg; Skin, rabbit: LD50 = >20 gm/kg; Skin, rat: LD50 = >2500 mg/kg.
CAS# 91-57-6: Oral, rat: LD50 = 1630 mg/kg.
CAS# 120-12-7.
CAS# 129-00-0: Draize test, rabbit, skin: 500 mg/24H Mild; Inhalation, rat: LC50 = 170 mg/m3; Oral, mouse: LD50 = 800 mg/kg; Oral, rat: LD50 = 2700 mg/kg.

CAS# 132-64-9.
CAS# 205-99-2.
CAS# 206-44-0: Oral, rat: LD50 = 2 gm/kg; Skin, rabbit: LD50 = 3180 mg/kg.
CAS# 208-96-8: Oral, mouse: LD50 = 1760 mg/kg.
CAS# 218-01-9.
Carcinogenicity:
Benzo(a)pyrene -
ACGIH: A2 - Suspected Human Carcinogen
California: carcinogen; initial date 7/1/87
NIOSH: occupational carcinogen (listed as ** undefined **)
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2A carcinogen
1,2-Benzanthracene -
ACGIH: A2 - Suspected Human Carcinogen
California: carcinogen; initial date 7/1/87
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2A carcinogen
Acenaphthene -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Phenanthrene -
ACGIH: A1 - Confirmed Human Carcinogen (Benzene soluble aerosol)
NIOSH: occupational carcinogen (listed as ** undefined **)
OSHA: Select carcinogen (listed as ** undefined **).
IARC: Group 3 carcinogen
Fluorene -
IARC: Group 3 carcinogen
Pentachlorophenol -
ACGIH: A3 - Animal Carcinogen
California: carcinogen; initial date 1/1/90
Naphthalene -
ACGIH: A4 - Not Classifiable as a Human Carcinogen
2-methylnaphthalene -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Anthracene -
ACGIH: A1 - Confirmed Human Carcinogen (Benzene soluble aerosol)
NIOSH: occupational carcinogen (listed as ** undefined **)
OSHA: Select carcinogen (listed as ** undefined **).
IARC: Group 3 carcinogen
Pyrene -
ACGIH: A1 - Confirmed Human Carcinogen (Benzene soluble aerosol)
NIOSH: occupational carcinogen (listed as ** undefined **)
OSHA: Select carcinogen (listed as ** undefined **).
IARC: Group 3 carcinogen
Dibenzofuran -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Benzo(b)fluoranthene -
ACGIH: A2 - Suspected Human Carcinogen
California: carcinogen; initial date 7/1/87
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Fluoranthene -
IARC: Group 3 carcinogen
Acenaphthylene -

Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
1,2-benzphenanthrene -
ACGIH: A3 - Animal Carcinogen
California: carcinogen; initial date 1/1/90
NIOSH: occupational carcinogen (listed as ** undefined **)
OSHA: Select carcinogen (listed as ** undefined **).
IARC: Group 3 carcinogen

**** SECTION 12 - ECOLOGICAL INFORMATION ****

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 50-32-8: waste number U022. CAS# 56-55-3: waste number U018. CAS# 91-20-3: waste number U165. CAS# 206-44-0: waste number U120. CAS# 218-01-9: waste number U050.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
No information available
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 50-32-8 is listed on the TSCA inventory.
CAS# 56-55-3 is listed on the TSCA inventory.
CAS# 83-32-9 is listed on the TSCA inventory.
CAS# 85-01-8 is listed on the TSCA inventory.
CAS# 86-73-7 is listed on the TSCA inventory.
CAS# 87-86-5 is listed on the TSCA inventory.
CAS# 91-20-3 is listed on the TSCA inventory.
CAS# 91-57-6 is listed on the TSCA inventory.
CAS# 120-12-7 is listed on the TSCA inventory.
CAS# 129-00-0 is listed on the TSCA inventory.
CAS# 132-64-9 is listed on the TSCA inventory.
CAS# 205-99-2 is not listed on the TSCA inventory.
It is for research and development use only.
CAS# 206-44-0 is listed on the TSCA inventory.
CAS# 208-96-8 is listed on the TSCA inventory.
CAS# 218-01-9 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 91-20-3: Effective Date: June 1, 1987; Sunset Date: June 1, 1997

CAS# 129-00-0: Effective Date: June 1, 1987; Sunset Date: June 1, 1997
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 50-32-8: final RQ = 1 pound (0.454 kg)
CAS# 56-55-3: final RQ = 10 pounds (4.54 kg)
CAS# 83-32-9: final RQ = 100 pounds (45.4 kg)
CAS# 85-01-8: final RQ = 5000 pounds (2270 kg)
CAS# 86-73-7: final RQ = 5000 pounds (2270 kg)
CAS# 87-86-5: final RQ = 10 pounds (4.54 kg)
CAS# 91-20-3: final RQ = 100 pounds (45.4 kg)
CAS# 120-12-7: final RQ = 5000 pounds (2270 kg)
CAS# 129-00-0: final RQ = 5000 pounds (2270 kg)
CAS# 132-64-9: final RQ = 100 pound (45.4 kg)
CAS# 205-99-2: final RQ = 1 pound (0.454 kg)
CAS# 206-44-0: final RQ = 100 pounds (45.4 kg)
CAS# 208-96-8: final RQ = 5000 pounds (2270 kg)
CAS# 218-01-9: final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
CAS# 129-00-0: TPQ = 1000/10,000 pounds; RQ = 5000 pounds (calculated TPQ changed after technic al review as described in the technical support document)
SARA Codes
CAS # 50-32-8: acute, chronic.
CAS # 83-32-9: acute.
CAS # 85-01-8: acute.
CAS # 91-20-3: acute, chronic, flammable.
CAS # 91-57-6: acute.
CAS # 120-12-7: acute.
CAS # 129-00-0: acute, chronic.
CAS # 206-44-0: acute.
Section 313
This chemical is not at a high enough concentration to be reportable under Section 313.
This chemical is not at a high enough concentration to be reportable under Section 313.
This chemical is not at a high enough concentration to be reportable under Section 313.
This material contains Pentachlorophenol (CAS# 87-86-5, 0 2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
This chemical is not at a high enough concentration to be reportable under Section 313.
This chemical is not at a high enough concentration to be reportable under Section 313.
This chemical is not at a high enough concentration to be reportable under Section 313.
This chemical is not at a high enough concentration to be reportable under Section 313.
This chemical is not at a high enough concentration to be reportable under Section 313.
This chemical is not at a high enough concentration to be reportable

under Section 313.
Clean Air Act:
CAS# 87-86-5 is listed as a hazardous air pollutant (HAP).
CAS# 91-20-3 is listed as a hazardous air pollutant (HAP).
CAS# 132-64-9 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 87-86-5 is listed as a Hazardous Substance under the CWA.
CAS# 91-20-3 is listed as a Hazardous Substance under the CWA.
CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 56-55-3 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 83-32-9 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 86-73-7 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 87-86-5 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 91-20-3 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 120-12-7 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 129-00-0 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 205-99-2 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 206-44-0 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 208-96-8 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 83-32-9 is listed as a Toxic Pollutant under the Clean Water Act.
CAS# 87-86-5 is listed as a Toxic Pollutant under the Clean Water Act.
CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.
CAS# 206-44-0 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Benzo(a)pyrene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
1,2-Benzanthracene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
Acenaphthene can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.
Phenanthrene can be found on the following state right to know lists:

California, New Jersey, Pennsylvania, Minnesota, (listed as ** no name **), Massachusetts.
Fluorene can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.
Pentachlorophenol can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
Naphthalene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
2-methylnaphthalene is not present on state lists from CA, PA, MN, MA, FL, or NJ.
Anthracene can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as ** no name **), Massachusetts.
Pyrene can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as ** no name **), Massachusetts.
Dibenzofuran can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.
Benzo(b)fluoranthene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
Fluoranthene can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.
Acenaphthylene can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.
1,2-benzphenanthrene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Benzo(a)pyrene, a chemical known to the state of California to cause cancer.
WARNING: This product contains 1,2-Benzanthracene, a chemical known to the state of California to cause cancer.
WARNING: This product contains Pentachlorophenol, a chemical known to the state of California to cause cancer.
WARNING: This product contains Benzo(b)fluoranthene, a chemical known to the state of California to cause cancer.
WARNING: This product contains 1,2-benzphenanthrene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level:
CAS# 50-32-8: no significant risk level = 0.06 ug/day
CAS# 87-86-5: no significant risk level = 40 ug/day
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:
WGK (Water Danger/Protection)
CAS# 50-32-8: No information available.
CAS# 56-55-3: No information available.
CAS# 83-32-9: No information available.
CAS# 85-01-8: No information available.
CAS# 86-73-7: No information available.
CAS# 87-86-5: 3

CAS# 91-20-3: 2
CAS# 91-57-6: No information available.
CAS# 120-12-7: 2
CAS# 129-00-0: No information available.
CAS# 132-64-9: No information available.
CAS# 205-99-2: No information available.
CAS# 206-44-0: No information available.
CAS# 208-96-8: No information available.
CAS# 218-01-9: No information available.
United Kingdom Occupational Exposure Limits
CAS# 87-86-5: OES-United Kingdom, TWA 0.5 mg/m3 TWA
CAS# 87-86-5: OES-United Kingdom, STEL 1.5 mg/m3 STEL
CAS# 91-20-3: OES-United Kingdom, TWA 10 ppm TWA; 53 mg/m3 TWA
CAS# 91-20-3: OES-United Kingdom, STEL 15 ppm STEL; 80 mg/m3 STEL
CAS# 91-20-3: OES-United Kingdom, STEL 15 ppm STEL; 80 mg/m3 STEL

Canada
CAS# 50-32-8 is listed on Canada's DSL List.
CAS# 56-55-3 is listed on Canada's NDSL List.
CAS# 83-32-9 is listed on Canada's DSL List.
CAS# 85-01-8 is listed on Canada's DSL List.
CAS# 86-73-7 is listed on Canada's DSL List.
CAS# 87-86-5 is listed on Canada's DSL List.
CAS# 91-20-3 is listed on Canada's DSL List.
CAS# 91-57-6 is listed on Canada's DSL List.
CAS# 120-12-7 is listed on Canada's DSL List.
CAS# 129-00-0 is listed on Canada's DSL List.
CAS# 132-64-9 is listed on Canada's DSL List.
CAS# 206-44-0 is listed on Canada's NDSL List.
CAS# 208-96-8 is listed on Canada's NDSL List.
CAS# 218-01-9 is listed on Canada's DSL List.
This product has a WHMIS classification of D2A.
CAS# 50-32-8 is listed on Canada's Ingredient Disclosure List.
CAS# 56-55-3 is listed on Canada's Ingredient Disclosure List.
CAS# 83-32-9 is listed on Canada's Ingredient Disclosure List.
CAS# 85-01-8 is listed on Canada's Ingredient Disclosure List.
CAS# 86-73-7 is not listed on Canada's Ingredient Disclosure List.
CAS# 87-86-5 is not listed on Canada's Ingredient Disclosure List.
CAS# 91-20-3 is listed on Canada's Ingredient Disclosure List.
CAS# 91-57-6 is not listed on Canada's Ingredient Disclosure List.
CAS# 120-12-7 is listed on Canada's Ingredient Disclosure List.
CAS# 129-00-0 is listed on Canada's Ingredient Disclosure List.
CAS# 132-64-9 is not listed on Canada's Ingredient Disclosure List.
CAS# 205-99-2 is listed on Canada's Ingredient Disclosure List.
CAS# 206-44-0 is listed on Canada's Ingredient Disclosure List.
CAS# 208-96-8 is not listed on Canada's Ingredient Disclosure List.
CAS# 218-01-9 is listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 50-32-8: OEL-AUSTRALIA;Carcinogen
OEL-BELGIUM;Carcinogen
OEL-FINLAND:TWA 0.01 mg/m3;Skin;Carcinogen
OEL-FRANCE;Carcinogen
OEL-GERMANY;Carcinogen
OEL-RUSSIA:STEL 0.00015 mg/m3;Carcinogen
OEL-SWEDEN:TWA 0.005 mg/m3;STEL 0.03 mg/m3;Skin
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV
CAS# 56-55-3: OEL-FRANCE;Carcinogen
CAS# 83-32-9: OEL-RUSSIA:STEL 10 mg/m3
CAS# 85-01-8 (listed as ** undefined **): OEL-UNITED KINGDOM:TWA 0.14 mg/m3 JANUARY 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV
CAS# 86-73-7: Not available.
CAS# 87-86-5: OEL-AUSTRALIA:TWA 0.5 mg/m3;Skin
OEL-BELGIUM:TWA 0.5 mg/m3;Skin
OEL-DENMARK:TWA 0.05 ppm (0.5 mg/m3);Skin
OEL-FINLAND:TWA 0.5 mg/m3;STEL 1.5 mg/m3;Skin
OEL-FRANCE:TWA 0.5 mg/m3;Skin
OEL-GERMANY:TWA 0.005 ppm (0.05 mg/m3);Skin
OEL-HUNGARY:TWA 0.2 mg/m3;STEL 0.4 mg/m3;Skin
OEL-JAPAN:TWA 0.5 mg/m3;Skin
OEL-THE NETHERLANDS:TWA 0.5 mg/m3;Skin
OEL-THE PHILIPPINES:TWA 0.5 mg/m3;Skin
OEL-RUSSIA:STEL 0.1 mg/m3;Skin
OEL-SWEDEN:TWA 0.5 mg/m3;STEL 1.5 mg/m3;Skin JAN9
OEL-SWITZERLAND:TWA 0.05 ppm (0.5 mg/m3);STEL 0.1 ppm;Skin
OEL-TURKEY:TWA 0.5 mg/m3;Skin
OEL-UNITED KINGDOM:TWA 0.5 mg/m3;STEL 1.5 mg/m3;Skin
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV
CAS# 91-20-3: OEL-ARAB Republic of Egypt:TWA 10 ppm (50 mg/m3)
OEL-AUSTRALIA:TWA 10 ppm (50 mg/m3);STEL 15 ppm (75 mg/m3)
OEL-BELGIUM:TWA 10 ppm (52 mg/m3);STEL 15 ppm (79 mg/m3)
OEL-DENMARK:TWA 10 ppm (50 mg/m3)
OEL-FINLAND:TWA 10 ppm (50 mg/m3);STEL 20 ppm (10 mg/m3)
OEL-FRANCE:TWA 10 ppm (50 mg/m3)
OEL-GERMANY:TWA 10 ppm (50 mg/m3)
OEL-HUNGARY:TWA 40 mg/m3;STEL 80 mg/m3;Skin
OEL-THE NETHERLANDS:TWA 10 ppm (50 mg/m3)
OEL-THE PHILIPPINES:TWA 10 ppm (50 mg/m3)
OEL-POLAND:TWA 20 mg/m3
OEL-RUSSIA:STEL 20 mg/m3
OEL-SWITZERLAND:TWA 10 ppm (50 mg/m3)
OEL-UNITED KINGDOM:TWA 10 ppm (50 mg/m3);STEL 15 ppm (75 mg/m3)
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV
CAS# 91-57-6: OEL-RUSSIA:STEL 20 mg/m3
CAS# 120-12-7 (listed as ** undefined **): OEL-UNITED KINGDOM:TWA 0.14 mg/m3 JANUARY 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV
CAS# 129-00-0 (listed as ** undefined **): OEL-UNITED KINGDOM:TWA 0.14 mg/m3 JANUARY 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV
CAS# 205-99-2: OEL-FRANCE;Carcinogen
OEL-GERMANY;Carcinogen
CAS# 206-44-0: Not available.
CAS# 208-96-8: Not available.
CAS# 218-01-9: OEL-AUSTRALIA;Carcinogen
OEL-BELGIUM;Carcinogen
OEL-GERMANY;Carcinogen

OEL-SWITZERLAND;Carcinogen
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/02/1997 Revision #2 Date: 8/02/2000

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 way 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.

ENVIRONMENTAL RESOURCE ASSOC -- PCBS IN SOIL (LAB STD), AROCLOR 1260 -- 6665-00N069068

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MSDS Safety Information

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FSC: 6665
MSDS Date: 06/09/1994
MSDS Num: CCBVL
LIIN: 00N069068
Tech Review: 03/13/1996
Product ID: PCBS IN SOIL (LAB STD), AROCLOR 1260
Responsible Party
Cage: 1R664
Name: ENVIRONMENTAL RESOURCE ASSOC
Address: 5540 MARSHALL ST
City: ARVADA CA 80002 US
Info Phone Number: 303-431-8454
Emergency Phone Number: 303-431-8454
Review Ind: N

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Contractor Summary

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Cage: 1R664
Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Address: 5540 MARSHALL STREET
City: ARVADA CO 80002 US
Phone: 303-431-8454

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Ingredients

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Cas: 1336-36-3
RTECS #: TQ1350000
Name: POLYCHLORINATED BIPHENYLS (PCBS); (POLYCHLOROBIPHENYLS) (SARA 313) (CERCLA)
% by Wt: <0.01
OSHA PEL: N/K (FP N)
ACGIH TLV: 1 MG/M3
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB
Ozone Depleting Chemical: N

Name: SOIL; (CLEAN SOIL)
% by Wt: >99.0
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Cas: 11096-82-5
RTECS #: TQ1362000
Name: POLYCHLORINATED BIPHENYL (AROCCLOR 1260); (AROCLOR 1260) (SARA 313) (CERCLA)
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB
Ozone Depleting Chemical: N

Name: SUPDAT:CARCINS, 1994:ANTIC TO BE CARCIN. ANIMAL:LIVER.

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Health Hazards Data
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LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: YES
IARC: YES
OSHA: NO
Effects of Exposure: PRIMARY IRRIT. IRRIT & DMGS ALL TISS. MAY CAUSE LIVER, KIDNEY & LUNG DAMAGE. MAY CAUSE CARDIAC ARRHY, MAY SENSIT HEART TO EPINEPHRINE. MAY CAUSE ALLERGIC DERM/CHLORACNE. MAY CAUSE CANCER OF LIVER OR H EMATOPOEITIC SYS. SYMPS:RED, DRY SCALY SKIN; CRACKING & WEEPING SKIN, COUGH & WHEEZING. JAUNDICE, NAUS (EFTS OF OVEREXP)
Explanation Of Carcinogenicity: POLYCHLOROBIPHENYLS:IARC MONOGRAPHS, SUPP, VOL 7, PG 322, 1987:GROUP 2A. NTP 7TH ANNUAL RPT ON CARCINS. 1994:(SUPDAT)
Signs And Symptions Of Overexposure: EFTS OF OVEREXP:& VOMIT; UREMIA. MAY CAUSE CHLORACNE. CHLOROCARB MATLS HAVE PRDCED SENSIT OF MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & COULD HAVE SIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEPHR INE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY/CHRONICALLY EXPOSED TO CHLOROCARBS(SUPDAT)
Medical Cond Aggravated By Exposure: DERMATITIS, LIVER DISEASE, KIDNEY DISEASE, ANEMIAS AND LEUKOPENIAS.
First Aid: EYES:IMMEDIATELY FLUSH W/POTABLE WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD (FP N). INHALATION:REMOVE FROM EXPOSURE. INGESTION:GIVE SYRUP OF IPECAC 30 CC AND 180 CC (6 OZ) WATER IF SWA LLOWED. SKIN:WASH SKIN.
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Handling and Disposal
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Spill Release Procedures: VENTILATE AREA. DAMPEN WITH WATER SPRAY TO PREVENT DUST DISPERSION. CALL CLEANUP TEAM. DO NOT FLUSH TO DRAIN OR OPEN WATER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N). INCINERATE OR DISPOSE AS HAZARDOUS WASTE.
Handling And Storage Precautions: ONLY 1 AROCLOR WILL BE PRESENT IN EACH SAMPLE. AROCLORS ARE ABSORBED TO INERT MICRO-PARTICULATE CLAY. HANDLE WITH CARE. MATERIAL CONTAINS CARCINOGENS.
Other Precautions: NO SMOKING IN AREA OF USE. DO NOT USE IN GEN VICIN OF ARC WELDING, OPEN FLAMES/HOT SURFS. HEAT &/OR UV RADIA MAY CAUSE FORM OF HCL &/OR PHOSGENE (FP N). AVOID BREAKAGE. USE IN AREA WHERE SPILLS CAN BE CONTAINED.
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Fire and Explosion Hazard Information
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Flash Point Text: NON-FLAMMABLE
Extinguishing Media: MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).
Fire Fighting Procedures: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire/Explosion Hazard: MAY FORM CARBON MONOXIDE, PHOSGENE, AND CARBONYL BROMIDE IN FIRE. (SIGNIFICANT ONLY IF LG QTY INVOLVED). THERMAL DECOMPOSITION PRODS MAY INCLUDE HCL (FP N).
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Control Measures
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Respiratory Protection: NIOSH/MSHA APPROVED PARTICULATE OR COMBINED VAPOR/PARTICULATE FULL FACE RESPIRATOR OR NIOSH/MSHA APPROVED SELF CONT/POSITIVE PRESSURE FULL FACE UNIT.
Ventilation: LOCAL EXHAUST:USE IN HOOD. SPECIAL:VENTILATE SPILLS.
Protective Gloves: VITON OR NEOPRENE GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: ANSI APPRVD EMER EYEWASH & DELUGE SHOWER (FP N). CHEM IMPERVIOUS CLTHG IF LG AMTS USED. LAB COAT, IMPERVIOUS (SUP DAT)
Work Hygienic Practices: USE CAREFUL LABORATORY TECHNIQUE. AVOID CONTACT.
Supplemental Safety and Health: EFTS OF OVEREXP:(FP N). SEVERAL POLYCHLOROBIPHENYLS ARE ANIMAL POS, HUMAN SUSPECT, CARCINS. THESE SAMPLES SHOULD BE HNDLD W/GREAT CARE. OTHER PROT EQUIP:APRON W/SLEEVE & CLSD SHOES. EXPLAN OF CARCINS: ANTIC TO BE CARCIN. ANIMAL:TUMORS OF LIVER, PITUITARY GLAND, LEUKEMIA. AROCLOR 1260:NTP 7TH ANNUAL RPT ON (ING 4)
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Physical/Chemical Properties
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Solubility in Water: INSOLUBLE
Appearance and Odor: FINE GREY POWDER; ODORLESS.
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Reactivity Data
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Stability Indicator: YES
Stability Condition To Avoid: NONE
Materials To Avoid: NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products: HCL, PHOSGENE (FP N).
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT
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Toxicological Information
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Ecological Information
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MSDS Transport Information
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Regulatory Information
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Other Information
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HAZCOM Label
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Product ID: PCBS IN SOIL (LAB STD), AROCLOR 1260
Cage: 1R664
Company Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Street: 5540 MARSHALL STREET
City: ARVADA CO
Zipcode: 80002 US
Health Emergency Phone: 303-431-8454

Date Of Label Review: 03/13/1996
Label Date: 03/13/1996
Chronic Hazard IND: Y
Skin Protection IND: YES
Signal Word: WARNING
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None
Hazard And Precautions: DECOMPOSITION PRODUCTS MAY BE HAZARDOUS.
ACUTE:INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEAT (FP N). PRIMARY IRRITANT. IRRITATES AND DAMAGES ALL TISSUES. MAY CAUSE LIVER , KIDNEY AND LUNG DAMAGE. MAY CAUSE CARDIAC ARRHYTHMIA, MAY SENSITIZE THE HEART TO EPINEPHRINE. MAY CAUSE ALLERGIC DERMATITIS OR CHLORACNE. SYMPTOMS:RED, DRY SCALY SKIN; CRACKING AND WEEPING SKIN, COU GH AND WHEEZING. JAUNDICE, NAUSEA AND VOMITING; UREMIA. MAY CAUSE CHLORACNE. CHRONIC:CANCER HAZARD. CONTAINS POLYCHLOROBIPHENYLS WHICH ARE LISTED AS ANIMAL LIVER CARCINOGENS (FP N).

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APPENDIX E

FLOAT PLAN

Float Plan

Boat: _____

Description of Boat: _____

Registration Number: _____

Operator: _____

Passengers:

_____

Radio Call Sign or Cell Phone Number: _____

TRIP ITINERARY:

_____

Expected Time of Return: _____

Steps to Initiate a search if expected time of return is exceeded:

- Attempt to contact boat on radio or cell phone.
- Launch a search boat to follow lost boat's itinerary in reverse.
- Call 911
- Other:_____

NOTE: Boats operated by experienced boat operators only, and boats occupied by not less than one operator and one additional person. **Coast Guard approved equipment**, boat registration must be in primary state of use, gasoline engines to have flame arrestor, **carry at least one air horn or similar sounding device. Personal flotation devices (PFDs) of type II or higher, and at least one type IV PFD.** At least one type B-I or B-II fire extinguisher, **carry a selection of pyro-technic and non pyrotechnic visual signals.** Do not load beyond capacity, carry a tool kit, if in remote area have survival kit, and practice fuel management.