MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan

Niagara Mohawk Power Corporation
North Albany Service Center
Albany, New York

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1. Introduction

1.1 General

This document presents a detailed Work Plan for conducting the following activities at the Niagara Mohawk Power Corporation (NMPC) North Albany Service Center (the site) located at 1125 Broadway in Albany, New York:

- Implementing a Remedial Investigation/Feasibility Study (RI/FS) to evaluate potential issues associated with a former manufactured gas plant (MGP) facility at the site. The RI/FS will be conducted in accordance with an existing Order on Consent (Index # D0-0001-92101, herein referred to as the "Consent Order") between NMPC and the New York State Department of Environmental Conservation (NYSDEC); and

- Implementing a RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) to evaluate releases of hazardous wastes or hazardous constituents from solid waste management units (SWMUs) at the North Albany Service Center. The RFI and CMS will be conducted in accordance with the requirements of Module III - Corrective Action (Permit Module III) of the 6NYCRR Part 373 Hazardous Waste Management Permit for the hazardous waste treatment, storage, and disposal facility (TSDF) located at the North Albany Service Center.

As required by the Consent Order, the elements of this Work Plan have been structured to generally follow the RI/FS requirements set forth in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. 960 et. seq., the National Contingency Plan (NCP), and the United States Environmental Protection Agency (USEPA) guidance document entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", dated October 1988.

During a January 25, 1996 meeting at the North Albany Service Center between NMPC and the NYSDEC, NMPC proposed to conduct a comprehensive, site-wide investigation and evaluation of remedial alternatives (the "MGP/RCRA Investigation and Remedial Measures Evaluation") to satisfy the requirements of both the Consent Order and Permit Module III. NMPC's technical approach for combining the requirements of the Consent Order and Permit Module III was presented in a February 6, 1996 letter from NMPC to the NYSDEC. The technical approach was approved by the NYSDEC in a February 14, 1996 letter to NMPC. Copies of NMPC and NYSDEC correspondence relating to this MGP/RCRA Investigation and Remedial Evaluation Work Plan are presented in Attachment 1.

The MGP/RCRA Investigation to be implemented at the North Albany Service Center will consist of the following activities:

- Soil investigation;
- Ground-water investigation;
- Storm sewer investigation;
- Focused Screening Level Risk Assessment;
- Assessment of air emissions; and
- Assessment of interim remedial measures.

Relevant background information and the objectives and scope of work of the MGP/RCRA Investigation and Remedial Measures Evaluation are summarized below.

1.2 Background Information

This section presents a summary of information used to develop the approach for the MGP/RCRA Investigation and Remedial Measures Evaluation. A description of the location and physical setting of the North Albany Service Center is presented below followed by a discussion of background information relating to the site.

1.2.1 Facility Location and Regional Setting

The North Albany Service Center location, topographic and surface water features, and geologic and hydrogeologic setting are discussed below.

1.2.1.1 Location

The North Albany Service Center is located at 1125 Broadway in Albany, New York. A facility location map is presented as Figure 1. The approximately 25-acre site is bordered by Broadway to the west; Interstate I-90 to the North; a Delaware and Hudson Railroad right-of-way to the east; and Bridge Street to the south. Land use in the surrounding area is primarily commercial/industrial, with residential areas located to the west of the facility. As shown on Figure 1, Interstate I-787 and the Hudson River are located east of the railroad right-of-way that forms the eastern property boundary of the site.

1.2.1.2 Topography and Drainage

The North Albany Service Center is located on land gently sloping to the south. The average ground surface elevation at the North Albany Service Center is approximately 20 feet above mean sea level. Surface water runoff from the site is collected by catch basins which discharge to the south and east of the facility. The ultimate discharge location for surface water drainage from the facility will be determined as part of the MGP/RCRA Investigation activities described in this Work Plan.

1.2.1.3 Geology and Hydrogeology

The North Albany Service Center is located in the Hudson-Champlain Lowland physiographic province. Bedrock beneath the site is reportedly the Black Snake Hill Shale. The depth to bedrock generally varies from 16 to 24 feet in the western/northwestern part of the site, and is generally greater than 25 feet in the eastern/southeastern part of the site. Overburden soils in the vicinity of the site consist of fill, glacial-fluvial deposits, and till. Surface soil and shallow subsurface soil at the site consists of a mixture of imported fill and native materials that have been disturbed by excavation and grading activities. Based on subsurface conditions encountered during previous investigations at the site, the water table occurs within the overburden at depths ranging from 5 to 16 feet below ground surface. The extent of seasonal fluctuations of ground-water elevations and/or daily fluctuations associated with the tidal conditions of the Hudson River will be evaluated as part of the MGP/RCRA Investigation activities described in this Work Plan.

1.2.2 Facility Description

The North Albany Service Center is a maintenance/supply and office facility that supports NMPC's eastern operating division. The North Albany Service Center consists of several buildings, parking lots, and storage areas. As shown on the site plan presented on Figure 2, primary buildings and support facilities currently located at the site include the following:

- The Versaire Building (Building 1) is a warehouse and crew headquarters building. A storage shed, which is part of the North Albany TSDF (the PCB storage shed), is located along the western side of the Versaire Building;

- Building 2 is a three-story structure which contains offices, meeting rooms, and maintenance shops. A transformer shop located on the first floor of Building 2 is used to service various electrical equipment (including oil-filled units containing PCBs);

- Building 2-1, an office building located at the southwestern corner of the property, is used to support NMPC customer service and billing operations;

- Buildings 2-3 and 2-4 are storage sheds that were constructed as part of a lumber planning business formerly located in the southeastern section of the property;

- A vehicle maintenance building is located in the northeastern section of the property;

- An electrical equipment and non-RCRA-regulated waste storage building is located to the south of Building 2;

- An aboveground storage tank facility consisting of a PCB-contaminated waste oil tank, two non-hazardous waste oil storage tanks, and a virgin oil storage tank, is located south of Building 2 in the area immediately outside the transformer shop;

- A large portion of the southern section of the site consists of a gravel-covered storage yard (the yard storage area), which is used to store various electrical equipment, cable spools, steel framing, and wood poles.

- An electrical substation (the Genesee Street Substation) is located at the northwestern corner of the property;

- Two guard houses are located at the facility (one at an entrance off Bridge Street and one at the main facility near the northeastern corner of Building 2); and

A diesel fuel pump island is located east of Building 2, and a gasoline pump island is located to the north of Building 2.

1.2.3 Site History

This subsection presents a summary of MGP and RCRA-related activities previously conducted at the North Albany Service Center. Results obtained for a Preliminary Site Assessment/Interim Remedial Measures (PSA/IRM) Study that was implemented at the site during 1994 in accordance with the requirements of the Consent Order are also summarized below.

1.2.3.1 Summary of MGP-Related Activities

MGP operations were conducted at the North Albany Service Center property from the 1870s until the 1940s. The approximate locations of former structures and support facilities associated with the MGP at the site are shown on Figure 3.

The initial MGP facility at the site was constructed in the northern portion of the current property by the People's Gas Light Company in 1872. The People's Gas Light Company was purchased by the Municipal Gas Company during the 1880s, and operations from several small, privately-owned gas companies in the area were consolidated at the site. The Municipal Gas Company expanded the MGP facility in several stages, including the addition of several buildings and gas holders with a total storage capacity exceeding 5,000,000 cubic feet.

When the Municipal Gas Company was acquired by New York Power and Light Company (NYP&L) in 1927, the MGP facility was further expanded and renovated. In 1931, Building 2 was constructed in the area south of the MGP facility. The current property boundaries of the site were attained during the 1930s, when NYP&L acquired several properties to the south of Building 2 (including property previously owned by Albany Planning and Lumber Company, Hudson Valley Ice Company, the Delaware and Hudson Railroad, Paradise Oil Company, and Beacon Oil Company). MGP operations at the site were discontinued by NYP&L during the 1940s. Ownership of the former MGP site transferred to NMPC during the 1950's when NYP&L and other regional utilities were consolidated into NMPC.

In December 1992, NMPC executed the Consent Order with the NYSDEC which required that NMPC conduct a site investigation and remediation program at the North Albany Service Center. The Consent Order required NMPC to implement a PSA to identify any MGP-related constituents at the site, evaluate whether any identified constituents represent a significant threat to public health or the environment, and develop appropriate IRMs, if necessary. Based on the results of the PSA, the NYSDEC would determine requirements for conducting a more comprehensive investigation (i.e., a RI/FS) to address the constituents identified at the site.

NMPC retained O'Brien & Gere Engineers, Inc., to prepare the document entitled "Work Plan for Preliminary Site Assessment/Interim Remedial Measures (PSA/IRM) Study for the North Albany Former MGP Site in Albany, New York" (May 1994). The PSA/IRM Work Plan was approved for implementation by the NYSDEC in a letter dated June 8, 1994. NMPC retained Foster Wheeler Environmental Corporation (Foster Wheeler) to implement the PSA/IRM Work Plan at the facility during the fall of 1994. The scope and results of the PSA/IRM Study are described below in Subsection 1.2.3.3. In addition to the investigation of constituents associated with the former MGP facility at the site, a secondary objective of the PSA/IRM was to investigate potential releases of hazardous wastes or hazardous constituents from the RCRA SWMUs at the site.

1.2.3.2 Summary of RCRA-Related Activities

During 1982, NMPC submitted a Solid Waste Management Permit Application for storage of hazardous waste at the North Albany Service Center, in accordance with the solid waste management permitting requirements contained in 6NYCRR Part 360. This submittal resulted in automatic designation of the hazardous waste storage areas at the North Albany Service Center, as an interim status TSDF when the regulations contained in 6NYCRR Part 373-1.2(d) were promulgated in 1985. In July 1988, NMPC submitted a 6NYCRR Part 373 Hazardous Waste Management Permit Application (HWMPA) to the NYSDEC to obtain final status for the North Albany Service Center TSDF. NMPC was issued a final 6NYCRR Hazardous Waste Management Permit for the North Albany Service Center TSDF on January 6, 1995.

As a requirement of the HWMPA, NMPC submitted Corrective Action Information Forms identifying 26 SWMUs that were known to exist at the site. Based on a review of the information contained in the Corrective Action Information Forms completed by NMPC, the NYSDEC determined that a RCRA Facility Assessment-Sampling Visit (RFA-SV) was required to determine if any hazardous wastes or hazardous constituents had been released from 13 of the 26 identified SWMUs at the North Albany Service Center. The locations of SWMUs included under the RFA-SV requirements as outlined in Permit Module III are shown on Figure 2. SWMUs included under the RFA-SV requirements of Permit Module III were as follows:

Unit Number	SWMU Description
DW-1	Dry Well (Inactive)
L-1	Coal Tar Residuals from Former MGP Area
S-3	Mercury Storage Area
B-2	Soil Beneath Transformer Shop (Building 2)
S-5	Yard Storage Area
T-1	Oil/Water Separator
T-2	8000-Gallon Underground Diesel Tank
T-3	1000-Gallon Waste Oil Tank (Removed)
T-4	Skimmed Oil Collection Tank
T-5	8000-Gallon Underground Gasoline Tank (Removed)
T-9	8000-Gallon Underground Gasoline Tank (Removed)
T-6200	Non-Hazardous Waste Oil Tank (Removed)
T-6300	PCB-Contaminated Waste Oil Tank (Removed)

In accordance with Section E.2(b) of Permit Module III, RFA-SV investigation requirements for the above-listed SWMUs were to be incorporated into the PSA/IRM Study implemented pursuant to the Consent Order, as described above. Based on the results of the PSA/IRM Study, any SWMUs requiring further investigation (based on an apparent release from the SWMU) would be categorized as follows:

- *Category I SWMUs:* SWMUs impacted by MGP residuals and MGP-related constituents only;
- *Category II SWMUs:* SWMUs impacted by MGP residuals and MGP-related constituents, together with 6NYCRR Part 371 hazardous wastes or hazardous constituents; and

- *Category III SWMUs:* SWMUs impacted with only 6NYCRR Part 371 hazardous wastes or hazardous constituents.

In accordance with Permit Module III, further investigation of Category I and Category II SWMUs would be conducted under the Consent Order and further investigation of Category III SWMUs would be conducted under Permit Module III. In accordance with the technical approach for the MGP/RCRA Investigation and Remedial Measures Evaluation, as outlined in the February 6, 1996 letter from NMPC to the NYSDEC (included in Attachment 1), NMPC has categorized the 13 SWMUs investigated as part of the PSA/IRM Study and three newly-identified SWMUs/Areas of Concern (AOCs) as summarized below.

Unit Number	SWMU Description
Category I SWMUs	
L-1	Coal tar residuals from former MGP area
Category II SWMUs	
DW-1	Dry well (inactive)
B-2	Soil beneath transformer shop (Building 2)
T-1	Oil/water separator
T-2	8,000-gallon underground diesel tank
T-3	1,000-gallon waste oil tank (removed)
T-4	Skimmed oil collection tank
T-5	8,000-gallon underground gasoline tank (removed)
T-9	8,000-gallon underground gasoline tank (removed)
--	Storm sewer system
Category III SWMUs	
S-3	Mercury storage area
S-5	Yard storage area
T-6200	Non-hazardous waste oil tank (removed)
T-6300	PCB-contaminated waste oil tank (removed)

Unit Number	SWMU Description
--	AOC located in the vicinity of ground-water monitoring well MW-10 (portion of facility utilized as petroleum storage facility prior to NMPC ownership)
--	AOC located in vicinity of soil boring SB-5 (area located west of Versaire Building)

1.2.3.3 Summary of PSA/IRM Study

The PSA/IRM Study field activities implemented at the site by Foster Wheeler during 1994 consisted of the following:

- Collecting two surface soil samples in the vicinity of the mercury storage area. Both of the surface soil samples were submitted for laboratory analysis for PCBs, Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), Target Analyte List (TAL) inorganic constituents, and pesticides;

- Completing 37 soil borings and excavating eight test pits. Approximately 75 percent of the subsurface soil samples collected from the soil borings/test pits were submitted for laboratory analysis for benzene, toluene, ethylbenzene, and xylenes (BTEX), polynuclear aromatic hydrocarbons (PAHs), and cyanide. The remaining 25 percent of the subsurface soil samples were submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and pesticides. Approximately 60 percent of the soil samples submitted for laboratory analysis were collected from below the water table (i.e., saturated soil samples);

- Installing 14 ground-water monitoring wells. Ground-water samples were collected from the monitoring wells during two sampling events (conducted at the beginning and at the end of November 1994). Thirteen monitoring wells were sampled during the first sampling event, while 12 monitoring wells were sampled during the second sampling event. Each ground-water sample was submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and pesticides. Concentrations of dissolved constituents detected in ground-water samples collected for the PSA/IRM Study may not be representative of actual ground-water quality beneath the site due to the presence of light non-aqueous phase liquids (LNAPLs) and/or dense non-aqueous phase liquids (DNAPLs) in the monitoring wells at the time of sampling; and

- Collecting grab samples of accumulated debris from two storm drains located in the area north of Building 2 (within the limits of the former MGP facility). Both of the debris samples were submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and pesticides.

Soil, ground-water, and debris samples collected for the PSA/IRM Study were submitted to Nytest Environmental, Inc., for laboratory analysis. The analytical results of the samples were submitted for data validation by a chemist certified by United States Environmental Protection Agency (USEPA) Region II to perform organic and inorganic data validation. The analytical results for the soil samples were compared by Foster Wheeler to NYSDEC-recommended soil cleanup objectives contained in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4046 entitled, "Determination of Soil Cleanup Objectives and Cleanup Levels," dated January 1994. Ground-water analytical results were compared to Class GA Ground-Water Standards/Guidance Values contained in the NYSDEC Technical and Operational Guidance Series Memorandum entitled, "Ambient Water Quality Standards and Guidance Values," dated October 1993.

A summary of the analytical results obtained by the laboratory analysis of soil, ground-water, and debris samples collected for the PSA/IRM Study is presented below.

Surface Soil Samples

- PCBs, TCL VOCs, and pesticides were not detected in any of the surface soil samples at concentrations above the NYSDEC-recommended soil cleanup objectives;

- PAHs, including benzo(a)pyrene and dibenz(a,h)anthracene, were detected in surface soil samples at concentrations above the NYSDEC-recommended soil cleanup objectives; and

- TAL inorganic constituents, including beryllium, chromium, iron, mercury, nickel, zinc, and cyanide, were detected at concentrations above the NYSDEC-recommended soil cleanup objectives. However, no background soil samples were collected to evaluate naturally occurring concentrations of inorganic constituents in the vicinity of the site.

Subsurface Soil Samples

- PCBs were detected at a concentration of 0.35 parts per million (ppm) in a subsurface soil sample collected from the soil boring for monitoring well MW-4. PCBs were not detected above laboratory detection limits in any of the other subsurface soil samples submitted for analysis.

- TCL VOCs (primarily BTEX) were detected at concentrations above the NYSDEC-recommended soil cleanup objectives in subsurface soil samples collected from locations along the northern and eastern boundaries of the site;

- TCL SVOCs (primarily PAHs) were detected at concentrations exceeding the NYSDEC-recommended soil cleanup objectives in several subsurface soil samples collected at the site. In addition, coal tar and petroleum residuals were encountered in numerous soil borings completed as part of the PSA/IRM Study; and

- TAL inorganic constituents were detected at concentrations exceeding the NYSDEC-recommended soil cleanup criteria in subsurface soil samples collected for the PSA/IRM Study. The PSA/IRM Study concluded that elevated concentrations of TAL inorganic constituents may either be naturally occurring or the result of historical industrial operations conducted at the site.

Ground-Water Samples

- PCBs and pesticides were not detected above laboratory detection limits in the ground-water samples collected during either of the two ground-water sampling events;

- TCL VOCs, including BTEX, 1,1-dichloroethane, tetrachloroethene, 1,1,2,2-tetrachloroethane, and methylene chloride were detected above NYSDEC ground-water standards/guidance values during the two ground-water sampling events;

TCL SVOCs, including phenolics, phthalates, dibenzofuran, and carbazole, were also detected above NYSDEC ground-water standards/guidance values during both ground-water sampling rounds; and

- TAL inorganic constituents, including antimony, barium, chromium, iron, lead, magnesium, manganese, sodium, and cyanide, were detected in ground-water samples above the NYSDEC ground-water standards/guidance values.

Debris Samples

- PCBs and pesticides were detected above laboratory detection limits in both of the debris samples collected from catch basins located north of Building 2;
- Ethylbenzene was the only TCL VOC detected in the debris samples;
- Low concentrations of PAHs were detected in both debris samples; and
- Cyanide was not detected above laboratory detection limits in either of the debris samples.

1.3 Objectives of the MGP/RCRA Investigation

Based on the background information relating to former MGP and current RCRA activities at the North Albany Service Center (as summarized above), the overall objective of the MGP/RCRA Investigation is to provide data that can be used to assess current site conditions, supplement the existing data provided by the PSA/IRM Study, and determine the scope of future remedial measures which may be implemented at the site. Based on this general objective, the following specific objectives have been established for the MGP/RCRA Investigation:

1. Determine the presence and extent of chemical constituents in environmental media resulting from past releases of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents at the site;

2. Determine the potential for off-site migration of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents;

3. Determine potential sources of releases to and/or from the storm sewer system;

4. Evaluate potential exposure pathways for on-site NMPC and contractor employees;

5. Provide data to be used in preparation of the Remedial Measures Evaluation; and

6. Determine if any IRMs are necessary to address existing conditions present at the site.

1.4 Work Plan Organization

The MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan is organized into the following sections:

Section	Purpose
Section 1.0 - Introduction	Provides background information related to the site, as well as the objectives and scope of the MGP/RCRA Investigation.
Section 2.0 - Work Plan Rationale	Establishes the specific data requirements to meet the MGP/RCRA Investigation objectives, describes how the data from the MGP/RCRA Investigation will be used, and the quality of the data required.
Section 3.0 - MGP/RCRA Investigation Activities	Describes the MGP/RCRA Investigation activities, including: performance of field investigations, evaluation of field data, identification of potential interim remedial measures, and preparation of a MGP/RCRA Investigation Report.
Section 4.0 - Focused Screening Level Risk Assessment	Describes the content of the Focused Screening Level Risk Assessment.

Section	Purpose
Section 5.0 - Remedial Measures Evaluation	Provides an outline for a Remedial Measures Evaluation which will be used to assess potential remedial activities based on the results of the MGP/RCRA Investigation and Focused Screening Level Risk Assessment.

The Work Plan is supported by a Project Management Plan (PMP), a Data Management Plan (DMP), a Quality Assurance Project Plan (QAPjP), a Health and Safety Plan (HASP), and a Community Relations Plan (CRP). The information contained in each of these documents is summarized below:

- PMP - Presents the project organization, schedule, and personnel involved with the MGP/RCRA Investigation and Remedial Measures Evaluation;

- DMP - Addresses the methods to be used to document and track the field data and laboratory analytical results generated by the MGP/RCRA Investigation;

- QAPjP - Addresses sample collection, analytical methods, and quality assurance/quality control (QA/QC) procedures to be followed during implementation of the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan;

- HASP - Presents plans and procedures to be followed during the MGP/RCRA Investigation to protect the health and safety of field personnel; and

- CRP - Promotes public understanding of NMPC's responsibilities, planning activities, and remedial activities at the site.

2. Work Plan Rationale

2.1 Data Requirements and Approaches

This section presents the basis for the investigation activities that will be implemented to address the MGP/RCRA Investigation objectives. The data collection needs and planned approaches to obtaining the data necessary to achieve each MGP/RCRA Investigation objective are described below.

1. **Determine the presence and extent of chemical constituents in environmental media resulting from past releases of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents at the site.**

This objective will be addressed by implementing investigations to define the presence and/or extent of chemical constituents in soil and ground water at the site. Based on the analytical results generated during the PSA/IRM Study, soil and ground-water samples collected during the MGP/RCRA Investigation will be submitted for laboratory analysis for PCBs, BTEX, PAHs, and TAL inorganic constituents. Select soil samples will also be submitted for laboratory analysis for TCL VOCs, TCL SVOCs, total petroleum hydrocarbons (TPH), and supplemental parameters (including particle size distribution, Atterberg limits, bulk density, moisture, and specific gravity). Ground-water samples will also be submitted for laboratory analysis for nitrate/nitrite and sulfate/sulfide. If encountered, samples of LNAPL/DNAPL will be collected and submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TPH. DNAPL samples will also be submitted for analysis of physical parameters, including BTU content, viscosity, density, and interfacial tension.

2. **Determine the potential for off-site migration of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents.**

The potential for off-site migration of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents will be evaluated by the following activities:

- Collecting soil samples from test pits and soil borings at locations near the perimeter of the site;

Completing soil borings, collecting soil samples (as appropriate), installing ground-water monitoring wells, and collecting ground-water samples at monitoring well locations downgradient of the site; and

Collecting samples of dry-weather flow and accumulated debris from drainage structures and piping associated with the storm sewer system at the site.

3. Determine potential sources of releases to and/or from the storm sewer system.

This objective will be addressed by implementing a site-wide storm sewer investigation that will consist of inspecting all identified drainage structures at the site and collecting samples of dry-weather flow and accumulated debris in manholes, catch basins, and piping. Dry-weather flow and debris samples will be collected for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents. Dry-weather flow samples will also be submitted for laboratory analysis for total suspended solids (TSS).

4. Evaluate potential exposure pathways for on-site NMPC and contractor employees.

This objective will be addressed by preparing a Focused Screening Level Risk Assessment (Focused Screening Level RA) to evaluate potential exposure pathways for on-site NMPC and contractor employees. The Focused Screening Level RA will be prepared following the receipt of validated analytical results obtained from the laboratory analysis of samples collected at the site as part of the MGP/RCRA Investigation. Depending on the results of MGP/RCRA Investigation (i.e., evidence of off-site migration of chemical constituents), the scope of the Focused Screening Level RA may be expanded to evaluate potential exposure pathways for off-site workers in the vicinity of the site.

5. Provide data to be used in preparation of the Remedial Measures Evaluation.

This objective will be addressed by collecting the appropriate data necessary to support the identification and evaluation of potential remedial measures to address the presence of MGP residuals, MGP-related constitutents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents in environmental media at the site.

6. Determine if any IRMs are necessary to address existing conditions present at the site.

The need for IRMs will be determined based on the site conditions encountered during the MGP/RCRA Investigation field activities (i.e., LNAPL, DNAPL, dissolved chemical constituents in ground water, oil-saturated soils). The evaluation will include an assessment of whether additional data is required to confirm the need for IRMs.

2.2 Data Quality Objectives

As described above, some of the work tasks conducted for the MGP/RCRA Investigation will entail the collection and laboratory analysis of soil, ground-water, dry-weather flow, and drainage structure debris samples. The QAPjP specifies the appropriate field and analytical procedures and the data quality required to meet the objectives of the MGP/RCRA Investigation.

3. MGP/RCRA Investigation

3.1 General

This section presents a description of activities that will be performed to achieve the MGP/RCRA Investigation objectives presented in Section 1.3 of the Work Plan. Activities associated with the MGP/RCRA Investigation will be conducted under the following tasks:

- Task 1 - Area Reconnaissance and Mapping;
- Task 2 - Soil Investigation;
- Task 3 - Ground-Water Investigation;
- Task 4 - Storm Sewer Investigation;
- Task 5 - Focused Screening Level Risk Assessment;
- Task 6 - Assessment of Air Emissions;
- Task 7 - Assessment of Potential Interim Remedial Measures; and
- Task 8 - MGP/RCRA Investigation Report.

The scope of the work activities included under each of the MGP/RCRA Investigation tasks has been developed based on the PSA/IRM study results. Depending on field activities encountered during implementation of the MGP/RCRA Investigation, additional investigation activities will be implemented, as necessary, to meet the investigation objectives. To the extent possible, NMPC intends to complete any additional investigation activities which may be required in conjunction with the field activities presented in this Work Plan. However, if necessary, a separate phase (Phase II) of field activities may also be conducted.

Detailed protocols for field activities that will be conducted during completion of Tasks 2, 3, 4, and 6 (as listed above) are presented in the QAPjP. Analytical procedures that will be followed for the laboratory analysis of samples collected as part of the MGP/RCRA Investigation are also presented in the QAPjP. As detailed in the QAPjP, samples selected for laboratory analysis will be analyzed using NYSDEC 1991 Analytical Services Protocol (ASP) Methods. Health and safety protocols that will be followed by field sampling personnel during completion of the MGP/RCRA Investigation tasks are discussed in the project-specific HASP. Relevant information pertaining to the implementation of the MGP/RCRA Investigation activities is also presented in the PMP, DMP, and CRP, as described in Section 1.4 above.

A detailed description of the activities that will be conducted for each MGP/RCRA Investigation task is presented below.

3.2 Proposed MGP/RCRA Investigation Activities

Task 1 - Area Reconnaissance and Mapping

This task will consist of contacting the Underground Facilities Protective Organization (UFPO) to request field location of underground utilities at the North Albany Service Center (and at off-site locations, as necessary). Following the location of underground utilities (including water supply, electric, gas, telephone, and sanitary/storm sewer), Blasland, Bouck & Lee, Inc. (BBL) will conduct a site visit with appropriate NMPC personnel (as identified by NMPC's Project Manager) to coordinate on-site MGP/RCRA Investigation activities and to field-mark 12 test pits, 18 soil borings, and 6 ground-water monitoring wells at the approximate locations shown on Figure 4. The sampling locations will be field-marked using a flagged wooden stake, flagged metal spike, or paint, and the approximate sample locations will be recorded in field notes for later reference. The sampling locations will be adjusted in the field, as necessary, based on the presence of underground utilities and visual observations of field personnel, with input from NMPC and BBL project managers. Proposed background soil boring locations will be selected during the site visit and approved by NYSDEC, NMPC, and BBL project management personnel.

Following completion of the MGP/RCRA Investigation field activities, survey activities will be performed by NMPC to document the location and elevation of the test pits, soil borings, ground-water monitoring wells, and storm water manholes/catch basins. Locations will be surveyed relative to the State Plane Coordinate System of 1927, or an appropriate reference point located at or near the site. Elevations will be surveyed relative to the National Geodetic Vertical Datum (NGVD) of 1929. The surveyed test pits, soil borings, ground-water monitoring wells, and storm water manholes/catch basins will be plotted on figures which will be incorporated in the MGP/RCRA Investigation Report.

Task 2 - Soil Investigation

Based on the information discussed in Section 1.2, a soil investigation will be conducted to define the potential presence, concentration, and relative extent (horizontal and vertical) of chemical constituents in soil at the site. The soil investigation will include the collection of surface soil samples, the excavation of test pits, the completion of soil borings, and the collection of subsurface soil samples as described in the subtasks below.

The soil piles located in the southeast corner of the property, in the yard storage area, and adjacent to the vehicle maintenance buildings are the result of recent on-site activities (i.e., construction, demolition, etc.) and are not directly related to the objectives of the MGP/RCRA Investigation. NMPC will address the soil piles as a separate issue from the MGP/RCRA Investigation. NMPC will collect representative samples from the soil piles for laboratory analysis. Analytical results obtained from the laboratory analysis of the soil pile samples will be used to evaluate options for future disposition of the soil.

Subtask 2.1 - Collection of Surface Soil Samples

This subtask will consist of collecting surface soil samples in the yard storage area and the area immediately south of the TSDF (i.e., within the fenced area south of the transformer shop loading dock) to evaluate surface soil as a potential exposure pathway for on-site workers at the North Albany Service Center. Surface soil samples will be collected at up to 12 sampling locations in the yard storage area (test pit locations TP-101 through TP-112, as shown on Figure 4) and up to 6 sampling locations in the area immediately south of the TSDF (soil boring locations SB-101 through SB-106, as shown on Figure 4). Surface soil samples will not be collected at any of the test pit or soil boring locations where asphalt pavement is present. Based on the locations for soil borings SB-101 through SB-106 and the extent of asphalt pavement in the area immediately south of the TSDF, additional surface soil sampling locations will be identified as necessary in order to provide a minimum of four surface soil samples in the area south of the TSDF.

Surface soil samples will be collected following the removal of gravel and/or crushed stone covering the sampling area. A composite soil sample will be collected at each surface soil sampling location to reduce the potential effect of local spatial variation in the concentration of any chemical constituents present. The composite sample will be formed in the field from eight subsamples collected from a depth of approximately 0 to 6 inches below the soil surface. The eight subsamples will be collected within a one-square-meter area centered around the surface soil sampling location. The protocols for collecting and compositing the surface soil samples are presented in the QAPjP.

The surface soil samples will be visually characterized and screened using a photoionization detector (PID) to measure the relative concentration of VOC vapors, if any. If elevated PID readings are encountered in any of the surface soil samples collected in the yard storage area, a discrete surface soil grab sample will be collected immediately adjacent to the composite surface soil sampling location where the elevated PID measurements were encountered. The discrete surface soil grab sample will be submitted for laboratory analysis for TCL VOCs. Protocols for handling, storing, and transporting the surface soil samples are specified in the QAPjP. Each surface soil sample will be analyzed for PCBs and TAL inorganic constituents. In addition, surface soil samples collected at up to nine of the surface soil sampling locations will be analyzed for TCL SVOCs. Surface soil samples will be selected for laboratory analysis for TCL SVOCs based on the presence of staining, odors, or PID measurements above background levels, and to provide a uniform spatial distribution across the yard storage area and the area immediately south of the TSDF. Surface soil samples selected for laboratory analysis will be submitted to Galson Technical Services, Inc. (Galson) for analysis in accordance with NYSDEC 1991 ASP methods.

Subtask 2.2 - Excavation of Soil Test Pits

This subtask will consist of excavating twelve test pits in the yard storage area (test pit locations TP-101 through TP-112, as shown on Figure 4) to facilitate visual observation and sampling of subsurface soil. The number of test pits in the yard storage area has been selected based on the use of a 100-foot by 100-foot grid across the yard storage area.

Test pits will be excavated to the water table or to a maximum depth of 8 feet below ground surface (whichever is encountered first). The test pits will be excavated by SJB Services, Inc. (SJB), a BBL subcontractor, using a backhoe in accordance with the protocols outlined in the QAPjP.

At each test pit location, soil samples will be collected from the backhoe bucket at 2-foot intervals. Soil samples collected from each 2-foot interval within the excavation will be visually characterized and screened using a PID to measure the potential presence of VOCs. If any visible staining, odors, and/or elevated PID headspace screening measurements are encountered at a test pit location, one soil sample will be collected from the side wall of the test pit (within the depth interval where visual staining, odors, or elevated PID screening measurements are encountered) and submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents. If no visible staining, odors, or PID measurements above background concentrations are encountered in the soil from the test pit excavation, one soil sample from the 6- to 18-inch depth interval will be selected for laboratory analysis for PCBs and TAL inorganic constituents. BBL sampling personnel (who are trained in accordance with the OSHA excavation standards contained in 29 CFR 1926) will be permitted to enter test pits at depths up to four feet for the purposes of collecting soil samples (based on the judgements of BBL's on-site Health and Safety Supervisor). Subsurface soil samples at depths of greater than four feet (and at depths of less than four feet, depending on soil conditions encountered) will be collected using a hand-held bucket auger equipped with extension handles. The bucket auger will be cleaned following the collection of each soil sample using the equipment decontamination procedures outlined in the Quality Assurance Project Plan (QAPjP). For the purpose of estimating the number of QA/QC samples to be collected (presented in the QAPjP), it is assumed that up to six soil samples will be selected for laboratory analysis for TCL VOCs and TCL SVOCs from the test pits. Following the collection of subsurface soil samples, the test pit excavations will be backfilled using the excavated soil.

Subsurface soil samples collected from the test pits will be handled, stored, and transported according to the protocols specified in the QAPjP. The subsurface soil samples selected for laboratory analysis will be submitted to Galson for laboratory analysis in accordance with NYSDEC 1991 ASP methods.

Subtask 2.3 - Completion of Soil Borings

This subtask will consist of completing a total of twenty-two soil borings at the site. Twenty of the soil borings, designated SB-101 through SB-120, will be completed at the locations shown on Figure 4. Two of the soil borings, designated SB-121 and SB-122, will be completed at background locations to be determined by NMPC (and approved by the NYSDEC) as part of the Area Reconnaissance and Mapping work task. Each soil boring will be completed to either the top of bedrock or the water table as indicated below:

- Soil borings SB-101 through SB-105 and soil borings SB-121 and SB-122 will be completed to the water table; and

- Soil borings SB-106 through SB-120 will be completed to the top of bedrock.

Soil borings SB-101 through SB-106 will be completed to identify and evaluate potential releases of hazardous wastes or hazardous constituents in the area immediately south of the TSDF. Soil borings SB-107 through SB-120 will be completed to evaluate the presence of LNAPL/DNAPL and further define site stratigraphy in areas where MGP or petroleum-related residuals were observed during the PSA/IRM Study. Soil borings SB-121 and SB-122 will be completed to determine background concentrations of TAL inorganic constituents in subsurface soils. Each soil boring will be completed using the hollow-stem auger drilling method with a truck-mounted drill rig. Soil at each boring location will be continuously sampled using 2-foot long, 2-inch outer-diameter, split-spoon sampling devices. Soil recovered from each 2-foot sampling interval will be visually characterized by an on-site geologist and placed in a jar for PID headspace screening to determine the potential presence of VOCs. Soil samples recovered from borings SB-107 through SB-120 will also be evaluated for the presence of LNAPL/DNAPL via PID screening, ultraviolet (UV) fluorescence, and/or jar testing (i.e., placing soil in a jar of water, shaking the jar, and visually observing the presence of any sheens or residuals).

One or more representative soil samples from each boring will be collected for laboratory analysis based on the presence of any LNAPL/DNAPL, visually-stained soil, odors, and/or elevated PID screening measurements. Table 3 presents a summary of the sampling and analysis rationale for each soil boring. Criteria for selecting soil samples recovered from the soil borings for laboratory analysis will include the following:

- If DNAPL is encountered at a soil boring location (as identified by PID screening, UV fluorescence, or jar testing), one soil sample collected from the lower extent of the DNAPL within the boring will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH;

- If LNAPL is encountered at a soil boring location (as identified by PID screening or jar testing), then one soil sample collected within the water table fluctuation zone will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH; and

- If LNAPL/ DNAPL is encountered at a soil boring location, then the soil sample recovered from the first "clean" sampling interval (i.e., no LNAPL/ DNAPL based on PID screening, UV fluorescence, or jar testing) located stratigraphically below the LNAPL/DNAPL will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- If LNAPLs and/or DNAPLs are not observed at a soil boring location, sample selection will be based on other visual observations (e.g. staining, odors, fill/waste materials, etc.) and/or elevated PID headspace screening measurements (particularly for samples to be analyzed for TCL VOCs). Samples may also be collected from sampling intervals located directly below such visual observations/measurements for delineation purposes. If no elevated PID headspace screening measurements and no observed staining, odors, fill/waste materials, etc. are encountered at a soil boring location, then the sample recovered from the sampling internal above the water table will be submitted for laboratory analysis.

Protocols for completing soil borings, collecting soil samples, and performing field screening (PID screening, UV fluorescence, and jar testing) are presented in the QAPjP. Information regarding each soil boring to be completed for the MGP/RCRA investigation, the samples to be collected from each boring, and the laboratory analyses to be performed for each sample are discussed below.

- **Soil Borings SB-101 through SB-106:** These soil borings will be completed in the area immediately south of the TSDF (i.e., within the fenced area south of the transformer shop loading dock) to collect subsurface soil samples for the purpose at evaluating potential releases of hazardous waste or hazardous constituents from SWMUs in this area of the site. Soil borings SB-101 through SB-105 will be shallow borings completed to the water table (assumed depth of 10 feet). Soil boring SB-106 will be completed to the depth of bedrock (assumed depth of 25 feet). Based on the subsurface conditions encountered at each boring, one soil sample from each boring will be submitted for laboratory analysis for PCBs and TAL inorganic constituents. Samples collected from three of the six borings will also be submitted for laboratory analysis for TCL VOCs and TCL SVOCs.

- **Soil Borings SB-107 and SB-108:** These soil borings will be completed to bedrock (assumed depth of 25 feet) in the vicinity of the newly identified AOC associated with soil boring SB-5 (completed as part of the PSA/IRM Study). Because the PSA/IRM Study Report indicates that DNAPL was identified in soil boring SB-5, these soil borings will be completed to determine if the DNAPL encountered at the location of soil boring SB-5 is an isolated occurrence, and whether any DNAPL observed in this area is related to the former MGP operation at the site. Soil samples recovered from these borings will be evaluated for the presence of DNAPL via PID screening, UV fluorescence, and/or jar testing. Up to three soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Borings SB-109 through SB-111:** These soil borings will be completed to bedrock (assumed depth of 25 feet) in the area west of monitoring well MW-2 (installed for the PSA/IRM) along the western property boundary. The purpose of these borings is to evaluate whether DNAPL could impact utility conduits/subsurface work along Broadway to the north of the former relief holder (the current location of the Genesee Street Substation). Soil samples recovered from these borings will be evaluated for the presence of DNAPL via PID screening, UV fluorescence, and/or jar testing. Up to five soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Borings SB-112 through SB-115 and SB-120:** These soil borings will be completed to bedrock (assumed depth of 20 feet) in the vicinity of the former MGP operation and petroleum-related SWMUs located to the north of Building 2. The locations for these borings were selected to further delineate the horizontal extent of the LNAPL and DNAPL observed in soil borings and test pits completed north of Building 2 as part of the PSA/IRM Study. Soil samples recovered from these borings will be evaluated for the presence of LNAPL and DNAPL via PID screening, UV fluorescence, and/or jar testing. Up to twelve soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Borings SB-116 through SB-118:** These soil borings will be completed to bedrock (assumed depth of 20 feet) in the vicinity of the newly-identified AOC near monitoring well MW-10 (installed for the PSA/IRM). The locations for these borings were selected to establish the horizontal extent of the LNAPL observed at monitoring well MW-10 and to determine whether the LNAPL is part of a larger plume originating to the north of MW-10 or a separate plume associated with the former oil storage facilities previously located in this area of the site. Soil samples recovered from these borings will be evaluated for the presence of LNAPL via PID screening and/or jar testing. Up to four soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Boring SB-119:** This soil boring will be completed to bedrock (assumed depth of 20 feet) in the vicinity of the fuel service island east of Building 2 (near the location of former monitoring well MW-6) to evaluate the presence of LNAPL and DNAPL. The location of this boring was selected to determine the horizontal extent of LNAPL observed in monitoring well MW-6 and to determine whether the LNAPL is part of a larger plume originating to the north of MW-6 or a separate plume associated with former USTs in this area. Soil samples recovered from this boring will be evaluated for the presence of LNAPL and DNAPL via PID screening and/or jar testing. Up to four soil samples collected from this boring will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **SB-121 and SB-122 (Background Soil Borings):** As part of the MGP/RCRA investigation, these background soil borings will be completed to the water table at suitable off-site or on-site locations identified during the field reconnaissance activities. One subsurface soil sample collected from each background soil boring will be submitted for laboratory analysis for TAL inorganic constituents. The analytical results for these soil samples will be used to establish background inorganic constituent concentrations in the vicinity of the site.

Drilling and sampling equipment will be cleaned prior to initiating drilling activities, between each boring location, and at the completion of drilling activities. Following completion, each boring will be grouted to the ground surface with cement/bentonite grout. Soil cuttings generated at each boring location will be collected by the drilling subcontractor and placed into steel drums or a roll-off waste container (to be provided by NMPC) for off-site disposal by NMPC. Decontamination water generated by the soil boring activities will also be containerized by the drilling subcontractor. Wastes generated by the soil investigation activities will be characterized for off-site disposal as discussed in the QAPjP.

Task 3 - Ground-Water Investigation

The ground-water investigation will evaluate potential MGP-related impacts to ground water in the area hydraulically downgradient from the North Albany Service Center site. The ground-water investigation approach will initially consist of installing monitoring wells close to the eastern property boundary (which is the hydraulically downgradient direction based on the PSA/IRM Study). If the borings completed at the proposed monitoring well locations indicate the presence of LNAPL/DNAPL (based on soil screening as described above under Subtask 2.3 - Completion of Soil Borings), then the borings will be grouted to the surface and the monitoring well locations will be moved further downgradient from the site. The exact locations of the wells will be determined in the field based on ground-water flow direction, access, utility locations, and other considerations such as the former location of the Erie Canal, which has since been filled in and is now located beneath Erie Boulevard. Depending on the nature of the backfill material, the former canal could affect local ground-water flow patterns.

The overall objective of the ground-water investigation will be to provide data to evaluate the need for and practicability of remedial measures. The ground-water investigation will provide data to assess off-site migration of LNAPL, DNAPL, and dissolved phase constituents in ground water; physically and chemically characterize the LNAPL/DNAPL; physically and chemically characterize the ground-water flow system; and evaluate the potential recovery of LNAPL/DNAPL.

The ground-water investigation will consist of the following work efforts:

- Evaluation of existing monitoring wells;

- Installation of new monitoring wells;
- Physical characterization of the ground-water flow system; and
- Chemical characterization of the ground-water flow system and LNAPL/DNAPL.

Work efforts associated with the ground-water investigation are described below.

Subtask 3.1 - Evaluation of Existing Monitoring Wells

This subtask will consist of evaluating the general physical condition of the existing monitoring wells (including surface seals, protective casing, and well depths). Ground-water and LNAPL/DNAPL levels, if present, will be measured to evaluate the appropriateness of sampling each existing monitoring well for dissolved phase constituents. Ground-water samples will not be collected from monitoring wells containing LNAPL/DNAPL, as these samples would not be representative of dissolved-phase constituent concentrations in ground water. The on-site extent of LNAPL/DNAPL will be characterized using soil borings as described above under Subtask 2.3. Based on the data presented in the PSA/IRM Study Report, it is anticipated that LNAPL/DNAPL may be encountered in the following existing monitoring wells at the site:

Well Number	Observation (October 20, 1994/November 29, 1994)
MW-4	0.01/ 0.15 feet of LNAPL
MW-5	0.01 feet of LNAPL / Well casing coated with tar
MW-7	Well casing coated with tar
MW-10	0.0 / 0.47 feet of LNAPL
MW-13	0.0 feet of LNAPL / well casing coated with tar

Note: Observations obtained from Table 3-1 in the PSA/IRM Study Report (Foster Wheeler, May 1995).

Ground-water elevations obtained from the existing monitoring wells at the site will be used to develop a ground-water elevation contour map to determine ground-water flow direction and assist in locating the proposed new monitoring wells.

Well evaluation procedures and procedures for obtaining ground-water and LNAPL/DNAPL level measurements are included in the QAPjP.

Subtask 3.2 - Installation of New Monitoring Wells

Under this subtask, up to nine new ground-water monitoring wells will be installed at the locations indicated on Figure 4. A summary of the new monitoring well locations is presented below.

- **Monitoring well MW-15S:** This will be a shallow water table monitoring well (assumed depth of 15 feet) located hydraulically downgradient of the area to the east of the newly-identified AOC near MW-10. This well will be used to establish the hydraulically downgradient extent of the LNAPL observed at existing monitoring well location MW-10. In the event that the boring for this monitoring well indicates evidence of LNAPL, the boring will be grouted to the surface and the well location will be moved further downgradient from the site.

- **Monitoring Well MW-6A:** This will be a replacement monitoring well for MW-6 (assumed depth of 20 feet) which was inadvertently paved over by NMPC. This well will be used to further evaluate the presence of LNAPL in this area, including an assessment of whether the LNAPL is part of a larger plume originating from the north or a separate plume associated with the former USTs in this area.

- **Monitoring Well MW-16S:** This will be a shallow water table monitoring well (assumed depth of 15 feet) located hydraulically downgradient of the area to the east of SWMUs T-2 and T-9 near MW-6. This well will be used to establish the hydraulically downgradient extent of the LNAPL observed at well MW-6. In the event that the boring for this monitoring well indicates evidence of LNAPL, the boring will be grouted to the ground surface and the well location will be moved further downgradient from the site.

- **Monitoring Wells MW-18S and MW-19S:** These shallow water table monitoring wells (assumed depth of 15 feet) will be installed hydraulically downgradient of the area east of the former MGP facility (including the other SWMUs located in this area at the site). These wells will be used to assess the hydraulically downgradient extent of the LNAPL identified in the area north and northeast of Building 2 by the PSA/IRM Study. In the event that the borings for these monitoring wells indicate evidence of LNAPL, the borings will be grouted to the surface and the location of the wells will be moved further downgradient from the site.

- **Monitoring Well MW-20D:** This will be a deep off-site well (assumed depth of 25 feet) located hydraulically upgradient of the former gas holders and existing monitoring well MW-2. This well will be used to establish the western extent of the LNAPL and DNAPL observed at the site.

- **Monitoring Wells MW-16D, MW-17D, and MW-18D:** These deep monitoring wells (assumed depth of 25 feet) will be installed to the till/bedrock interface in the area hydraulically downgradient of the former MGP facility. These wells will be used to assess the downgradient extent of DNAPL associated with the former MGP facility. In the event that the borings for these monitoring wells indicate evidence of DNAPL, the borings will be grouted to the surface and the location of the wells will be moved further downgradient from the site.

The proposed locations for shallow monitoring wells MW-15S, MW-16S, MW-18S, and MW-19S and the replacement well MW-6A will be adjusted in the field based on ground-water flow direction, locations of existing monitoring wells which contain LNAPL, and physical access. Based on water levels observed during the PSA/IRM Study, the shallow wells will be screened from approximately 5 to 15 feet below ground level to straddle the water table and allow for anticipated water level fluctuations.

The exact location of the deep off-site monitoring well MW-20D will be based on observations from soil borings SB-109 and SB-110, the locations of underground utilities, and access for installation of the well.

The locations of the three deep on-site monitoring wells will be adjusted in the field based on ground-water flow direction, the till/bedrock surface orientation (a till/bedrock high is present near SB-10 and MW-7/MW-14, which may affect DNAPL migration), physical access, and the shallow monitoring well locations. Based on the occurrence of DNAPL at the till/bedrock interface and the depth to bedrock observed during the PSA/IRM Study, the deep wells will be screened from approximately 15 to 25 feet below ground surface to monitor for the presence of DNAPL and dissolved constituents, which could be associated with the DNAPL. Deep monitoring wells MW-16D and MW-18D will be installed adjacent to shallow monitoring wells MW-16S and MW-18S, respectively, to form two well clusters. This will allow for the evaluation of vertical hydraulic gradients in addition to monitoring for the presence of LNAPL/DNAPL at the well cluster locations.

Soil borings will be completed at each new monitoring well location using hollow-stem auger drilling methods. Continuous split-spoon sampling will be conducted at each of the proposed deep monitoring well locations (MW-16D, MW-17D, MW-18D, and MW-20D), at two of the shallow monitoring well locations (MW-15S and MW-19S), and at the location of replacement well MW-6A. At the two remaining shallow monitoring wells (MW-16S and MW-18S, installed as part of a cluster with a deep monitoring well), split-spoon samples will be recovered at five-foot intervals within each boring. The on-site geologist will visually characterize each sample and perform PID headspace screening on a portion of each sample, using the procedures presented in the QAPjP. Soil samples will also be screened for the presence of LNAPL/DNAPL using UV fluorescence and/or jar testing. If LNAPL/DNAPL is encountered in soil samples recovered from soil borings completed at any of the proposed monitoring well locations, the monitoring well will be moved further downgradient from the site to a location that will provide a representative ground-water quality sample. Any off-site monitoring well locations will be discussed and coordinated with the NYSDEC, NMPC, and the appropriate property owner(s) prior to installation.

Representative soil samples of till and overlying soils encountered within the borings completed for the monitoring wells will be submitted for geotechnical analysis (including up to ten soil samples for sieve analyses; five soil samples for Atterberg limits; five soil samples for hydrometer analysis; and two soil samples for bulk density, moisture, and specific gravity). The geotechnical samples will be selected to physically characterize the geologic units, intervals where monitoring well screens have been installed and units where LNAPL/DNAPL migration may occur in the subsurface.

In addition to collecting soil samples from soil borings completed at the proposed monitoring well locations, two five-foot runs of NX coring will be performed at two deep soil borings to confirm the degree of competency of the underlying shale bedrock. The NX coring will be performed in deep soil borings located downgradient from areas where DNAPL is observed to minimize the potential for DNAPL migration into the bedrock during coring. These NX cores will be used to assess the physical characteristics of the bedrock, including an evaluation of relative permeability. Based on the observed characteristics of the bedrock, NMPC will (in consultation with the NYSDEC and BBL) determine whether it is necessary to install bedrock monitoring wells (either at the coreholes completed for the two planned NX core runs or at other locations at the site). Bedrock monitoring wells may be installed if the bedrock characteristics indicate that the bedrock is a potential pathway for NAPL and/or dissolved physical constituents, and/or if visual observations indicate the presence of NAPLs in the bedrock. Rock coring will be performed using the protocols presented in the QAPjP.

Each monitoring well will be constructed using 2-inch diameter PVC risers with 5- to 10-foot screens as described in the QAPjP. A sump will be installed at each deep well to allow for the collection of DNAPL within the well. The deep well sump will be installed approximately 0.5 to 1 foot into the till or bedrock, whichever unit appears to confine the DNAPLs. Following installation, each new well will be developed to remove fine-grained materials to the extent practicable, using the bailing or pumping methods detailed in the QAPjP. Development water will be containerized on-site for disposal by NMPC.

Based on the soil investigation activities summarized under Subtask 3.1, additional monitoring wells may be installed in the yard storage area, as necessary, to meet the objectives of the MGP/RCRA Investigation.

Drilling and sampling equipment will be cleaned prior to initiating drilling activities, between each boring location, and at the completion of drilling activities. Bedrock coreholes will be grouted at least to the top of rock prior to installing overburden monitoring wells at the drilling location. Soil cuttings generated at each boring location will be collected by the drilling subcontractor and placed into steel drums or a roll-off waste container (to be provided by NMPC) for off-site disposal by NMPC. Decontamination water and drilling fluids generated by the drilling activities will also be containerized by the drilling subcontractor for disposal by NMPC.

As described above under Task 1 - Area Reconaissance and Mapping, each monitoring well location will be surveyed relative to the State Plane Coordinate System of 1927, or an appropriate reference point located at or near the site. The ground surface and monitoring well casing elevations will be surveyed relative to the NGVD of 1929.

Subtask 3.3 - Physical Characterization of the Ground-Water Flow System

In-situ hydraulic conductivity testing will be performed and ground-water level measurements will be obtained to evaluate ground-water flow directions and tidal influences from the Hudson River. The in-situ hydraulic conductivity testing will provide data to physically characterize the ground-water flow system and evaluate the potential for off-site migration of dissolved phase constituents in ground water. In-situ hydraulic conductivity testing will be performed at each newly installed well following procedures included in the QAPjP.

Prior to installation of the new monitoring wells, one round of ground-water level measurements will be obtained from the existing monitoring wells (as described above under Subsection 3.1). In addition, one complete round of ground-water level measurements will be obtained for the existing monitoring wells and each new monitoring well at the time of sampling. These water level measurements will be used to evaluate ground-water flow directions at the time of sampling. To evaluate potential tidal influences that may cause daily water table fluctuations, ground-water level measurements will be obtained at one downgradient monitoring well cluster for a period of up to 5 days using pressure transducers and an automatic data logger. The procedures for measuring water levels are included in the QAPjP.

Subtask 3.4 - Chemical Characterization of Ground Water and LNAPL/DNAPL

Under this task, ground-water samples will be collected for laboratory analysis and measurement of field parameters to chemically characterize the ground-water flow system. This task will also consist of collecting LNAPL/DNAPL samples for laboratory analysis to characterize the physical and chemical properties of LNAPL/DNAPL encountered at the site.

Ground-water samples will be collected from each of the nine new monitoring wells, two existing upgradient wells (MW-1 and MW-3), one on-site well located in the storage yard area (MW-12), and three existing wells (e.g., MW-8, MW-11, MW-14) where LNAPL/DNAPL was not observed during the PSA/IRM Study. Each ground-water sample will be submitted to Galson for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and geochemical parameters including sulfate/sulfide and nitrate/nitrite. Field measurements of pH, temperature, conductivity, turbidity, dissolved oxygen (DO) and oxidation-reduction potential (ORP) will also be performed at the time of collecting each ground-water sample.

Ground-water samples will be obtained using low-flow sampling procedures to minimize sample turbidity (to provide ground-water samples which are representative of dissolved phase constituent concentrations). Sampling procedures, including field parameter measurements and sample identification, shipping, and handling protocols, are provided in the QAPjP. Purge water will be containerized for off-site disposal by NMPC.

In addition to the collection of ground-water samples, up to two LNAPL samples and two DNAPL samples will be collected from existing wells where LNAPL/DNAPL is identified during the implementation of Subtask 3.1 - Evaluation of Existing Monitoring Wells. If more than one type of LNAPL or DNAPL is observed (based on differences in visual appearance, specific gravity, viscosity, odor, depth or stratigraphic placement, and/or PID readings), representative samples of each type of LNAPL/DNAPL encountered will be collected. Each LNAPL and DNAPL sample will be submitted to Galson for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TPH. A portion of each DNAPL sample will also be submitted to Doble Engineering Company (Doble) for analysis for physical parameters, including BTU content, viscosity, density, and interfacial tension.

Procedures for collecting LNAPL and DNAPL samples are provided in the QAPjP. Purge fluids will be containerized for off-site disposal by NMPC.

<u>**Task 4 - Storm Sewer Investigation**</u>

The storm sewer investigation will be conducted to determine whether the storm sewer system may act as a pathway for off-site migration of chemical constituents associated with the former MGP facility or the other SWMUs at the site. The storm sewer investigation will also evaluate the presence and extent of chemical constituents in dry-weather flow and accumulated debris within drainage structures and piping associated with the site storm sewer system. Activities associated with the storm sewer investigation will include the following:

- Inspecting drainage structures and piping associated with the storm sewer system;

- Collecting dry-weather flow samples; and

- Collecting samples of accumulated debris within the drainage structures and piping.

Activities associated with the storm sewer investigation are described below.

Subtask 4.1 - Inspection of Drainage Structures and Piping

This subtask will consist of visually inspecting each manhole and catch basin associated with the site storm sewer system. Prior to inspecting each manhole/catch basin, traffic cones will be placed around the structure, the cover will be removed, and the air inside the structure will be monitored for volatile organic vapors, oxygen, combustible gases, carbon monoxide, and hydrogen sulfide levels, as described in the HASP. The visual inspection will be performed by manned entry (as necessary) into the drainage structures to determine the following information:

- Dimensions of each manhole/catch basin (i.e., diameter of the cover, depth from the rim to the base of the structure, depth from the rim to the inverts for piping entering or leaving the structure);

- Size, orientation, and material of construction for all pipes entering or exiting each manhole/catch basin, including the joint composition of the pipes, if visible;

- Material(s) of construction for the sidewalls and base of each manhole/catch basin (i.e., pre-cast concrete, brick and mortar, etc.) and overall observed condition of each manhole/catch basin (i.e., cracks, corrosion, infiltration);

- The presence and depth of any accumulated water, the presence of any sheen on the surface of accumulated water, and/or the presence of any flowing water within the manhole/catch basin. The approximate dry-weather flow rate will be measured, if flow is observed; and

- Presence and amount of debris in the base of each manhole/catch basin and piping entering the manhole/catch basin.

The results of the visual inspection activities will be recorded on manhole inspection forms. Field personnel will also take a photograph of the interior of each manhole/catch basin for inclusion in the project file. Protocols for inspecting the manholes/catch basins are detailed in the QAPjP. Based on the inspection of each manhole/catch basin, field personnel will attempt to verify the layout of the storm sewer system, as shown on Figure 4.

After identifying the locations where dry-weather flow and debris are present, field personnel will coordinate with BBL's project manager to identify locations for collecting dry-weather flow samples and debris samples, as described below.

Subtask 4.2 - Collection of Dry Weather Flow Samples

Based on the results of the visual inspection, up to five dry-weather flow samples will be collected from pipes that discharge to manholes/catch basins associated with the site storm sewer system. The dry-weather flow sampling locations will be selected by the BBL project manager to provide information regarding sources and the potential extent of chemical constituents in dry-weather flow within the storm sewer system. Each dry-weather flow sample will be submitted to Galson for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TSS in accordance with NYSDEC 1991 ASP Methods. At two dry-weather flow sampling locations, both filtered and unfiltered flow samples will be collected for analysis for PCBs and TAL inorganic constituents in accordance with the protocols presented in the QAPjP. Filtration of dry-weather flow samples selected for filtered PCB analysis will be performed in the laboratory using a 0.5 micron filter. Filtration of dry-weather flow samples selected for filtered TAL inorganic constituent analysis will be performed in the field using a 0.45 micron filter.

Collection of dry-weather flow samples will start at the most downstream sampling location in the storm sewer system and will then proceed to the upstream locations. The dry-weather flow sampling will be conducted at the same time as sampling of debris from manholes/catch basins and piping as described below under Subtask 4.3. The approximate flow rate discharged from each pipe that is sampled will be determined at the time of sampling by measuring the length of time required to fill a graduated cylinder (known volume) or by other methods, as appropriate.

Subtask 4.3 - Collection of Drainage Structure Debris Samples

Based on the results of the visual inspection of the storm sewer system, up to ten samples of accumulated debris will be collected from manholes/catch basins associated with the system. The storm sewer debris sampling locations will be selected by BBL's project manager to provide specific information regarding the source and distribution of chemical constituents in accumulated debris within the storm sewer system. The debris sampling locations will generally coincide with the dry-weather flow sampling locations, as described under Subtask 4.2 (unless the drainage structure and piping inspections indicate a reason to sample debris at a location where dry-weather flow does not occur). Each debris sample will be submitted to Galson for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents in accordance with NYSDEC 1991 ASP methods.

Samples of accumulated debris will be collected from the drainage structures/piping in conjunction with the dry-weather flow sampling activities. In order to obtain representative samples, dry-weather flow samples will be collected at each location prior to the collection of debris samples. Sampling will start at the most downstream location in the storm sewer system and will proceed to upstream locations.

Task 5 - Focused Screening Level Risk Assessment

This task will consist of conducting a Focused Screening Level RA to identify and quantify potential risks for on-site NMPC and contractor employees who could potentially be exposed to surface soil, subsurface soil, and ground water at the site. Based on the ecological assessment information presented in the PSA/IRM Study Report, NMPC does not currently propose to include an Ecological RA as part of the MGP/RCRA Investigation. However, an Ecological RA may be conducted if the results of the MGP/RCRA Investigation indicate that chemical constituents are migrating off-site from the North Albany Service Center property.

The Focused Screening Level RA will include the identification of potentially complete exposure pathways associated with each environmental media at the site. A complete exposure pathway consists of a chemical release from a source, an exposure point where human contact can occur, and a route of exposure (oral, dermal, inhalation), through which chemical constituents may enter into the body. Potential risks will be quantified for those pathways which could reasonably be expected to be complete. Potential risks will be quantified through the use of maximum detected concentrations, USEPA reference toxicity information, and standard default exposure assumptions recommended by the USEPA.

Based on the results of the PSA/IRM Study and historical site information, NMPC anticipates that the Focused Screening Level RA will evaluate the following pathways:

- Hypothetical exposure of a utility worker in a trench (i.e., dermal contact with subsurface soil and ground water, inhalation of organic and inorganic constituents in soil or ground water during excavation activities); and

- Hypothetical exposure of an on-site NMPC worker to chemical constituents in surface soil in the area immediately south of the TSDF and in the yard storage area (i.e., incidental ingestion of surface soil, dermal contact with surface soil, inhalation of organic and inorganic constituents released to air from surface soil).

If the results of the MGP/RCRA Investigation indicate that chemical constituents are migrating off-site from the North Albany Service Center property, it may also be necessary to expand the scope of the Focused Screening Level RA to address off-site exposure pathways for workers in the vicinity of the site (i.e., railroad workers in the area downgradient from the site).

Ground water in the vicinity of the North Albany Service Center is not used as a source of potable water. Therefore, potable use of ground water will not be evaluated as a potential exposure pathway.

<u>Task 6 - Assessment of Air Emissions</u>

As outlined in the HASP, air emissions in the worker breathing zone during implementation of the MGP/RCRA Investigation activities will be monitored using a PID and a Real-Time Aerosol Monitor (mini-RAM). The need for additional perimeter monitoring of air emissions at the boundary of the property during the investigation will be determined based on the results of the monitoring conducted in the worker breathing zone.

Task 7 - Assessment of Potential Interim Remedial Measures

This task will consist of an evaluating the need for IRMs to address chemical constituents and/or LNAPL/DNAPL identified by the MGP/RCRA Investigation. The need for the IRM(s) will be evaluated based on the results of the MGP/RCRA Investigation and the Focused Screening Level RA. The purpose of any proposed IRM(s) will be to control active source areas and/or address areas where the concentrations of a particular constituent are judged to be an immediate problem that should be addressed prior to conducting the Remedial Measures Evaluation and/or implementation of a site-wide remedy. A detailed description of any proposed IRM(s) will be presented in an IRM Action Plan. A schedule for implementation of any proposed IRMs (including design and construction) and a list of necessary permits and approvals (if any) will also be presented in the IRM Action Plan. Upon completion, the IRM Action Plan will be submitted to the NYSDEC for review and approval.

Upon NYSDEC approval of the IRM Action Plan for any proposed IRMs, NMPC will prepare detailed documents and specifications (if necessary) to implement the IRM Action Plan. In addition to the detailed documents and specifications, a health and safety plan and contingency plan will also be prepared. Information regarding any proposed IRMs will also be provided to the public in accordance with the CRP.

Task 8 - MGP/RCRA Investigation Report

This work task will consist of preparing a MGP/RCRA Investigation Report to present the results of the investigation activities implemented under Tasks 1 through 6 above. The MGP/RCRA Investigation Report will be organized as follows:

Section 1.0 - Introduction

1.1 General
1.2 Background Information
  1.2.1 Location and Regional Setting
    1.2.1.1 Location
    1.2.1.2 Topography and Drainage
    1.2.1.3 Geology and Hydrogeology
  1.2.2 Site History
    1.2.2.1 Summary of MGP-Related Activities

1.2.2.2 Summary of RCRA-Related Activities
1.2.2.3 Summary of Previous Investigations

1.3 MGP/RCRA Investigation Objectives
1.4 Report Organization

Section 2.0 - Interpretation of Analytical Results

Section 3.0 - Soil Investigation

3.1 General
3.2 Soil Investigation Activities
3.3 Soil Investigation Results

Section 4.0 - Ground-Water Investigation

4.1 General
4.2 Ground-Water Investigation Activities
4.3 Ground-Water Investigation Results

Section 5.0 - Storm Sewer Investigation

5.1 General
5.2 Storm Sewer Investigation Activities
5.3 Storm Sewer Investigation Results

Section 6.0 - Focused Screening Level Risk Assessment

Section 7.0 - Assessment of Air Emissions

Section 8.0 - Conclusions and Recommendations

8.1 General
8.2 Conclusions
8.3 Recommendations

Tables
Figures
Appendices

Detailed information regarding the contents of the tables, figures, and appendices to be included in the MGP/RCRA Investigation Report is provided in the DMP. Analytical results presented in the MGP/RCRA Investigation Report will be validated by BBL's data validation staff in accordance with relevant USEPA and NYSDEC data validation guidance, as described in the QAPjP.

Upon completion, the MGP/RCRA Investigation Report will be submitted to the NYSDEC for review and approval.

4. Remedial Measures Evaluation

4.1 General

Following completion of the MGP/RCRA Investigation, NMPC will complete a Remedial Measures Evaluation to identify and evaluate remedial measure alternatives and to recommend remedial measures to be implemented to address chemical constituents in environmental media resulting from past releases of MGP residuals, MGP-related constituents and 6NYCRR Part 371 hazardous wastes and hazardous constituents at the site. The Remedial Measures Evaluation will consist of the following work elements:

- Developing RAOs to address the environmental concerns identified at the site;
- Identifying and performing a preliminary screening of potential remedial measure technologies;
- Conducting a detailed analysis of potential remedial measure alternatives that could be implemented to address the RAOs; and

  Preparing a Remedial Measures Evaluation Report to present the results of the Remedial Measures Evaluation and NMPC's recommended Remedial Measure Alternative(s).

The Remedial Measures Evaluation will be focused toward addressing potential exposure pathways that may result in unacceptable human health risks and/or continued sources for release of hazardous waste or hazardous constituents to the environment. The Remedial Measures Evaluation will be conducted in accordance with the following guidance:

- Appendix III-C of Permit Module III which presents a detailed outline for a Corrective Measures Study;
- NYSDEC TAGM for the Selection of Remedial Actions at Inactive Hazardous Waste Disposal Sites (May 15, 1990);
- USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October 1988); and

- Other applicable NYSDEC, USEPA, and New York State Department of Health (NYSDOH) regulations and guidance.

A brief description of each element of the Remedial Measures Evaluation is presented below.

4.2 Development of Remedial Action Objectives

RAOs for the various environmental media at the site will be developed based on the results of the MGP/RCRA Investigation, including the distribution of LNAPL/DNAPL, and the concentrations of chemical constituents identified in environmental media at the site. The objectives will focus on overall environmental protection, while acknowledging the limitation of current technology to address DNAPL.

4.3 Identification of Preliminary Screening of Potential Remedial Measure Alternatives

This task will involve identifying remedial technologies for removal, containment, and/or treatment of LNAPL, DNAPL, and chemical constituents identified in environmental media at and in the vicinity of the site. Appropriate presumptive remedial measures will be identified as described in the USEPA Superfund Accelerated Cleanup Model (SACM), the USEPA Presumptive Remedy Guidance for MGP Sites (currently being prepared by the USEPA), the USEPA Site Remediation Strategy Document, the New York Power Pool document entitled, "Standard Remedy Framework for Manufactured Gas Plant Sites in the State of New York" (December 1994, currently under review by the NYSDEC), and the draft "Feasibility Study Guidance Document for Former Manufactured Gas Plant Sites" (Parsons Engineering Science, Inc., February 1996).

Following identification, the remedial technologies will be screened based on effectiveness, implementability, and ability to achieve the RAOs in a reasonable time period. Site characteristics, waste characteristics, and technology limitations will be considered during the screening process. Remedial technologies that are unlikely to provide satisfactory or reliable results, technologies that are not feasible to implement, and technologies that will not achieve the RAOs within a reasonable time period will be eliminated. The remedial technologies that survive the screening process will be combined to form remedial measure alternatives that will be subjected to a detailed evaluation, as described in Subsection 4.4 below.

The results of the identification and preliminary screening of potential remedial measure technologies will be presented in a Preliminary Screening Report. The Preliminary Screening Report will be submitted to the NYSDEC for review and approval.

4.4 Detailed Evaluation of Remedial Measures

This task will consist of performing a detailed evaluation of the remedial measure alternatives that could be implemented to address the RAOs for the site. The evaluation of remedial measure alternatives will consist of the following work elements:

- Evaluating remedial measure alternatives based on the RCRA CMS criteria of technical feasibility, environmental and human health, cost, and compliance with institutional requirements; and

- Recommending and justifying the preferred remedial measure alternative(s).

A brief description of each criteria to be used for the detailed evaluation of the remedial measure alternatives is presented below.

Technical Analysis

The technical analysis of each alternative is primarily a descriptive process by which technical feasibility is assessed based on performance, reliability, implementability, and safety. The evaluation of an alternative's performance will be based on the effectiveness and useful life of the remedy. Reliability will include a discussion of the alternative's operation and maintenance requirements, and its demonstrated reliability. The implementability of each alternative will include a discussion of the alternative's ease of installation (constructability), the time required to implement the alternative, and the time it takes to realize beneficial results. Safety, including potential threats to nearby communities and environments, as well as those to on-site workers, will also be evaluated for each alternative.

Environmental Analysis

The environmental analysis will include an assessment of possible effects on the environment resulting from the implementation of each of the remedial measure alternatives. The objective of the environmental analysis is to delineate the "net" effects of each remedial measure alternative so that consideration of environmental risk is explicitly incorporated into the ultimate selection of the preferred remedial alternative. The no-action alternative will serve as the baseline from which "net" effects can be determined.

Human Health Analysis

A human health analysis of each remedial measure alternative will be conducted to assess the extent that implementation of each alternative will affect the potential human health expense pathways.

As with the environmental analysis of each remedial measure alternative, the no-action alternative will be fully evaluated as a baseline for the human health analysis activities. This will involve a review of existing conditions in terms of human health exposures, as identified by the Focused Screening Level RA to be prepared under Task 5 above.

Institutional Analysis

The institutional analysis will include an evaluation of the remedial alternatives with respect to local, state, and federal requirements. In the process of this analysis, permitting requirements and permitting schedules will be defined, under which each alternative could be implemented.

Cost Analysis

A cost analysis will be performed to identify present worth costs for each alternative. The purpose will be to evaluate the alternatives in terms of aggregate costs, including capital, and operation and maintenance (O&M) costs. Capital costs will include direct (construction) and indirect (engineering, legal, contingencies, etc.) costs. The total cost (capital and O&M costs) will be evaluated through a present-worth analysis of all costs involved in the remedy.

Upon completion of the detailed evaluation of potential remedial measure alternatives, a recommendation and justification of the preferred remedial alternative(s) will be developed using the technical, environmental, human health, and institutional criteria described above. The results of the Remedial Measures Evaluation will be presented in the Remedial Measures Evaluation Report, as described below.

4.5 Preparation of Remedial Measures Evaluation Report

This task will consist of preparing a Remedial Measures Evaluation Report. The Remedial Measures Evaluation Report will present the following:

- A summary of relevant issues identified by the MGP/RCRA Investigation;
- A detailed discussion of the evaluation of remedial measure alternatives based on the criteria of technical feasibility, environmental and human health assessment, costs, and compliance with institutional requirements (as outlined under Task 4.4, above). The discussion will include performance expectations, preliminary design criteria, general operation and maintenance requirements, and long-term monitoring requirements;
- Tables presenting capital costs and operation and maintenance costs for each remedial measure alternative;
- A summary table presenting a clear comparison of the positive and negative aspects of each remedial measure alternative;

  A recommendation and justification of the preferred remedial measure alternative(s);
- A summary of any field, bench-scale laboratory, or pilot-scale laboratory studies (if conducted);
- A preliminary discussion of the preferred remedial measure(s) design and implementation precautions, including special technical issues (i.e., additional engineering data required, permits and regulatory requirements, access, easements, rights-of-way, health and safety requirements, and community relations activities); and

- A project schedule that covers preparation of a Remedial Measures Design, Construction QA/QC Plan, Health and Safety Plan, and Remedial Measure Construction for the preferred remedial measure alternative(s).

The Remedial Measures Evaluation Report will be signed by a licensed New York State Professional Engineer, as required by the Consent Order. The Remedial Measures Evaluation Report will be submitted to the NYSDEC for review and approval. Upon approval by the NYSDEC, the Remedial Measures Evaluation Report will be provided to the public as described in the Community Relations Plan.

Tables

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Table 1

Niagara Mohawk Power Corporation
North Albany Service Center
MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan

TCL VOCs and TCL SVOCs

Volatile Organic Compounds		
Chloromethane	2-Butanone	Bromoform
Bromomethane	1,1,1-Trichloroethane	4-Methyl-2-pentanone
Vinyl Chloride	Carbon Tetrachloride	2-Hexanone
Chloroethane	Vinyl Acetate	Tetrachloroethene
Methylene Chloride	Bromodichloromethane	Toluene
Acetone	1,2-Dichloropropane	1,1,2,2-Tetrachloroethane
Carbon Disulfide	cis-1,3-Dichloropropene	Chlorobenzene
1,1-Dichloroethene	Trichloroethene	Ethylbenzene
1,1-Dichloroethane	Dibromochloromethane	Styrene
1,1-Dichloroethene (total)	1,1,2-Trichloroethane	Xylenes (total)
Chloroform	Benzene	
1,2-Dichloroethane	trans-1,3-Dichloropropene	

Semi-Volatile Organic Compounds		
Phenol	Hexachlorobutadiene	N-nitrosodiphenylamine
bis(2-chloroethyl)ether	4-Chloro-3-methylphenol (para-chloro-meta-cresol)	4-Bromophenyl-phenylether
2-Chlorophenol		Hexachlorobenzene
1,3-Dichlorobenzene	2-Methylnaphthalene	Pentachlorophenol
1,4-Dichlorobenzene	Hexachlorocyclopentadiene	Phenanthrene
Benzyl alcohol	2,4,6-Trichlorophenol	Anthracene
1,2-Dichlorobenzene	2,4,5-Trichlorophenol	Di-n-butylphthalate
2-Methylphenol	2-Chloronaphthalene	Fluoranthene
bis(2-Chloroisopropyl)ether	2-Nitroaniline	Pyrene
4-Methylphenol	Dimethylphthalate	Butylbenzylphthalate
N-nitroso-di-n-dipropylamine	Acenaphthylene	3,3'-Dichlorobenzidine
Hexachloroethane	2,6-Dinitrotoluene	Benzo(a)anthracene
Nitrobenzene	3-Nitroaniline	Chrysene
Isophorone	Acenaphthene	bis(2-ethylhexyl)phthalate
2-Nitrophenol	2,4-Dinitrophenol	Di-n-octylphthalate
2,4-Dimethylphenol	4-Nitrophenol	Benzo(b)fluoranthene
Benzoic Acid	Dibenzofuran	Benzo(k)fluoranthene
bis(2-Chloroethoxy)methane	2,4-Dinitrotoluene	Benzo(a)pyrene
2,4-Dichlorophenol	Diethylphthalate	Indeno(1,2,3-cd)pyrene
1,2,4-Trichlorobenzene	4-Chlorophenyl-phenyl ether	Dibenzo(a,h)anthracene
Naphthalene	Fluorene	Benzo(g,h,i)perylene
4-Chloroaniline	4,6-Dinitro-2-methylphenol	

Table 2

Niagara Mohawk Power Corporation
North Albany Service Center
MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan
TAL Inorganic Constituents

Aluminum	Magnesium
Antimony	Manganese
Arsenic	Mercury
Barium	Nickel
Beryllium	Potassium
Cadmium	Selenium
Calcium	Silver
Chromium	Sodium
Cobalt	Thallium
Copper	Vanadium
Iron	Zinc
Lead	Cyanide

Table 3
Niagara Mohawk Power Corporation
North Albany Service Center

Work Plan

Soil Boring and Sampling Activities Summary

Soil Boring Designation	Sampling and Analysis	Rationale
SB-101 through SB-106	• Install borings SB-103 through SB-107 to the water table (approx. 10 feet below ground level). • Install boring SB-108 to bedrock (approx. 25 feet below ground level). • Conduct PID screening. • Submit one soil sample from each boring for laboratory analysis of PCBs and TAL inorganic constituents. • Three of these soil samples will also be submitted for TCL VOCs and SVOCs.	• Install borings in the area immediately south of the TSDF to evaluate potential releases of hazardous waste or hazardous constituents from SWMUs located in this area of the facility. • Unsaturated soil samples from this area will be submitted based on the presence of staining, elevated PID readings, and/or other field observations. Samples submitted for TCL VOCs and SVOCs will be selected based on PID readings.
SB-107 and SB-108	• Install to bedrock (approx. 25 feet, below ground level). • Conduct PID screening, jar testing, and UV flourescence screening. • Up to three soil samples for PCBs, BTEX compounds, PAHs, TAL inorganic constituents, and TPH.	• Characterize soil and evaluate DNAPL presence in the vicinity of newly identified AOC near soil boring SB-5. • Determine if DNAPL observed at soil boring SB-5 is of limited extent and assess non-MGP related sources of DNAPL in this area. • Up to two soil samples will be selected based on field evidence of DNAPL, staining, elevated PID readings; and one soil sample to determine the vertical extent of chemical constituents based on field screening.
SB-109 through SB-111	• Install to bedrock (approx. 25 feet below ground level). • Conduct PID screening, jar testing, and UV flourescence screening. • Submit up to five soil samples for PCBs, BTEX compounds, PAHs, TAL inorganic constituents, and TPH.	• Install borings in the area adjacent to monitoring well MW-2, located near the western property boundary, to evaluate whether DNAPLs could impact utility conduits/ subsurface work along Broadway to the north of the former relief holder. • Soil samples submitted for analysis will target elevations comparable to any utilities backfill at which migration may occur.

Soil Boring Designation	Sampling and Analysis	Rationale
SB-112 through SB-115 and SB-120	• Install to bedrock (approx. 20 feet below ground level). Conduct PID screening, jar testing, and UV flourescence screening. • Submit up to ten soil samples for PCBs, BTEX compounds, PAHs, TAL inorganic constituents, and TPH.	• Install borings in the vicinity of the former MGP operation and other petroleum-related SWMUs, located to the north of Building 2, to further delineate the horizontal extent of the LNAPL and DNAPL observed in soil borings and test pits completed north of Building 2 as part of the PSA/IRM Study. • Soil samples will be collected from the unsaturated zone or water table fluctuation zone and to delineate the vertical extent of DNAPL constituents. DNAPL samples will not be targeted in this area since DNAPL analyses were performed during the PSA/IRM Study.
SB-116 through SB-118	• Install to bedrock (approx. 20 feet below ground level). • Conduct PID screening, jar testing, and UV flourescense screening. • Submit up to four soil samples for PCBs, BTEX compounds, PAHs, TAL inorganic constituents, and TPH.	• Install borings in the vicinity of the newly-identified AOC near monitoring well MW-10, to establish the horizontal extent of LNAPL observed at monitoring well MW-10. • Determine whether the LNAPL is part of a larger plume originating to the north of MW-10 or a separate plume associated with the former oil storage facilities in this area of the facility. • Soil samples will be collected from the unsaturated zone or water table fluctuation zone.
SB-119	• Install to bedrock (approx. 20 feet below ground level). • Conduct PID screening, jar testing, and UV flourescense screening. • Submit up to four soil samples for PCBs, BTEX compounds, PAHs, TAL inorganic constituents, and TPH.	• Install boring in the vicinity of the fuel service island east of Building 2 to investigate the horizontal extent of LNAPL observed at MW-6. • Determine whether the LNAPL is part of a larger plume originating to the north or a separate plume associated with the former underground storage tanks in this area. • Soil samples will be collected from the unsaturated zone or water table fluctuation zone.
SB-121 and SB-122	• Install to the water table (approx. 10 feet below ground level). • Conduct PID screening. • Submit one soil sample from each boring for laboratory analysis of TAL inorganic constituents.	• Determine appropriate background soil boring locations, based on field reconnaissance. • Establish background soil TAL inorganic constituent concentrations in the vicinity of the facility. • Unsaturated soil samples will be collected.

Figures

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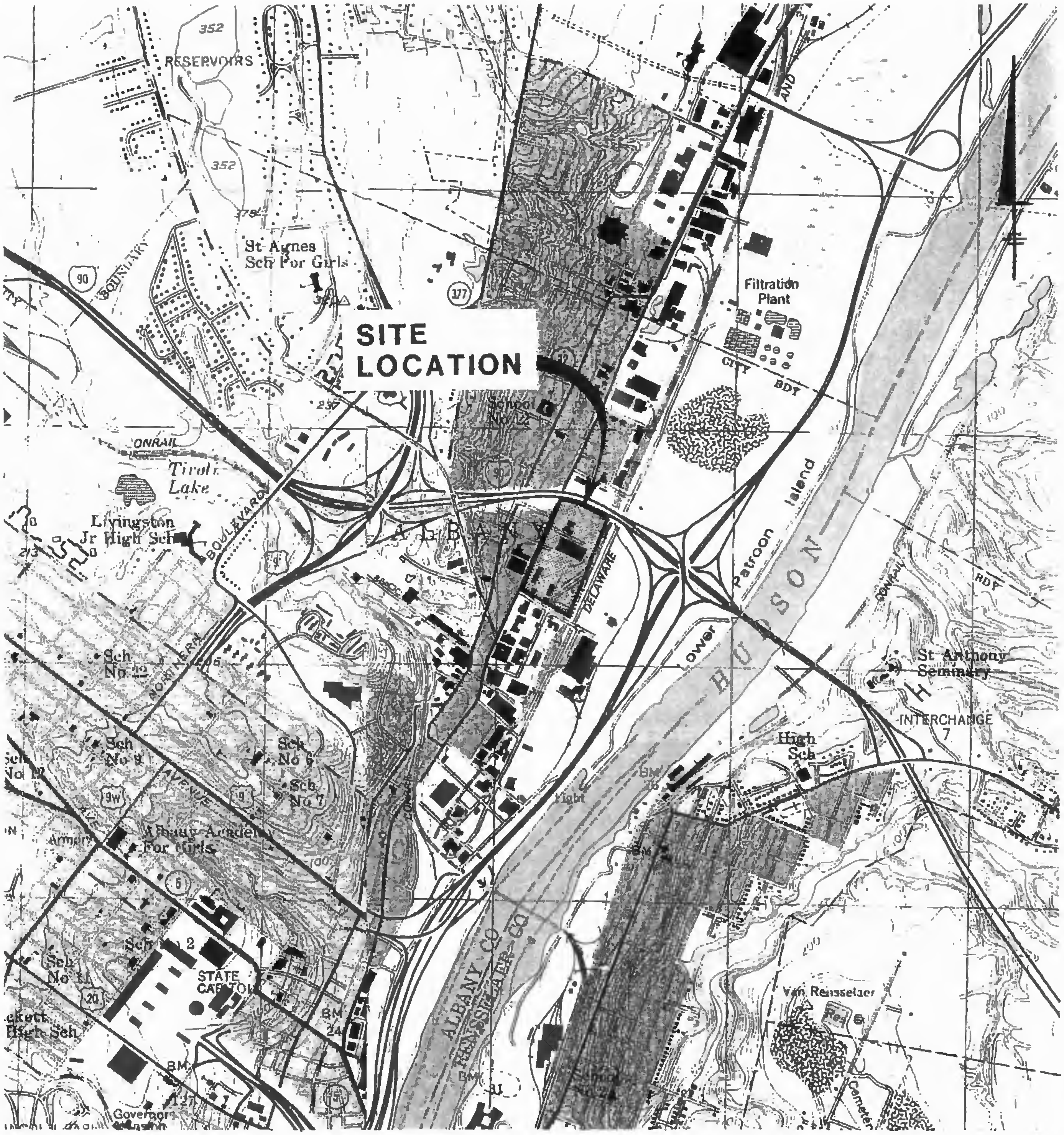
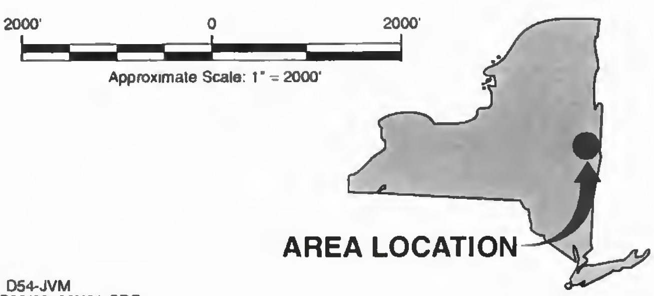


REFERENCE: ALBANY, NEW YORK USGS QUAD. 1980
TROY SOUTH, NEW YORK USGS QUAD. 1980



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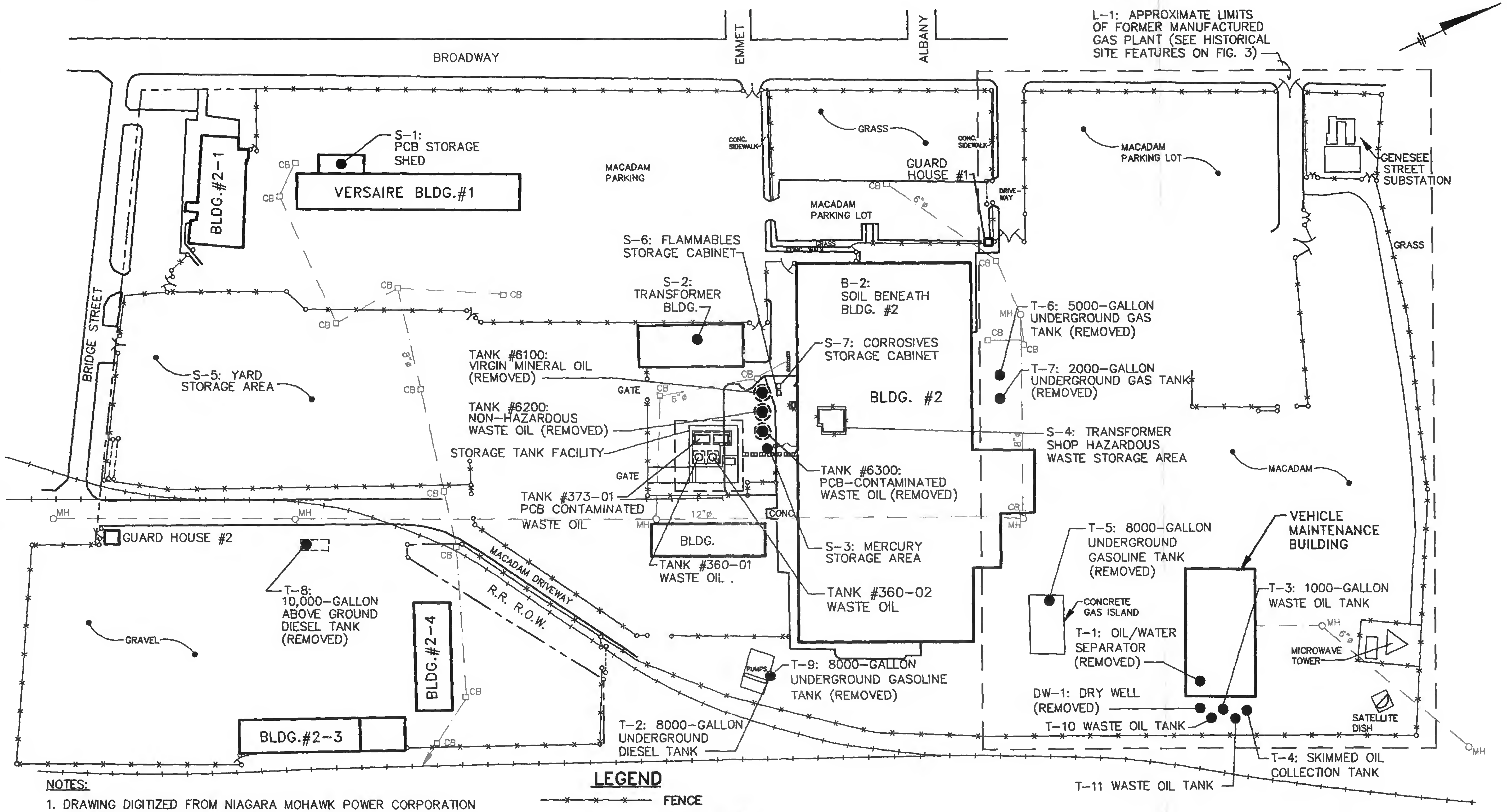
MGP/RCRA INVESTIGATION & REMEDIAL MEASURES EVALUATION

LOCATION MAP

FIGURE 1

11/95 D54-JVM
36469P02/36469N01 CDR



NOTES:

1. DRAWING DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. D-24687-E, FILE NO. INDEX 20.3-A1.1-B2, DATED 10/29/85.
2. STORM SEWER LAYOUT DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. C-16925-E, FILE NO. INDEX 20.3-A1.1, CIRCA 1983.
3. EXISTING SAMPLE LOCATIONS DIGITIZED FROM FOSTER WHEELER CORPORATION DRAWING NO. NMPC2-3A.DWG, DATED 4/11/95.
4. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

- FENCE
- RIGHT-OF-WAY
- EXISTING RAILROAD
- EXISTING STORM SEWER PIPE
- CB EXISTING CATCH BASIN
- MH EXISTING MANHOLE

100' 0 100'

SCALE: 1" = 100'

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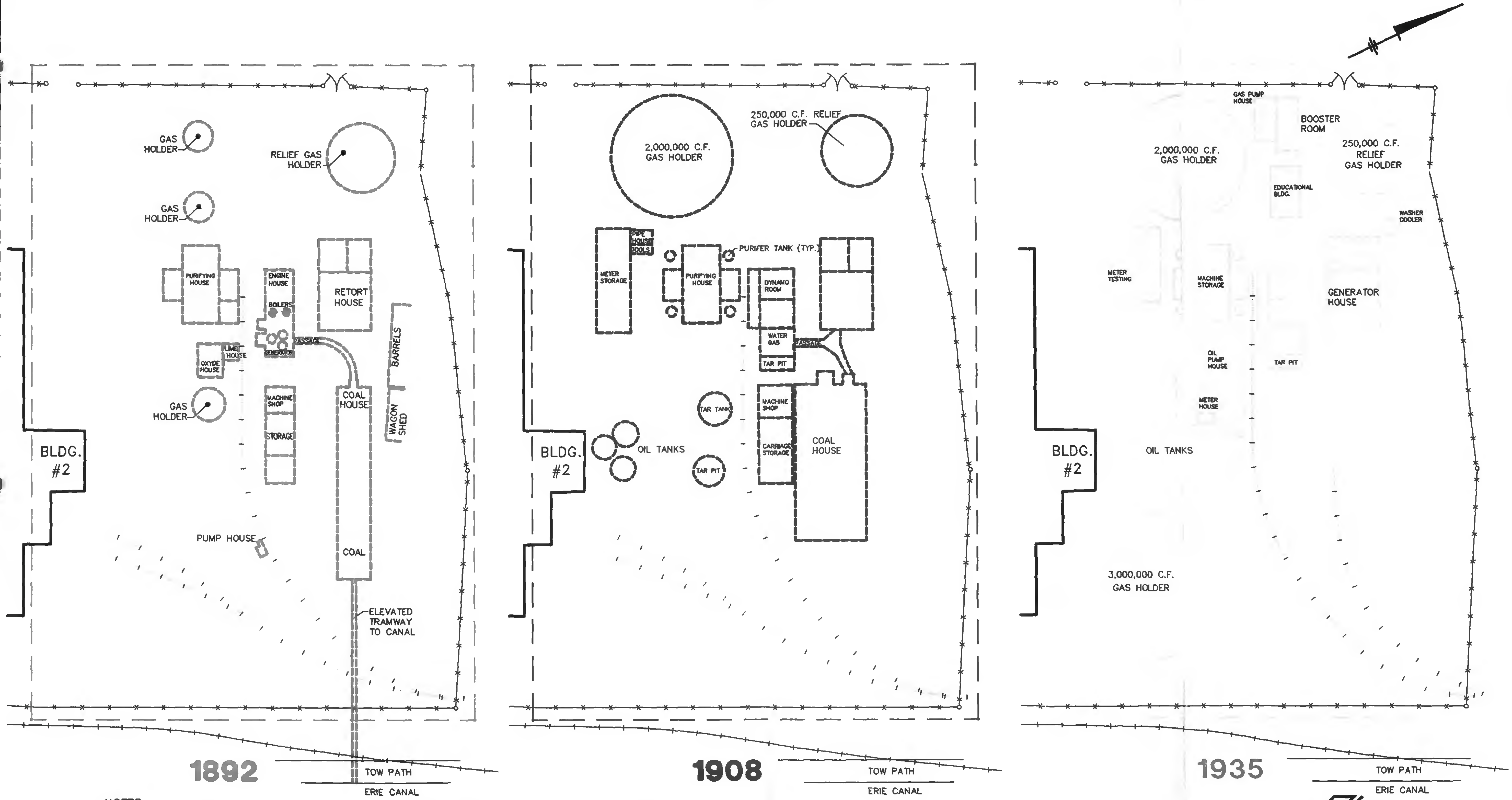
MGP/RCRA INVESTIGATION & REMEDIAL MEASURES EVALUATION

SITE PLAN

FIGURE 2

11/28/95 54-AK, RCB, PGL
36469P02/36469G03.DWG
LAYERS OFF: REF,1*,BO*,P*,TE,WE,TXTP



NOTES:

1. BUILDING 2 AND EXISTING FENCE LOCATION DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. D-24687-E, FILE NO. INDEX 20.3-A1.1-B2, DATED 10/29/85.
2. HISTORIC STRUCTURE LOCATIONS ARE BASED ON ENGINEERING-SCIENCE FIGURE NO. 3.2, "MGP SITE PLAN" AND HISTORICAL MAPS INCLUDING SANBORN FIRE INSURANCE MAPS. THESE LOCATIONS ARE APPROXIMATE.
3. LOCATION OF FACILITY SHOWN ON FIGURE 2.
4. C.F. = CUBIC FEET

LEGEND

- FENCE
- EXISTING RAILROAD
- FORMER RAILROAD

100' 0 100'

SCALE: 1" = 100'

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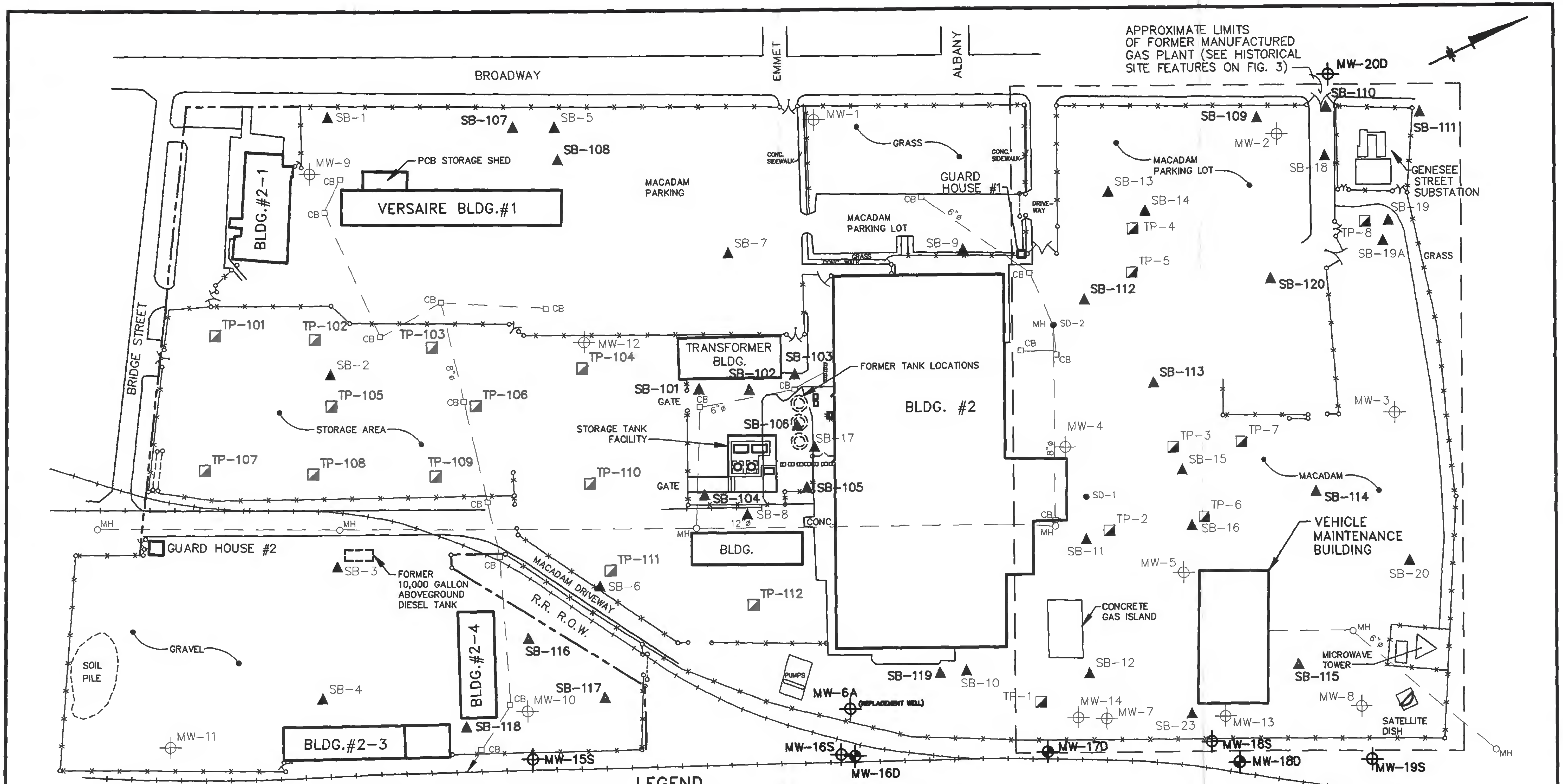
REMEDIAL MEASURES EVALUATION

HISTORICAL SITE FEATURES FIGURE 3

3/96 54-AK,RCB,POL,RCB
36469P02/36469G04.DWG

LAYERS OFF: REF,BO*,P*,TE,WE,FENCE,SS,TXTT,TXTS,



LEGEND

FENCE	
RIGHT-OF-WAY	
EXISTING RAILROAD	
EXISTING STORM SEWER PIPE	
CB	EXISTING CATCH BASIN
MH	EXISTING MANHOLE
SD-1	EXISTING DEBRIS SAMPLE LOCATION
MW-11	EXISTING GROUND-WATER MONITORING WELL LOCATION
SB-4	EXISTING SOIL BORING LOCATION
TP-3	EXISTING TEST PIT LOCATION
SB-118	PROPOSED SOIL BORING LOCATION
TP-111	PROPOSED TEST PIT LOCATION
MW-15S	PROPOSED SHALLOW GROUND-WATER MONITORING WELL LOCATION
MW-17D	PROPOSED DEEP GROUND-WATER MONITORING WELL LOCATION

100' 0 100'

SCALE: 1" = 100'

NOTES:

1. DRAWING DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. D-24687-E, FILE NO. INDEX 20.3-A1.1-B2, DATED 10/29/85.
2. STORM SEWER LAYOUT DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. C-16925-E, FILE NO. INDEX 20.3-A1.1, CIRCA 1983.
3. EXISTING SAMPLE LOCATIONS, SOIL PILE, AND VEHICLE MAINTENANCE BUILDING DIGITIZED FROM FOSTER WHEELER CORPORATION DRAWING NO. NMPC2-3A.DWG, DATED 4/11/95.
4. ALL LOCATIONS ARE APPROXIMATE.
5. STORM SEWER MANHOLE/CATCH BASINS TO BE INVESTIGATED AS PART OF STORM SEWER INVESTIGATION.
6. TWO BACKGROUND SOIL BORINGS WILL BE COMPLETED AT LOCATIONS TO BE DETERMINED IN THE FIELD.

8/96 54-AK,RCB
36469001/36469G03.DWG

LAYERS OFF: REF,1=,TXTT,TXTS

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

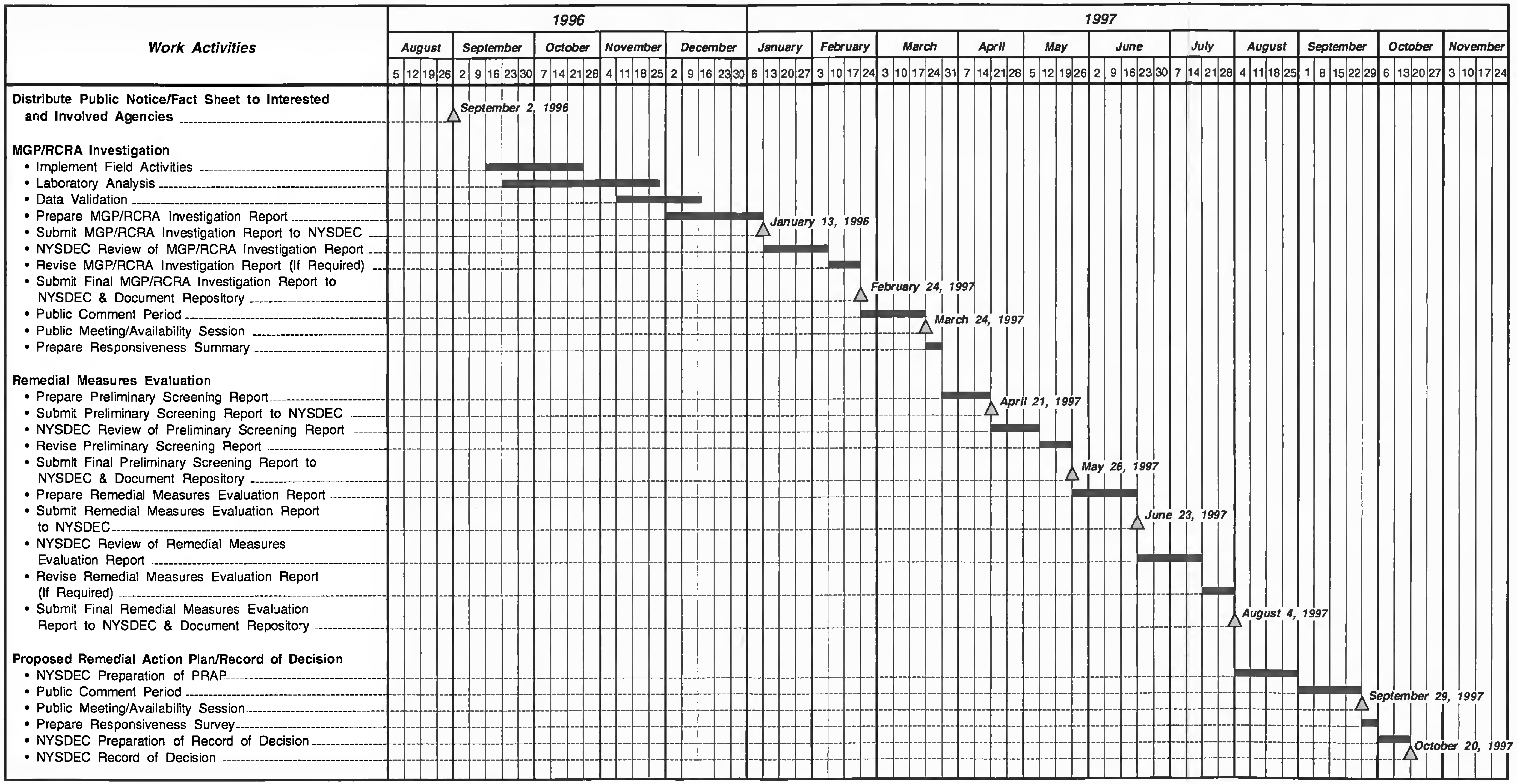
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER
MGP/RCRA INVESTIGATION & REMEDIAL MEASURES EVALUATION

PROPOSED SAMPLING LOCATIONS

FIGURE 4

Proposed Project Schedule

Niagara Mohawk Power Corporation
MGP/RCRA Investigation and Remedial Measures Evaluation
North Albany Service Center



Notes:
1. Schedule for completion of the Remedial Measures Evaluation will be dependent upon the results of the MGP/RCRA Investigation.
2. Schedule is dependent upon NYSDEC review time frames.
3. Schedule for preparation of MGP/RCRA Investigation Report includes the evaluation of interim remedial measures and completion of the Focused Screening Level Risk Assessment.

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8/96 SYR-D54-DJH
36469001/36469j01.cdr

Attachments

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Attachment 1
Remedial Measures Evaluation Work Plan

NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

Transmitted Via U.S. Mail

February 6, 1996

Mr. John T. Spellman, P.E.
Bureau of Construction Services
Division of Hazardous Waste Remediation
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

Re: Niagara Mohawk Power Corporation
North Albany Service Center
MGP/RCRA Investigation

Dear Mr. Spellman:

This letter presents Niagara Mohawk Power Corporation's (NMPC's) technical approach for complying with the requirements of the Manufactured Gas Plant (MGP) Consent Order (Order on Consent index #D0-0001-92101) and Permit Module III of the Hazardous Waste Management Permit for the above-referenced facility. As discussed during the January 25, 1996 meeting at the North Albany Service Center, NMPC's overall technical approach is to conduct a comprehensive site-wide MGP/RCRA Investigation and Remedial Measures Evaluation that will satisfy the requirements of both the MGP Consent Order and Permit Module III. As discussed during the meeting, the investigation and remedial action evaluation requirements presented in Permit Module III are more specific (and generally more rigorous) than the requirements of the MGP Consent Order. Therefore, NMPC proposes to conduct the MGP/RCRA Investigation and Remedial Measures Evaluation in accordance with the requirements of Permit Module III [with the exception that the requirements will apply to the entire facility instead of to specific solid waste management units (SWMUs)]. Based on a detailed comparison of the MGP Consent Order and Permit Module III, NMPC has concluded that conducting the site-wide MGP/RCRA Investigation and Remedial Measures Evaluation in accordance with the requirements of Permit Module III will automatically result in satisfying the requirements of the MGP Consent Order.

Background information relating to NMPC's technical approach for complying with the MGP Consent Order and Permit Module III is presented below followed by a discussion of the elements to be included in the MGP/RCRA Investigation and Remedial Measures Evaluation.

I. Background

NMPC conducted a Preliminary Site Assessment/Interim Remedial Measures (PSA/IRM) Study for the North Albany Former MGP site during 1994 pursuant to the MGP Consent Order. The purpose of the PSA/IRM Study was to investigate hazardous substances associated with MGP operations at the facility. A secondary objective of the PSA/IRM Study was to investigate potential releases of hazardous wastes or hazardous constituents from 13 SWMUs located at the facility.

Pursuant to Permit Module III, SWMUs that are determined to require further investigation based on the results of the PSA/IRM Study were to be grouped into the following three categories:

- *Category I SWMUs*: This category includes SWMUs containing MGP residuals;
- *Category II SWMUs*: This category includes SWMUs containing MGP residuals mixed with 6NYCRR hazardous wastes or hazardous substances; and
- *Category III SWMUs*: This category includes SWMUs containing 6NYCRR Part 373 hazardous wastes or hazardous substances.

In accordance with Permit Module III, further investigation of Category I and Category II SWMUs would be conducted under the MGP Consent Order and further investigation of Category III SWMUs would be conducted under Permit Module III. The 13 SWMUs investigated as part of the PSA/IRM Study were not categorized in accordance with the requirements of Permit Module III in the NYSDEC-approved PSA/IRM Study Report (June 1995). In order to establish applicable requirements for further investigation activities at the facility, NMPC proposes to categorize the 13 SWMUs investigated as part of the PSA/IRM Study as summarized below.

Unit Number	SWMU Description
Category I SWMUs	
L-1	Coal tar residuals from former MGP area
Category II SWMUs	
DW-1	Dry well (inactive)
B-2	Soil beneath transformer shop (Building 2)
T-1	Oil/water separator
T-2	8,000-gallon underground diesel tank
T-3	1,000-gallon waste oil tank (removed)
T-4	Skimmed oil collection tank
T-5	8,000-gallon underground gasoline tank (removed)
T-9	8,000-gallon underground gasoline tank (removed)
Category III SWMUs	
S-3	Mercury storage area
S-5	Yard storage area
T-6200	Non-hazardous waste oil tank (removed)
T-6300	PCB-contaminated waste oil tank (removed)
--	Storm sewer system

Unit Number	SWMU Description
--	AOC located in the vicinity of ground-water monitoring well MW-10 (portion of facility utilized as petroleum storage facility prior to NMPC ownership)
--	AOC located in vicinity of soil boring SB-5 (area located west of Versaire Building)

Based on the grouping of SWMUs under the categories indicated above, the RCRA Facility Investigation (RFI) requirements in Permit Module III would apply for future investigations at the facility. The NYSDEC has also requested that NMPC conduct a remedial investigation/feasibility study (RI/FS) for the site in accordance with the requirements of the MGP Consent Order. In order to coordinate future investigation and remedial action requirements under the MGP Consent Order and Permit Module III, NMPC proposes to conduct a single, comprehensive MGP/RCRA Investigation and Remedial Measures Evaluation that will consist of the following elements:

- MGP/RCRA Investigation;
- Evaluation and Implementation (if necessary) of Interim Remedial Measures;
- Remedial Measures Evaluation; and
- Proposed Remedial Action Plan.

A detailed description of NMPC's technical approach for completing these elements and satisfying the requirements of the MGP Consent Order and Permit Module III is presented below.

II. Elements of MGP/RCRA Investigation and Remedial Measures Evaluation

NMPC's technical approach for completing the elements of the MGP/RCRA Investigation and Remedial Measures Evaluation is as follows:

A. MGP/RCRA Investigation

In accordance with Appendix III-B of Permit Module III and consistent with the requirements of Subparagraph II.C. of the MGP Consent Order, NMPC will prepare a MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan (Work Plan) that will present a detailed description of activities to be conducted for the MGP/RCRA Investigation. In accordance with the requirements of Appendix III-B of Permit Module III, the Work Plan will be supported by the following documents:

- A Project Management Plan, which will present a discussion of the management approach, project schedule, and key personnel responsible for implementation of the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan (The Project Management Plan is not required under the MGP Consent Order);

- A Quality Assurance Project Plan (QAPjP) which will present project-specific protocols and QA/QC measures to be utilized during the collection of samples, completion of field measurements, and laboratory analysis of samples collected during implementation of the Work Plan (The QAPjP will include field sampling and quality assurance information that is required for a Sampling and Analysis Plan under the MGP Consent Order);

- A Data Management Plan that will present a discussion of how the data management system will document and track investigation data and results. The Data Management Plan will also present an outline of the contents to be included in the MGP/RCRA Investigation and Remedial Measures Evaluation Report (The Data Management Plan is not required under the MGP Consent Order);

- A project-specific Health and Safety Plan (HASP) which will present detailed procedures to minimize the exposure of on-site workers and the general public to hazardous wastes or constituents during implementation of the Work Plan (The HASP is required by both Permit Module III and the MGP Consent Order); and

- A Community Relations Plan which will present procedures for informing the public of activities to be conducted and the results generated for the MGP/RCRA Investigation and Remedial Measures Evaluation (The Community Relations Plan is consistent with the document referred to as a "Citizen Participation Plan" in the MGP Consent Order. Under Subparagraph III.A. of the MGP Consent Order, the document may be required at the discretion of the NYSDEC).

In addition to presenting the scope of work for conducting the MGP/RCRA Investigation, the Work Plan will also present a detailed outline for the Remedial Measures Evaluation to be conducted in accordance with the Feasibility Study (FS) requirements of the MGP Consent Order (Subparagraph V) and the Corrective Measures Study (CMS) requirements of Permit Module III (Appendix III-C and Conditions E.9 through E.12). The Work Plan will also present a detailed schedule for completing each work task presented in the Work Plan. The schedule will be developed to comply with Condition E and Appendix III-D of Permit Module III (which presents more detailed schedule requirements than the MGP Consent Order).

B. Evaluation and Implementation of Interim Remedial Measures

In accordance with Condition B.6. of Permit Module III and Subparagraph III.A. of the MGP Consent Order, NMPC will evaluate the need for interim remedial measures (IRMs) to address chemical constituents and/or non-aqueous phase liquids identified by the results of the MGP/RCRA investigation. The need for the IRM(s) will be evaluated based on the results of the MGP/RCRA Investigation and an exposure pathway analysis (i.e., focused screening level risk assessment) to be presented in the MGP/RCRA Investigation Report. The purpose of the IRM(s) will be to control active source areas or address areas where the concentrations of a particular constituent are judged to be an immediate problem that should be addressed prior to conducting the Remedial Measures Evaluation and/or implementation of a site-wide remedy. NMPC will provide a detailed description of the proposed IRM(s) in an IRM Action Plan that incorporates the requirements for an Interim Corrective Measures Study as described in Condition B.6. of Permit Module III and the requirements for an IRM Work Plan as described in Subparagraph III.A. of the MGP Consent Order.

As required by Subparagraph III.A. of the MGP Consent Order, NMPC will prepare detailed documents and specifications (if necessary) to implement the NYSDEC-approved IRM Action Plan. These documents and specifications will be signed and sealed by a professional engineer. In addition to the detailed documents and specifications, a health and safety plan and contingency plan will also be prepared. Information regarding the IRMs will be provided to the public in accordance with the Community Relations Plan.

Remedial Measures Evaluation

Based on the results of the MGP/RCRA Investigation, NMPC will conduct a Remedial Measures Evaluation that will consist of the following elements:

- Developing remedial action objectives (RAOs) to address the environmental concerns identified at the facility;
- Identifying and developing potential remedial measure alternatives and performing a preliminary screening of the remedial measure alternatives;
- Conducting a detailed analysis of potential remedial measures which could be implemented to address the remedial action objectives; and
- Preparing a Remedial Measures Evaluation Report to present the results of the Remedial Measures Evaluation and NMPC's recommended Remedial Measure Alternative(s).

A brief description of NMPC's technical approach for completing each element of the Remedial Measures Evaluation is presented below.

1. Establish Remedial Action Objectives

RAOs for the various environmental media at the site will be developed based on the results of the MGP/RCRA Investigation, including the present distribution of DNAPL and LNAPL, and the concentrations of chemical constituents identified in the soil and ground water at the site. The objectives will focus on overall environmental protection, while acknowledging the limitation of current technology to address DNAPL.

2. Remedial Measures Evaluation

The evaluation of potential remedial measures which could be implemented to address the remedial action objectives for the facility will be conducted in accordance with the following guidance:

- Appendix III-C of Permit Module III which presents a detailed outline for a Corrective Measures Study;
- NYSDEC Technical and Administrative Guidance Memorandum (TAGM) for the Selection of Remedial Actions at Inactive Hazardous Waste Disposal Sites (May 15, 1990);
- USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October 1988); and
- Other applicable NYSDEC, USEPA, and New York State Department of Health (NYSDOH) regulations and guidance.

NMPC will focus the Remedial Measures Evaluation to address potential exposure pathways that may result in unacceptable human health risks and/or continued sources for release of hazardous waste or hazardous constituents to the environment.

The Remedial Measures Evaluation will consist of the following work elements:

- Preliminary screening of remedial technologies based on effectiveness, implementability, and ability of the technology to achieve the remedial action objectives in a reasonable time period;
- Identification and development of potential remedial measure alternatives;
- Evaluation of the remedial measure alternatives based on the criteria of technical feasibility, environmental and human health, compliance with institutional requirements, and costs; and
- Justification and recommendation of the preferred remedial measure alternative(s).

The identification and development of the Remedial Measure Alternative(s) will involve the identification, screening, and development of the technologies for removal, containment, and/or treatment of chemical constituents in environmental media at the facility, based on the RAOs established for the site (as discussed above). A comparison of the criteria which will be used to evaluate the remedial measure alternative(s) under Permit Module III (i.e., the RCRA CMS Criteria) and the MGP Consent Order (i.e., CERCLA FS Criteria) is presented below.

RCRA CMS Criteria	Applicable CERCLA FS Criteria
Technical Analysis	- Implementability - Reduction of toxicity, mobility, and volume
Environmental Analysis	- Long-term effectiveness - Short-term effectiveness - Overall protection of human health and environment
Human Health Analysis	- Overall protection of human health and environment - Short-term effectiveness
Institutional Analysis	- Compliance with New York State Standards, Criteria, and Guidelines (SCGs)
Cost Feasibility	- Cost

Based on the similarity of the evaluation criteria under Permit Module III and the MGP Consent Order, NMPC proposes to use a single set of criteria for the entire Remedial Measures Evaluation. Since the former MGP operation residues are included as a SWMU in the RCRA permit for the North Albany Service Center facility, the Permit Module III criteria are more directly applicable on a site-wide basis; therefore, NMPC proposes to use the evaluation criteria presented in Permit Module III.

If appropriate based on the results of the MGP/RCRA Investigation, NMPC will incorporate the evaluation of presumptive remedial measures, as described in the USEPA's Superfund Accelerated Cleanup Model (SACM), the USEPA's Presumptive Remedy Guidance for MGP Sites, the USEPA's Site Remediation Strategy Document, and the New York Power Pool document entitled, "Standard Remedy Framework for Manufactured Gas Plant Sites in the State of New York" (December 1994).

3. Remedial Measures Evaluation Report

The Remedial Measures Evaluation Report will present a detailed discussion of the Remedial Measures Evaluation (including documentation that the evaluation meets the requirements of Permit Module III and the MGP Consent Order). The report will also present a preliminary discussion of the preferred remedial measure(s) design, implementation precautions, cost estimates, and schedule considerations. The Remedial Measures Evaluation Report will form the basis for the selection of an appropriate remedial alternative(s) for implementation at the site.

D. Proposed Remedial Action Plan

After an appropriate remedial alternative(s) has been selected and approved by the NYSDEC, NMPC will meet with the NYSDEC to discuss the development of a PRAP by the NYSDEC. Once an acceptable PRAP has been reached, NMPC will prepare for and attend public meetings associated with the NYSDEC Record of Decision (ROD) that will detail the selected remedy for the facility.

Based on discussions during the January 25, 1995 meeting, NMPC has attached a site location map, a site plan (showing the location of SWMUs), and a map of historical site features (including the former MGP operation) as Figures 1 through 3. A proposed schedule for completing the elements of the MGP/RCRA investigation is included as Figure 4.

NMPC trusts that the proposed technical approach for complying with the requirements of the MGP Consent Order and Permit Module III will be acceptable to the NYSDEC. Please do not hesitate to call me at (315) 428-3101 if you have any questions regarding NMPC's planned approach for the MGP/RCRA Investigation and Remedial Measures Evaluation.

Sincerely,

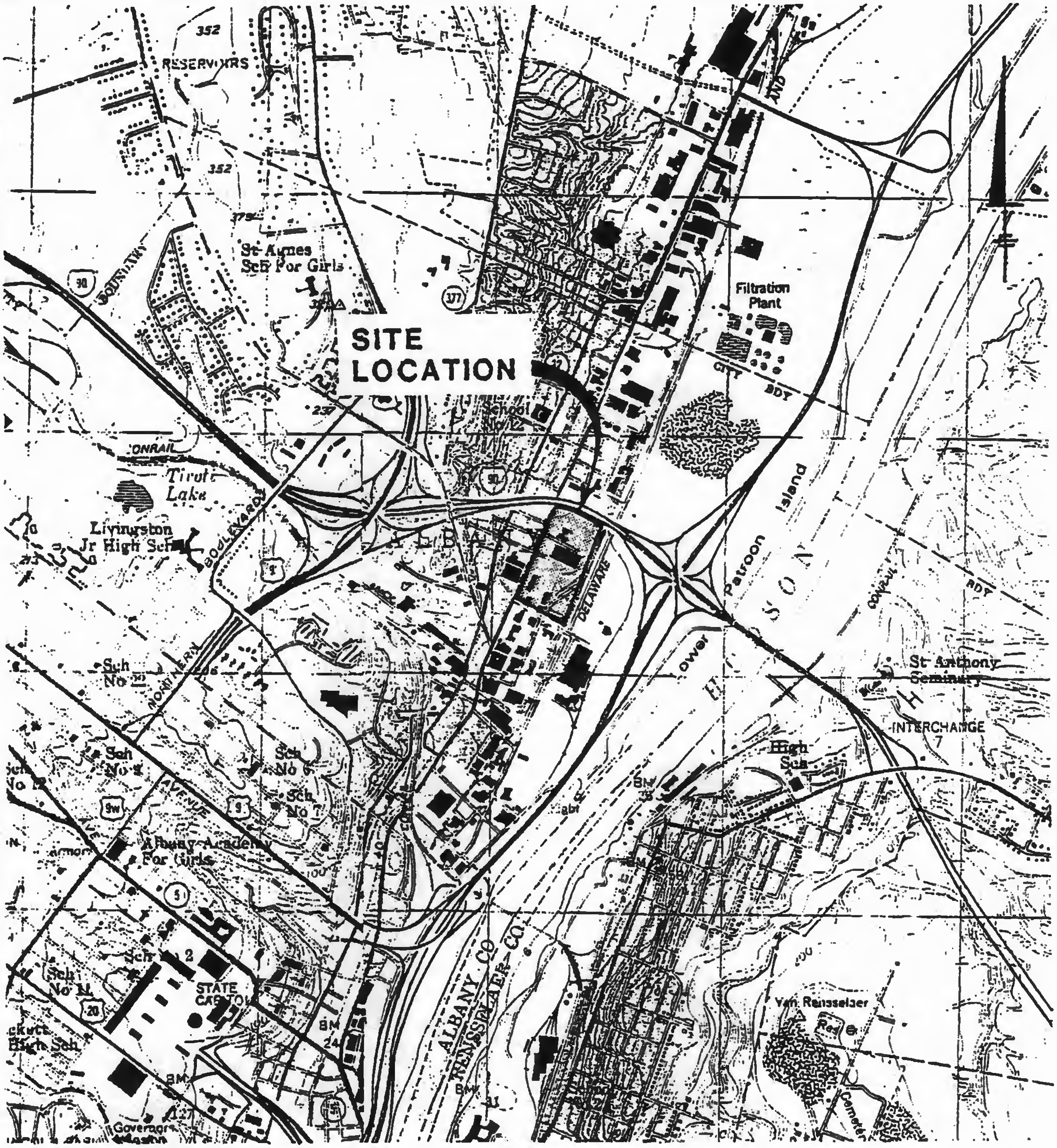
NIAGARA MOHAWK POWER CORPORATION

James F. Morgan

James F. Morgan
Environmental Analyst IV

JCB/mbl
Attachments
4296842.C

cc: Mr. James R. Meacham, NYSDEC
William C. Weiss, Esq., NMPC
William J. Holzhauer, Esq., NMPC
Robert J. Cazzolli, NMPC
Michael W. Sherman, NMPC
David H. King, NMPC
David J. Ulm, BBL ✓
Nancy E. Gensky, BBL
Michael C. Jones, BBL



REFERENCE: ALBANY, NEW YORK USGS QUAD. 1980
TROY SOUTH, NEW YORK USGS QUAD. 1980

2000' 0 2000'

Approximate Scale: 1" = 2000'

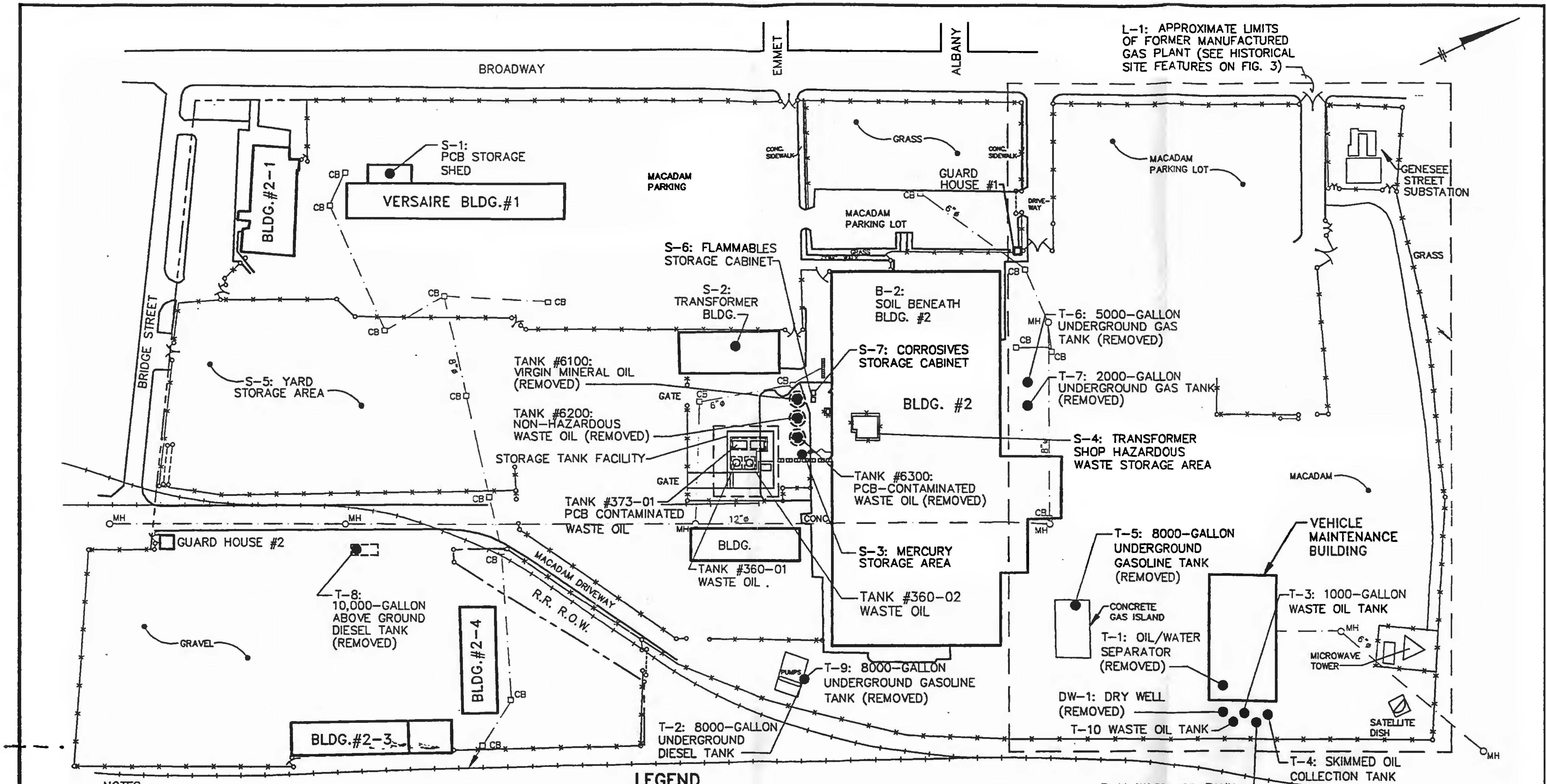
BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER
MGP/RCRA INVESTIGATION &
REMEDIAL MEASURES EVALUATION

LOCATION MAP

FIGURE
1

11/95 D54-JVM
36469P02/36469N01.CDR



NOTES:

1. DRAWING DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. D-24687-E, FILE NO. INDEX 20.3-A1.1-B2, DATED 10/29/85.
2. STORM SEWER LAYOUT DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. C-16925-E, FILE NO. INDEX 20.3-A1.1, CIRCA 1983.
3. EXISTING SAMPLE LOCATIONS DIGITIZED FROM FOSTER WHEELER CORPORATION DRAWING NO. NMPC2-3A.DWG, DATED 4/11/95.
4. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

- FENCE
- RIGHT-OF-WAY
- EXISTING RAILROAD
- EXISTING STORM SEWER PIPE
- CB EXISTING CATCH BASIN
- MH EXISTING MANHOLE

100' 0 100'

SCALE: 1" = 100'

BLASLAND, BOUCK & LEE, INC.

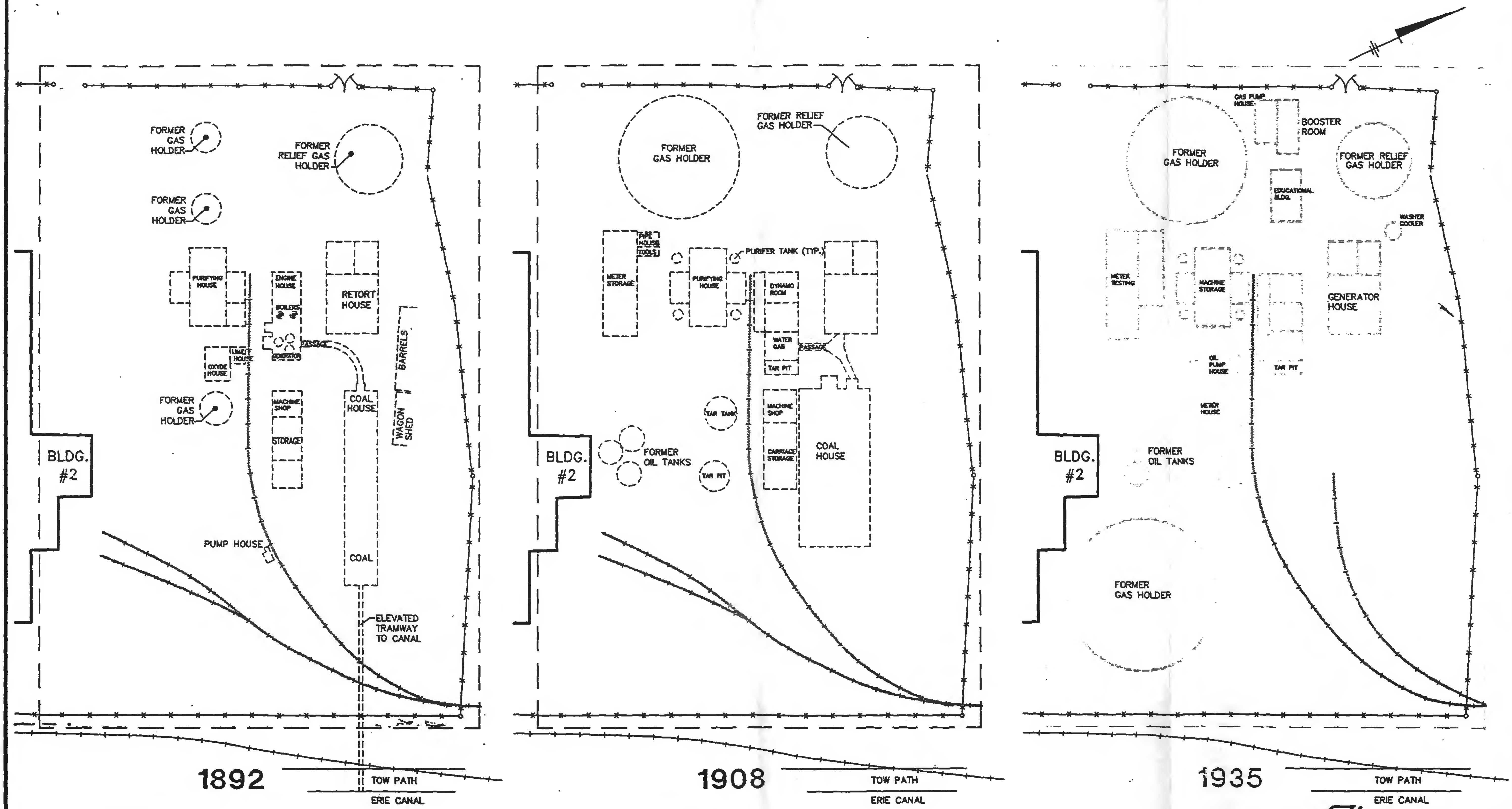
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER
MGP/RCRA INVESTIGATION & REMEDIAL MEASURES EVALUATION

SITE PLAN

FIGURE 2

11/28/95 54-AK RCB PGL
36469P02/36469C03.DWG
LAYERS OFF: REF,1=,BO=,P=,TE,WE,TXTP



NOTES:

1. BUILDING 2 AND EXISTING FENCE LOCATION DIGITIZED FROM NIAGARA MOHAWK POWER CORPORATION DRAWING NO. D-24687-E, FILE NO. INDEX 20.3-A1.1-B2, DATED 10/29/85.
2. HISTORIC STRUCTURE LOCATIONS ARE BASED ON ENGINEERING-SCIENCE FIGURE NO. 3.2, "MGP SITE PLAN" AND HISTORICAL MAPS INCLUDING SANBORN FIRE INSURANCE MAPS. THESE LOCATIONS ARE APPROXIMATE.
3. LOCATION OF FACILITY SHOWN ON FIGURE 2.

LEGEND

- FENCE
- EXISTING RAILROAD
- FORMER RAILROAD

100' 0 100'

SCALE: 1" = 100'

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER
MGP/RCRA INVESTIGATION & REMEDIAL MEASURES EVALUATION

HISTORICAL SITE FEATURES

FIGURE 3

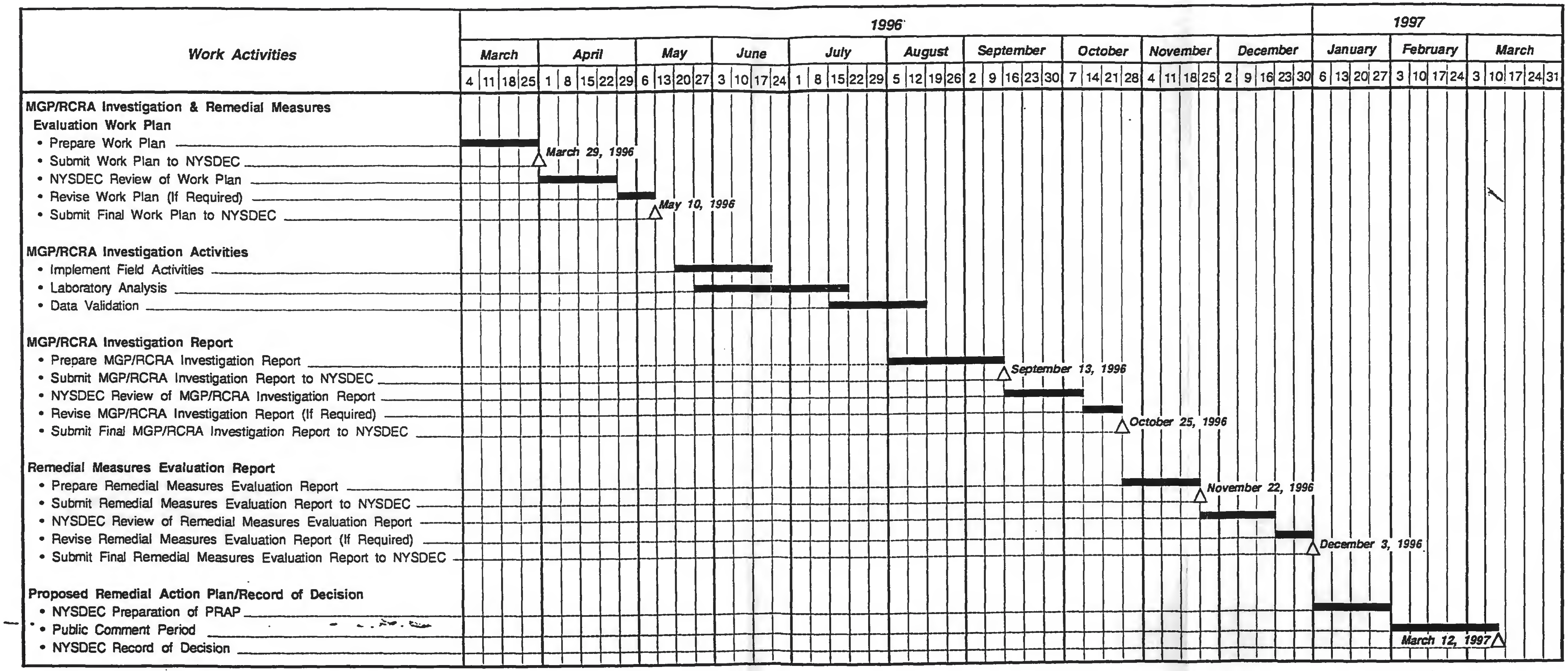
11/28/95 54-AK, RCB, PGL
36469P02/36469G04.DWG

LAYERS OFF: REF,BO=,P=,TE,WE,FENCE,SS,TXTT,TXTS

Proposed Project Schedule

FIGURE 4

Niagara Mohawk Power Corporation
MGP/RCRA Investigation and Remedial Measures Evaluation
North Albany Service Center



Notes:

1. Schedule assumes that MGP/RCRA Investigation and Remedial Measures Evaluation strategy will be approved by the NYSDEC prior to March 4, 1996.
2. Schedule for completion of the Remedial Measures Evaluation will be dependent upon the results of the MGP/RCRA Investigation.
3. Schedule is dependent upon NYSDEC review time frames.
4. Schedule for preparation of MGP/RCRA Investigation Report includes the evaluation of interim remedial measures and completion of the Focused Screening Level Risk Assessment.

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36469004/36469001.cdr

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010

Michael D. Zagata
Commissioner

FEB 1 4 1996

James F. Morgan
Environmental Analyst IV
Niagara Mohawk Power Corporation
300 Erie Boulevard West
Syracuse, New York 13202

Dear Mr. Morgan:

Re: North Albany Service Center
MGP/RCRA Investigation

The Department of Environmental Conservation (Department) approves of your February 6, 1996 proposed strategy for satisfying the requirements of both the MGP Consent Order and Permit Module III of the Hazardous Waste Management Permit for the North Albany Service Center.

The MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan shall be submitted to the Department on or before March 29, 1996. Please bear in mind the following comments when developing the work plan:

1. The New York Power Pool document is still under review by the Department and the New York State Department of Health.

2. The "Historical Site Features" figure indicates the gas holders are "former holders". More likely these holders were active during the three times shown. Also, please label the capacity of the holders as the holders often become a reference point for describing locations within the site.

Please call me at (518) 457-9285 if you have any questions.

Sincerely,

John Spellman

John Spellman, P.E.
Project Manager
Central Field Services Section
Bureau of Construction Services
Div. of Hazardous Waste Remediation

TECHNICAL REPORT

MGP/RCRA Investigation and Remedial Measures Evaluation Quality Assurance Project Plan

Niagara Mohawk Power Corporation
North Albany Service Center
Albany, New York

August 1996

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

6723 Towpath Road, P.O. Box 66
Syracuse, New York, 13214-0066
(315) 446-9120

Table of Contents

Appendix C - Procedures for Test Pit Excavation and Soil Sample Collection
Appendix D - Equipment Decontamination and Cleaning Procedures
Appendix E - Procedures for Soil Boring and Soil Sample Collection
Appendix F - Calibration, Operation, and Maintenance Procedures
Appendix G - Fluid Level Measurement and Sampling Procedures
Appendix H - Monitoring Well Installation and Development Procedures
Appendix I - Hydraulic Conductiviity Test Procedures
Appendix J - Storm Sewer Dry-Weather Flow Sampling Procedures
Appendix K - Storm Sewer Debris Sampling Procedures

1. Introduction

1.1 Introduction

This Quality Assurance Project Plan (QAPjP) supports the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan for the Niagara Mohawk Power Corporation (NMPC) North Albany Service Center (the site) at 1125 Broadway in Albany, New York. This QAPjP presents the specific quality assurance (QA) and quality control (QC) procedures associated with the MGP/RCRA Investigation to be implemented at the North Albany Service Center. The QAPjP has been prepared in accordance with the requirements of the following:

- The Order on Consent (Index #D0-0001-9210l, herein referred to as the "Consent Order") between NMPC and the New York State Department of Environmental Conservation (NYSDEC); and
- Module III - Corrective Action (Permit Module III) of the 6NYCRR Part 373 Hazardous Waste Management Permit for the North Albany Service Center hazardous waste treatment, storage, and disposal facility (TSDF).

The QAPjP is designed to ensure that the data quality objectives (DQOs), field sampling activities, and laboratory analyses conform to specific standards and guidelines from project initiation to completion.

This QAPjP has been prepared in general conformance with the following:

- The NYSDEC document entitled "RCRA Quality Assurance Project Plan Guidance";
- The United States Environmental Protection Agency (USEPA) document entitled "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition" Part 1, Chapter 1 updated July 1992; and
- The USEPA document entitled "RCRA Ground-Water Monitoring Technical Enforcement Guidance Document" dated September 1986.

Information contained in the QAPjP has been organized based on the requirements presented in "RCRA Quality Assurance Project Plan Guidance". A glossary of acronyms and abbreviations utilized in the QAPjP is presented in Section 14. A summary of the contents of each section of the QAPjP is presented below:

Section	Content
1	Project Description
2	Quality Assurance Objectives for Measurement of Data
3	MGP/RCRA Investigation Field Sampling
4	Sample Handling and Documentation
5	Calibration Procedures and Frequency
6	Analytical Procedures
7	Data Reduction, Review, and Reporting
8	Field and Laboratory Quality Control Checks
9	Performance and System Audits
10	Preventative Maintenance
11	Data Assessment Procedures
12	Corrective Action
13	Quality Assurance Reports to Management
14	Acronyms and Abbreviations

The QAPjP contains pertinent information from the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan relating to the measurement and evaluation of analytical data. This QAPjP also references supporting documents to the Work Plan, including the Project Management Plan (PMP), Data Management Plan (DMP), Health and Safety Plan (HASP), and Community Relations Plan (CRP). This QAPjP addresses specific QA/QC requirements for the MGP/RCRA Investigation from Appendix B of Permit Module III, as presented in the table below.

Appendix B of Permit Module III Corrective Action Requirement #	Description of Corrective Action Requirement	QAPjP Section That Addresses Requirement
IV.C.1 (a)	Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses.	1.3.1

Appendix B of Permit Module III Corrective Action Requirement #	Description of Corrective Action Requirement	QAPjP Section That Addresses Requirement
IV.C.1 (b)	Description of the methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data.	1.3.1, 11.0
IV.C.1 ©	Description of the rationale used to assure that the data accurately and precisely represents a characteristic of a population, parameter variation at a sampling point, a process condition, or an environmental condition.	2.2.1, 2.2.4, 2.2.5, 11.0
IV.C.1 (d)	Description of the measures to be taken to assure that data sets can be compared to each other.	2.2.2
IV.C.2 (a)	Sampling and field measurement locations, depths, etc.	3.0
IV.C.2 (b)	Collection of necessary ancillary data.	3.0
IV.C.2 ©	Conditions under which sampling and field measurements should be conducted.	3.0
IV.C.2 (d)	Media to be sampled and addressed by field measurements.	3.0
IV.C.2 (e)	Parameters to be measured, including locations.	3.0
IV.C.2 (f)	Frequency of sampling and field measurements and length of sampling period.	3.0 (Schedule provided in Project Management Plan)
IV.C.2 (g)	Types of samples (i.e., composite, grab) and number of samples to be collected.	3.0
IV.C.2 (h)	Measure to prevent contamination of the sampling equipment and cross-contamination between sampling points.	3.0, 4.0
IV.C.2 (I)(I)	Documentation of procedures for preparing reagents or supplies which are an integral part of the sample (i.e., filters, adsorbing reagents).	3.0, 4.0
IV.C.2 (I)(ii)	Procedures and forms for recording raw data and the exact location, time, and specific considerations associated with sample and data acquisition.	3.0, 4.2.5

Appendix B of Permit Module III Corrective Action Requirement #	Description of Corrective Action Requirement	QAPjP Section That Addresses Requirement
IV.C.2 (I)(iii)	Documentation of specific sample preservation method.	4.2.1
IV.C.2 (I)(iv)	Calibration of field equipment.	5.1
IV.C.2 (I)(v)	Collection of duplicate samples and measurements.	8.2.1, 8.2.4
IV.C.2 (I)(vi)	Submission of field-based blanks.	8.2.5, 8.2.6
IV.C.2 (I)(vii)	Potential interferences present at the facility.	8.0
IV.C.2 (I)(viii)	Construction materials and technologies associated with the monitoring wells.	3.3.2
IV.C.2 (I)(ix)	Field equipment listing and sample container listing.	3.0, 4.2.1
IV.C.2 (I)(x)	Sampling and field measurement procedures.	3.0
IV.C.2 (I)(xi)	Decontamination procedures.	3.0, 4.2.6.3
IV.C.2 (j)	Selection of appropriate sample containers.	4.2.1
IV.C.2 (k)	Sample preservation requirements.	4.2.1
IV.C.2 (l)	Chain-of-custody procedures including tracking procedures for samples in the field and pre-labeling.	4.2.3
IV.C.3 (a)(I)	Identification of sample custodian(s) at the laboratory who are authorized to sign for incoming field samples, obtain documents of shipment, and verify data entered onto the sample custody records.	1.4, 4.3
IV.C.3 (a)(ii)	Provision for laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets.	4.3.4
IV.C.3 (a)(iii)	Laboratory sample custody procedures for sample handling, storage, and disbursement for analysis.	4.3.2
IV.C.3 (b)	Sample storage procedures and storage times.	4.3.2

Appendix B of Permit Module III Corrective Action Requirement #	Description of Corrective Action Requirement	QAPjP Section That Addresses Requirement
IV.C.3 ©	Sample preparation methods.	4.3.3
IV.C.3 (d)(I)	Scope and application of analytical procedures.	6.2
IV.C.3 (d)(ii)	Analytical procedures for the sample matrices.	6.2
IV.C.3 (d)(iii)	Potential interferences with the analytical procedures.	6.2
IV.C.3 (d)(iv)	Precision and accuracy of the analytical methods.	11.0
IV.C.3 (d)(v)	Method detection limits for the analytical procedures.	1.3, 11.5
IV.C.3 (e)	Calibration procedures and frequency.	5.0
IV.C.3 (f)	Data reduction, validation, and reporting.	7.0
IV.C.3 (g)	Internal quality and control checks, laboratory performance and system audits and frequency.	8.0, 9.0
IV.C.3 (g)(I)	Method blank.	8.3.1
IV.C.3 (g)(ii)	Laboratory control sample(s).	8.3.9
IV.C.3 (g)(iii)	Calibration check sample(s).	8.3.7
IV.C.3 (g)(iv)	Replicate sample(s).	8.3.5
IV.C.3 (g)(v)	Matrix spike sample(s).	8.3.2
IV.C.3 (g)(vi)	Blind quality control sample(s).	8.2.3
IV.C.3 (g)(vii)	Control charts.	8.3.9
IV.C.3 (g)(viii)	Surrogate samples.	8.3.4
IV.C.3 (g)(ix)	Zero and span gases.	8.2.7
IV.C.3 (g)(x)	Reagent quality control checks.	8.3.1
IV.C.3 (h)	Preventative maintenance procedures and schedules.	10.0
IV.C.3 (I)	Corrective action for laboratory problems.	12.0
IV.C.3 (j)	Turnaround time.	6.2

1.2 MGP/RCRA Investigation and Remedial Measures Evaluation Objectives

The purpose of the QAPjP is to present QA/QC procedures which will be implemented to provide data quality that is sufficient to meet the objectives of the MGP/RCRA Investigation and Remedial Measures Evaluation. The objective(s) of the MGP/RCRA Investigation and Remedial Measures Evaluation are as follows:

1. Determine the presence and extent of chemical constituents in environmental media resulting from past releases of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents at the site;

2. Determine the potential for off-site migration of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents;

3. Determine potential sources of releases to and/or from the storm sewer system;

4. Evaluate potential exposure pathways for on-site NMPC and contractor employees;

5. Provide data to be used in preparation of the Remedial Measures Evaluation; and

6. Determine if any IRMs are necessary to address existing conditions present at the site.

1.3 MGP/RCRA Investigation and Remedial Measures Evaluation Data Quality Objectives

1.3.1 General

To obtain information necessary to meet the MGP/RCRA Investigation and Remedial Measures Evaluation objectives stated above, the following field investigations will be conducted:

1. Soil investigation;
2. Ground-water investigation; and

3. Storm sewer investigation.

Preliminary DQOs were identified to ensure that the data generated during field investigations will be of adequate quality and sufficient quantity to form a sound basis for decision making purposes relative to the above objectives. DQOs have been specified for each data collection activity or investigation. The DQOs presented herein address investigation efforts only and do not cover health and safety issues, which are addressed in detail in the HASP for this project.

A DQO summary for each of the investigation efforts is presented below. The summary consists of stated DQOs relative to the following items:

A. Data Uses;
B. Data Types;
C. Data Quality;
D. Data Quantity;
E. Sampling and Analytical Methods; and
F. Data Precision, Accuracy, Representativeness, Completeness, and Comparability Parameters (PARCC Parameters).

The categories of analytical data (with regard to data quality) discussed in the following sections are defined as follows:

Screening Data: Screening data affords a quick assessment of site characteristics or conditions. This objective for data quality is available for data collection activities that involve rapid, non-rigorous methods of analysis and quality assurance. This objective is generally applied to: physical and/or chemical properties of samples; relative concentration differences; and preliminary health and safety assessment.

Screening Data with Definitive Confirmation: Screening data provides rapid identification and quantitation, although the quantitation can be relatively imprecise. This objective of data quality is available for data collection activities that require qualitative and/or quantitative verification of a select portion of sample findings (10 percent or more). This objective can also be used to verify less rigorous laboratory-based methods.

Definitive Data: Definitive data are generated using analytical methods, such as approved USEPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files.

1.3.1.1 Soil Investigation

Data Uses

The soil investigation is designed to generate data to support the following evaluations:

1. Determine the presence and extent of chemical constituents in soil resulting from the former MGP facility and from past releases of hazardous wastes or hazardous constituents from RCRA solid waste management units (SWMUs) at the site;

2. Characterize surface and subsurface soil at the site;

3. Evaluate soil conditions at the perimeter of the site to determine whether chemical constituents may be migrating to or from the site;

4. Assess potential risks to human health and the environment associated with constituents detected in the soil; and

5. Evaluate remedial measure alternatives.

Data Types

In order to achieve the DQOs, surface and subsurface soil samples will be collected and analyzed for select analytical parameters as listed below:

Each surface soil sample will be analyzed for one or more of the following parameters:

- Polychlorinated biphenyls (PCBs);
- Target Compound List (TCL) semi-volatile organic compounds (SVOCs); and
- Target Analyte List (TAL) inorganic constituents.

- Each subsurface soil sample collected from the test pits will be analyzed for one or more of the following parameters:

  - PCBs;
  - TCL volatile organic compounds (VOCs);
  - TCL SVOCs; and
  - TAL inorganic constituents.

- Each subsurface soil sample collected from the soil borings will be analyzed for one or more of the following parameters:

  - PCBs;
  - TCL VOCs;
  - TCL SVOCs;
  - TAL inorganic constituents;
  - Benzene, toluene, ethylbenzene, and xylenes (BTEX);
  - Polynuclear aromatic hydrocarbons (PAHs); and
  - Total petroleum hydrocarbons (TPH).

Visual examination and photoionization detector (PID) screening of soil samples will also be conducted to evaluate subsurface conditions at the site and to select soil samples for laboratory analysis as described in Section 3.0 of this QAPjP.

The Work Plan provides the rationale for the soil chemical parameters selected for analysis.

Data Quality

Analytical results for the laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, BTEX, PAHs, and TPH using NYSDEC 1991 ASP-approved methods will be reported using Category B deliverables. In addition, field screening of soil samples will be performed using a PID.

Data Quantity

A total of up to 18 surface soil samples and 44 subsurface soil samples will be collected for laboratory analysis as part of the soil investigation. Surface soil samples will be collected at 12 soil test pit locations and 6 soil boring locations. The subsurface soil samples will be collected from 12 soil test pit locations and 20 soil boring locations. The locations of the test pits and soil borings are shown on Figure 4 of the Work Plan. The quantity of soil samples to be submitted for laboratory analysis (excluding QA/QC samples) and the sample locations are summarized in Table 1. The type and quantity of QA/QC samples to be submitted for laboratory analysis are summarized in Table 2.

Sampling and Analytical Methods

Section 3.0 and the appendices to this QAPjP contain a description of the soil sampling procedures to be used during the MGP/RCRA Investigation. The laboratory analytical methods to be used for the soil investigation are presented in Table 2. Reporting limits for the soil analytical parameters are presented in Table 3.

PARCC Parameters

Precision and accuracy quality control (QC) limits for chemical constituents which are used during data validation to assess analytical performance, are included in Table 4.

Data representativeness is addressed by the sample quantities and locations identified in the Work Plan and this QAPjP. Data comparability is intended to be achieved through the use of standard USEPA/NYSDEC approved methods, which are presented in Table 2. Data completeness will be assessed at the conclusion of the MGP/RCRA Investigation.

1.3.1.2 Ground-Water Investigation

Data Uses

The ground-water investigation is designed to generate hydrogeologic and water quality data to support the following evaluations:

1. Determine the presence and extent of chemical constituents in ground water hydraulically downgradient from the facility resulting from the former MGP facility and from past releases of hazardous wastes or hazardous constituents from RCRA SWMUs at the site;

2. Determine the ground-water flow system at the site, including flow directions, gradients, velocities, and tidal influences from the Hudson River;

3. Evaluate facility-specific subsurface conditions;

4. Evaluate topographic features that may influence ground-water flow;

5. Evaluate hydrogeologic units beneath the site and conditions that may influence migration of MGP-residuals, MGP-related constituents or 6NYCRR Part 371 hazardous wastes and hazardous constituents released to ground water;

6. Evaluate the uppermost aquifer that may act as a migration pathway for any MGP-residuals or MGP-related constituents released from the former MGP facility or 6NYCRR Part 371 hazardous wastes and hazardous constituents released from the RCRA SWMUs;

7. Evaluate the presence of any light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) that may be released to ground water from the former MGP facility or from RCRA SWMUs at the site;

8. Assess potential risks to human health and the environment associated with the level of constituents detected in ground water; and

9. Evaluate remedial measure alternatives.

Data Types

As set forth in the MGP/RCRA Investigation Work Plan, physical and chemical data for ground water and for LNAPL/DNAPL are required to meet the DQOs of the ground-water investigation, as follows:

- Physical data for ground water will consist of water level information from existing monitoring wells and proposed new monitoring wells which will be used to determine other hydrogeologic parameters (i.e., ground-water flow direction, in-situ hydraulic conductivity, and tidal influences from the Hudson River). In addition, field parameters consisting of pH, temperature, conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential will be measured.

- Chemical data for ground-water will include PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, nitrate/nitrite, and sulfate/sulfide;

- Physical parameters for DNAPL will include British Thermal Unit (BTU) content, viscosity, density, and interfacial tension; and

- Chemical data for LNAPL and DNAPL will include PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TPH.

In addition to the above-mentioned data, soil samples will be collected from soil borings at the monitoring well locations during the ground-water investigation for laboratory analysis for geotechnical parameters in order to meet the DQOs. Selected soil samples from the borings will be submitted for laboratory analysis for particle size distribution (using sieve and hydrometer analysis), Atterberg limits, bulk density, moisture, and specific gravity.

The Work Plan provides the rationale for the physical and chemical parameters selected for analysis for the ground-water investigation.

Data Quality

Analytical results for the laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, nitrate/nitrite, and sulfate/sulfide using NYSDEC 1991 ASP-approved methods will be reported using Category B deliverables. Sample analyses for particle size distribution (using sieve and hydrometer analysis), Atterberg limits, bulk density, moisture, and specific gravity will be performed using American Society for Testing and Materials (ASTM) methods and Corps of Engineers methods. Field measurement of pH, temperature, conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential will be performed in accordance with the equipment manufacturer's procedures, as outlined in the appendices to this QAPjP.

Data Quantity

The ground-water investigation will involve the collection of ground-water samples from 6 existing monitoring wells and each of 8 new monitoring wells to be installed for the MGP/RCRA Investigation. Ground-water elevation measurements will be obtained from 6 existing monitoring wells and the 8 new monitoring wells. Measurements of pH, temperature, conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential will be obtained for each ground-water sample collected for the ground-water investigation. The locations of the existing and new monitoring wells are shown on Figure 4 of the Work Plan. The estimated quantity of ground-water analytical data that will be collected during the MGP/RCRA Investigation (excluding QA/QC samples) is summarized in Table 1. The type and quantity of QA/QC samples to be submitted for laboratory analysis are summarized in Table 2.

Sampling and Analytical Methods

The ground-water level measurement procedures, hydraulic conductivity test procedures, field parameter measurement procedures, and ground-water and LNAPL/DNAPL sampling procedures are provided in Section 3.0 and the appendices to this QAPjP. The laboratory analytical methods to be used for the ground-water investigation are presented in Table 2. Reporting limits for the ground-water analytical parameters are presented in Table 3.

PARCC Parameters

Precision and accuracy QC limits for chemical constituents which are used during data validation to assess analytical performance, are included in Table 5.

Data representativeness is addressed by the sample quantities and locations identified in the Work Plan and this QAPjP. Data comparability is intended to be achieved through the use of standard USEPA/NYSDEC-approved methods, which are presented in Table 2. Data completeness will be assessed at the conclusion of the MGP/RCRA Investigation.

1.3.1.3 Storm Sewer Investigation

Data Uses

The storm sewer investigation is designed to generate inspection information and analytical data to support the following evaluations:

1. Determine potential sources of release to and/or from the site storm sewer system;

2. Determine whether hazardous waste or hazardous constituents are present in debris or dry-weather flow in the drainage structures and piping which are part of the site-wide storm sewer system;

3. Determine whether the storm sewer system acts as a pathway for off-site migration of chemical constituents associated with the former MGP facility or the RCRA SWMUs at the facility;

4. Assess potential risks to human health and the environment associated with the levels of constituents detected in the dry-weather flow and debris in the storm sewer system; and

5. Determine the need for any potential remedial measures based on inspection information and analytical results of dry-weather flow and debris samples.

Data Types

The storm sewer investigation will consist of inspecting the storm sewer system and sampling dry-weather flow and debris in pipes, manholes, and catch basins associated with the system. The inspection activities will be performed to determine the following information:

1. Dimensions of each manhole/catch basin (i.e., diameter of the cover, depth from the rim to the base of the structure, depth from the rim to the inverts for piping entering or leaving the structure);

2. Size, orientation, and material of construction for all pipes entering or exiting each manhole/catch basin, including the joint composition of the pipes, if visible;

3. Material(s) of construction for the sidewalls and base of each manhole/catch basin (i.e., pre-cast concrete, brick and mortar, etc.) and overall observed condition of each manhole/catch basin (i.e., cracks, corrosion, infiltration);

4. The presence and depth of any accumulated water, the presence of any petroleum/oil sheen on the surface of accumulated water, and/or the presence of any flowing water within the manhole/catch basin. The approximate dry-weather flow rate will be measured, if flow is observed; and

5. Presence and amount of debris in the base of each manhole/catch basin and piping entering the manhole/catch basin.

6. Levels of total organic vapors, oxygen, combustible gases, carbon monoxide, and hydrogen sulfide in each manhole/catch basin.

Based on the results of the inspection activities, sampling of the dry-weather flow (water) and accumulated debris in the storm sewer system will be performed. The parameters to be analyzed in the dry-weather flow and debris samples include PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents. The Work Plan and Section 3.0 of this QAPjP provide the rationale for selecting these chemical parameters. Both unfiltered and filtered dry-weather flow samples will be collected for analysis for PCBs and TAL inorganics. Filtration of samples selected for filtered PCB analysis will be performed in the laboratory using a 0.5-micron Teflon filter. Filtration of samples selected for filtered TAL inorganic analysis will be performed in the field using a 0.45 micron pore cellulose-based membrane filter, as discussed in Section 3.0. The laboratory will also measure total suspended solids (TSS) in the unfiltered water samples.

Data Quality

Analytical results for the laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TSS using NYSDEC 1991 ASP-approved methods will be reported using Category B deliverables. Field measurement of dry-weather flow will be performed as described in Section 3.0 and the protocols presented in this QAPjP.

Data Quantity

Up to 5 dry-weather flow samples and up to 10 samples of accumulated debris will be collected from the drainage structures and piping associated with the storm sewer system. For two of the dry-weather flow samples, both filtered and unfiltered samples will be analyzed for PCBs and TAL inorganics. The estimated quantity of dry-weather flow and debris data that will be collected during the MGP/RCRA Investigation (excluding QA/QC samples) is summarized in Table 1. The type and quantity of QA/QC samples to be submitted for laboratory analysis are summarized in Table 2.

Sampling and Analytical Methods

The dry-weather flow and debris samples will be collected using the procedures presented in Section 3.0 and the appendices to this QAPjP. The laboratory analytical methods for dry-weather flow and debris samples are presented in Table 2. Reporting limits for the dry-weather flow and debris analytical parameters are presented in Table 3.

PARCC Parameters

Precision and accuracy QC limits for chemical constituents which are used during data validation to assess analytical performance, are included in Table 4 and Table 5.

Data representativeness is addressed by the sample quantities identified above and the locations which will be identified in the field by qualified sampling personnel. Data comparability is intended to be achieved through the use of the standard USEPA/NYSDEC approved methods which are presented in Table 2. Data completeness will be assessed at the conclusion of the MGP/RCRA Investigation.

1.4 Project Organization and Responsibility

The MGP/RCRA Investigation and Remedial Measures Evaluation will require integrated efforts by personnel from NMPC, BBL, laboratory and drilling subcontractors, and the NYSDEC. The Project Management Plan which supports the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan includes a discussion of the project organization, schedule, and personnel to be utilized during implementation of the MGP/RCRA Investigation.

2. QA Objectives for the Measurement of Data

2.1 General

This section identifies the parameters that will be measured in the field and parameters that will be analyzed in the laboratory as part of the MGP/RCRA Investigation. This section also identifies the quality assurance objectives for the field measurement/laboratory analysis of the parameters.

2.1.1 Field Parameters and Methods

The subsections below identify the parameters that will be measured in the field as part of the MGP/RCRA soil, ground-water, and storm sewer investigations and the quality assurance objectives for measurement of the parameters. Also, a discussion of the quality assurance objectives for the survey of sampling locations following the completion of the MGP/RCRA field investigation activities is presented below.

2.1.1.1 Soil Investigation

During the soil investigation, the headspace of soil samples collected from test pits and soil borings will be screened using a PID to determine the presence and approximate levels of VOC vapors in the soil, if any. PID headspace screening measurement protocols are presented in Section 3.2 of this QAPjP.

2.1.1.2 Ground-Water Investigation

During the ground-water investigation, the following field measurements/testing will be performed:

- Measurement of water level and in-situ hydraulic conductivity testing, as described in Subsection 3.3.3; and

- Measurement of general water quality parameters, including pH, conductivity, dissolved oxygen, turbidity, temperature, and oxidation-reduction potential, as described in Subsection 3.3.4.

2.1.1.3 Storm Sewer Investigation

During the storm sewer investigation, the dry-weather flow rates inside drainage structures/piping will be measured. The flow rates will be measured based on the time required to fill a graduated cylinder or using an electronic velocity meter and the measured flow depth as described in Subsection 3.4.2 of this QAPjP.

2.1.1.4 Sampling Locations Survey

Following the MGP/RCRA Investigation field sampling activities, NMPC will survey the location of test pits, soil borings, monitoring wells, and storm sewer manholes/catch basins relative to the State Plane Coordinate System of 1927, or an appropriate reference point located at or near the site. The ground surface elevations of the test pits, soil borings, and monitoring wells will be surveyed relative to the National Geodetic Vertical Datum (NGVD) of 1929. In addition, the monitoring well casing elevations and the rims of the manholes/catch basins will be surveyed to the NGVD of 1929. All monitoring well casing elevations will be surveyed to the nearest 0.01 of a foot.

2.1.2 Laboratory Parameters and Methods

As described in the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan and in Section 3.0 of this QAPjP, laboratory analyses of soil, ground water, dry-weather flow, and catch basin debris samples will be performed as set forth in Tables 1 and 2. The analytical parameters selected for each media are described in the Work Plan and Section 3.0 of this QAPjP. Table 3 presents the chemical constituents identified by matrix, along with the selected analytical methods and reporting limits. If other constituents are detected during the performance of the selected analytical methods, the constituents will be identified in the laboratory report.

In order to aid in determining the potential for off-site chemical constituent migration and to aid in evaluating potential remedial measure alternatives, both filtered and unfiltered dry-weather flow samples from the storm sewer system will be submitted for analysis for PCBs and inorganics, as described in the Work Plan and Section 3.0 of this QAPjP.

Supplemental parameters analyzed in the laboratory will provide additional information regarding on-site media (soil, DNAPL, and dry-weather flow) as discussed in the Work Plan and Section 3.0 of this QAPjP. The supplemental parameters that will be analyzed for these media are listed below:

- Particle size distribution (using sieve and hydrometer analysis), Atterberg limits, bulk density, moisture content, and specific gravity for selected soil samples collected from the borings completed for monitoring wells;

- BTU content, viscosity, density, and interfacial tension for DNAPL samples; and

  Total suspended solids (TSS) for selected dry-weather flow samples.

The frequency of analysis and the analytical methods for the supplemental parameters are presented in Table 2. Applicable reporting limits for the supplemental parameters are presented in Table 3. No supplemental parameters will be analyzed for the surface soil samples or the drainage structure debris samples.

2.2 Quality Assurance Objectives

The overall quality assurance objective for this MGP/RCRA Investigation is to develop and implement procedures for sampling, chain-of-custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action, such that valid data will be generated. These procedures are presented or referenced in the following sections of the QAPjP. Specific QC checks are discussed in Section 8.0 of this QAPjP.

Quality assurance objectives are generally defined in terms of five parameters:

1. Representativeness;
2. Comparability;
3. Completeness;
4. Precision; and
5. Accuracy.

Each parameter is defined below. Specific objectives for this MGP/RCRA Investigation and Remedial Measures Evaluation are set forth in other sections of this QAPjP as referenced below.

2.2.1 Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability and the variability of the site. The MGP/RCRA Investigation has been designed to assess the presence of the chemical constituents and supplemental parameters at the time of sampling. The Work Plan and Section 3.0 herein presents the rationale for sample quantities and location. This QAPjP presents field sampling methodologies and laboratory analytical methodologies. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data. Further discussion of QC checks is presented in Section 8.0 of this QAPjP.

2.2.2 Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between phases of the MGP/RCRA Investigation, and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodologies set forth in this QAPjP through the use of established QA/QC procedures and through utilization of appropriately trained personnel. The comparability of MGP/RCRA Investigation data with existing data may be limited by any sampling and analytical differences between the MGP/RCRA Investigation and the previous investigation.

2.2.3 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the total amount that was obtained. This will be determined upon final assessment of the analytical results, as discussed in Section 11.0 of this QAPjP.

2.2.4 Precision

Precision is a measure of the reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the objectives of the MGP/RCRA Investigation. To maximize precision, sampling and analytical procedures used for the MGP/RCRA Investigation will adhere to established protocols presented in the QAPjP. Checks for analytical precision will include the analysis of matrix spike, matrix spike duplicates, laboratory duplicates and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements. Further discussion of precision QC checks is provided in Sections 8.0 and 11.0 of this QAPjP.

2.2.5 Accuracy

Accuracy is a measure of how close a measured result is to the true value. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, reference standards, matrix spikes, spike blanks, and surrogate standards will be used to assess the accuracy of the analytical data. Further discussion of these QC samples is provided in Sections 8.0 and 11.0 of this QAPjP.

3. MGP/RCRA Investigation Field Sampling

3.1 General

This section presents detailed protocols which will be utilized to implement the soil, ground-water, and the storm sewer investigation activities to be conducted for the MGP/RCRA Investigation at the North Albany Service Center. The following information is provided for each field sampling investigation:

- Proposed sample locations, numbers, and types;
- Sampling and measurement procedures; and
- A summary of the data to be generated from each sampling effort, including field parameters and analytical laboratory parameters.

Detailed sampling information is presented in Table 1 and Table 2 to provide a concise synopsis for the field personnel. A map showing the location of the facility is presented as Figure 1 of the Work Plan. Sampling locations are presented on Figure 4 of the Work Plan. Detailed sample collection procedures are provided in the appendices to this QAPjP. Information regarding area reconnaissance and mapping activities which will be conducted prior to implementation of the MGP/RCRA Investigation activities is provided in the Work Plan. Depending on field conditions encountered during implementation of the MGP/RCRA Investigation, additional field activities will be conducted, as necessary, to achieve the MGP/RCRA Investigation objectives.

3.2 Soil Investigation

The soil investigation described in the Work Plan consists of the following activities:

- Collection of surface soil samples;
- Excavation of test pits; and

- Completion of soil borings.

Each of these soil investigation activities is discussed in detail below.

3.2.1 Collection of Surface Soil Samples

This activity will consist of collecting surface soil samples in the yard storage area and the area immediately south of the TSDF (i.e., within the fenced area south of the transformer shop loading dock) to evaluate surface soil as a potential exposure pathway for on-site workers at the North Albany Service Center. Surface soil samples will be collected at up to 12 sampling locations in the yard storage area (test pit locations TP-101 through TP-112, as shown on Figure 4) and up to six sampling locations in the area immediately south of the TSDF (soil boring locations SB-101 through SB-106, as shown on Figure 4). Surface soil samples will not be collected at any of the test pit or soil boring locations where asphalt pavement is present. Based on the locations for soil borings SB-101 through SB-106 and the extent of asphalt pavement in the area immediately south of the TSDF, additional surface soil sampling locations will be identified as necessary in order to provide a minimum of four surface soil samples in the area south of the TSDF.

Surface soil samples will be collected following the removal of gravel and/or crushed stone covering the sampling area. A composite soil sample will be collected at each surface soil sampling location to reduce the potential effect of local spatial variation in the concentration of any chemical constituents present. The composite sample will be formed in the field from eight subsamples collected from a depth of approximately 0 to 6 inches below the soil surface. The eight subsamples will be collected within a one-square-meter area centered around the surface soil sampling location. The protocols for collecting and compositing the surface soil samples are presented in Appendix A.

The surface soil samples will be visually characterized and screened using a photoionization detector (PID) to measure the relative concentration of VOC vapors, if any. Each surface soil sample will be analyzed for PCBs and TAL inorganic constituents. In addition, surface soil samples collected at up to nine of the surface soil sampling locations will be analyzed for TCL SVOCs. Surface soil samples will be selected for laboratory analysis for TCL SVOCs based on the presence of staining, odors, or PID measurements above background levels, and to provide a uniform spatial distribution across the yard storage area and the area immediately south of the TSDF. If elevated PID readings are encountered in any of the composite surface soil samples, then one soil sample collected immediately adjacent to the composite sampling location (where the elevated PID levels were detected) will be collected and submitted for laboratory analysis for TCL VOCs. Surface soil samples selected for laboratory analysis will be submitted to Galson Technical Services, Inc. (Galson) for analysis in accordance with NYSDEC 1991 ASP methods.

QA/QC surface soil samples will be collected as described in Section 8.0. Table 2 presents the number of composite surface soil samples to be collected for laboratory analysis and the associated QA/QC soil sampling frequencies.

Surface soil samples will be placed into the appropriate sample containers, preserved, and labeled as described in Section 4.0. The surface soil samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix B.

3.2.2 Excavation of Soil Test Pits

This soil investigation activity will consist of excavating twelve test pits in the yard storage area (test pit locations TP-101 through TP-112, as shown on Figure 4 of the Work Plan) to facilitate visual observation and sampling of subsurface soils. Test pits will be excavated to the water table or to a maximum depth of 8 feet below ground surface (whichever is encountered first). The test pits will be excavated by SJB Services, Inc. (SJB), a BBL subcontractor, using a backhoe in accordance with the protocols outlined in Appendix C.

At each test pit location, soil samples will be collected from the backhoe bucket at 2-foot intervals. Soil samples collected from each 2-foot interval within the excavation will be visually characterized and screened using a PID to measure the potential presence of VOCs. If any visible staining, odors, and/or elevated PID headspace screening measurements are encountered at a test pit location, one soil sample will be collected from the sidewall of the test pit (within the depth interval where visual staining, odors, or elevating PID screening measurements are encountered) and submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents. If no visible staining, odors, or PID measurements above background concentrations are encountered in the soil from the test pit excavation, one soil sample from the 6- to 18-inch depth interval will be selected for laboratory analysis for PCBs and TAL inorganic constituents. BBL sampling personnel will be permitted to enter test pits at depths of up to 4 feet for the purpose of collecting soil samples (based on the judgement of BBL's on-site Health and Safety Supervisor). For the purpose of estimating the number of QA/QC samples to be collected (presented in Table 2), it is assumed that up to six soil samples will be selected for laboratory analysis for TCL VOCs and TCL SVOCs from the test pits. The subsurface soil samples selected for laboratory analysis will be submitted to Galson for laboratory analysis in accordance with NYSDEC 1991 ASP-approved methods.

Following the collection of subsurface soil samples, the test pit excavation will be backfilled using the excavated soil. If necessary (as determined by BBL field personnel) the backhoe bucket will be decontaminated prior to excavating the next test pit using the procedures presented in Appendix D.

QA/QC subsurface soil samples will be collected as described in Section 8.0. Table 2 presents the number of subsurface soil samples to be collected for laboratory analysis and the associated QA/QC soil sampling frequencies.

The subsurface soil samples will be placed into the appropriate sample containers, preserved, and labeled as described in Section 4.0. The subsurface soil samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix B.

3.2.3 Completion of Soil Borings

This soil investigation activity will consist of completing a total of twenty-two soil borings at the site. Twenty of the soil borings, designated SB-101 through SB-120, will be completed at the locations shown on Figure 4. Two of the soil borings, designated SB-121 and SB-122, will be completed at background locations to be determined by NMPC and approved by the NYSDEC as part of the Area Reconnaissance and Mapping work task (described in the Work Plan). Each soil boring will be completed to either the water table or the top of bedrock as indicated below:

- Soil borings SB-101 through SB-105 and soil borings SB-121 and SB-122 will be completed to the water table; and

- Soil borings SB-106 through SB-120 will be completed to the top of bedrock.

Soil borings SB-101 through SB-106 will be completed to identify and evaluate potential releases of hazardous wastes or hazardous constituents in the area immediately south of the TSDF. Soil borings SB-107 through SB-120 will be completed to evaluate the presence of LNAPL/DNAPL and further define site stratigraphy in areas where MGP or petroleum-related residuals were observed during the PSA/IRM Study. Soil borings SB-121 and SB-122 will be completed to determine background concentrations of TAL inorganic constituents in subsurface soils. Each soil boring will be completed using the hollow-stem auger drilling method with a truck-mounted drill rig. Soil at each boring location will be continuously sampled using 2-foot long, 2-inch outer-diameter, split-spoon sampling devices. Soil recovered from each 2-foot sampling interval will be placed in a jar for PID headspace screening to determine the potential presence of VOCs. Soil recovered from each 2-foot sampling interval will also be visually characterized by an on-site geologist for the following:

- Principal and minor components;
- Color;
- Moisture and organic content;
- Particle sizes, angularity and shape;
- Density/consistency;
- Hardness of gravel (Mohs hardness scale);
- Plasticity of fines;
- Cohesiveness;
- Pliability;
- Odors/discoloration;
- Mottling/staining;
- Weathering;
- Fill or geologic origin of deposit (local name of deposit, if known);
- Items that may indicate age of deposit (i.e., archaeological artifacts, newspapers, etc.);
- Fill component description (i.e., cinder, clay, metal, tires, etc.); and
- Unified Soil Classification System group symbol.

Soil samples recovered from borings SB-107 through SB-120 will also be evaluated for the presence of LNAPL/DNAPL via PID screening, ultraviolet (UV) fluorescence, and/or jar testing (i.e., placing soil in a jar of water, shaking the jar, and visually observing the presence of any sheens or residuals).

One or more representative soil samples from each boring will be collected for laboratory analysis based on the presence of any LNAPL/DNAPL, visually-stained soil, odors, and/or elevated PID screening measurements. Criteria for selecting soil samples recovered from the soil borings for laboratory analysis will include the following:

- If DNAPL is encountered at a soil boring location (as identified by PID screening, UV fluorescence, or jar testing), one soil sample collected from the lower extent of the DNAPL within the boring will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH;

- If LNAPL is encountered at a soil boring location (as identified by PID screening or jar testing), then one soil sample collected within the ground-water table fluctuation zone will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH;

- If LNAPL/DNAPL is encountered at a soil boring location, then the soil sample recovered from the first "clean" sampling interval (i.e., no LNAPL/DNAPL based on PID screening, UV fluorescence, or jar testing) located stratigraphically below the LNAPL/DNAPL will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH; and

- If LNAPLs and/or DNAPLs are not observed at a soil boring location, sample selection will be based on other visual observations (e.g., staining, odors, fill/waste materials, etc.) and/or elevated PID headspace screening measurements (particularly for samples to be analyzed for TCL VOCs). Samples may also be collected from sampling intervals located directly below such visual observations/measurements for delineation purposes. If no elevated PID headspace screening measurements and no observed staining, odors, fill/waste materials, etc. are encountered at a soil boring location, then the sample recovered from the sampling interval above the water table will be submitted for laboratory analysis.

Protocols for completing soil borings and collecting soil samples are presented in Appendix E. Procedures for performing field screening for soil samples using a PID are presented in Appendix F. Information regarding each soil boring to be completed for the MGP/RCRA Investigation, the samples to be collected from each boring, and the laboratory analysis to be performed for each sample are discussed below.

- **Soil Borings SB-101 through SB-106:** These soil borings will be completed in the area immediately south of the TSDF (i.e., within the fenced area south of the transformer shop loading dock) to collect subsurface soil samples for the purpose of evaluating potential releases of hazardous waste or hazardous constituents from SWMUs in this area of the site. Soil borings SB-101 through SB-105 will be shallow borings completed to the water table (assumed depth of 10 feet). Soil boring SB-106 will completed to the depth of bedrock (assumed depth of 25 feet). Based on the subsurface conditions encountered at each boring, one soil sample from each boring will be submitted for laboratory analysis for PCBs and TAL inorganic constituents. Samples collected from three of the six borings will also be submitted for laboratory analysis for TCL VOCs and TCL SVOCs.

- **Soil Borings SB-107 and SB-108:** These soil borings will be completed to bedrock (assumed depth of 25 feet) in the vicinity of the newly identified AOC associated with soil boring SB-5 (completed as part of the PSA/IRM Study). Because the PSA/IRM Study Report indicates that DNAPL was identified in soil boring SB-5, these soil borings will be completed to determine if the DNAPL encountered at the location of soil boring SB-5 is an isolated occurrence and whether any DNAPL observed in this area is related to the former MGP operation at the site. Soil samples recovered from these borings will be evaluated for the presence of DNAPL via PID screening, UV fluorescence, and/or jar testing. Up to three soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Borings SB-109 through SB-111:** These soil borings will be completed to bedrock (assumed depth of 25 feet) in the area west of monitoring well MW-2 (installed for the PSA/IRM Study) along the western property boundary. The purpose of these borings is to evaluate whether DNAPL could impact utility conduits/subsurface work along Broadway to the north of the former relief holder (the current location of the Genesee Street Substation). Soil samples recovered from these borings will be evaluated for the presence of DNAPL via PID screening, UV fluorescence, and/or jar testing. Up to five soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Borings SB-112 through SB-115 and SB-120:** These soil borings will be completed to bedrock (assumed depth of 20 feet) in the vicinity of the former MGP operation and petroleum-related SWMUs located to the north of Building 2. The locations for these borings were selected to further delineate the horizontal extent of the LNAPL and DNAPL observed in soil borings and test pits completed north of Building 2 as part of the PSA/IRM Study. Soil samples recovered from these borings will be evaluated for the presence of LNAPL and DNAPL via PID screening, UV fluorescence, and/or jar testing. Up to twelve soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Borings SB-116 through SB-118:** These soil borings will be completed to bedrock (assumed depth of 20 feet) in the vicinity of the newly-identified AOC near monitoring well MW-10 (installed for the PSA/IRM). The locations for these borings were selected to establish the horizontal extent of the LNAPL observed at monitoring well MW-10 and to determine whether the LNAPL is part of a larger plume originating to the north of MW-10 or a separate plume associated with the former oil storage facilities previously located in this area of the site. Soil samples recovered from these borings will be evaluated for the presence of LNAPL via PID screening and/or jar testing. Up to four soil samples collected from these borings will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **Soil Boring SB-119:** This soil boring will be completed to bedrock (assumed depth of 20 feet) in the vicinity of the fuel service island east of Building 2 (near the location of former monitoring well MW-6) to evaluate the presence of LNAPL and DNAPL. The location of this boring was selected to determine the horizontal extent of LNAPL observed in monitoring well MW-6 and to determine whether the LNAPL is part of a larger plume originating to the north of MW-6 or a separate plume associated with former USTs in this area. Soil samples recovered from this boring will be evaluated for the presence of LNAPL and DNAPL via PID screening and/or jar testing. Up to four soil samples collected from this boring will be submitted for laboratory analysis for PCBs, BTEX, PAHs, TAL inorganic constituents, and TPH.

- **SB-121 and SB-122 (Background Soil Borings):** As part of the MGP/RCRA investigation, these background soil borings will be completed to the water table at suitable off-site or on-site locations identified during the field reconnaissance activities. One subsurface soil sample collected from each background soil boring will be submitted for laboratory analysis for TAL inorganic constituents. The analytical results for these soil samples will be used to establish background inorganic constituent concentrations in the vicinity of the site.

QA/QC subsurface soil samples will be collected as described in Section 8.0. Table 2 presents the number of subsurface soil samples to be collected for laboratory analysis and the associated QA/QC soil sampling frequencies. The subsurface soil samples will be placed into the appropriate sample containers, preserved, and labeled as described in Section 4.0. The subsurface soil samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix B.

Drilling and sampling equipment will be cleaned prior to initiating drilling activities, between each boring location, and at the completion of drilling activities as described in Appendix D. Following completion, each boring will be grouted to the ground surface with cement/bentonite grout. Soil cuttings generated at each boring location will be collected by the drilling subcontractor and placed into steel drums or a roll-off waste container (to be provided by NMPC) for off-site disposal by NMPC. Decontamination water generated by the soil boring activities will also be containerized by the drilling subcontractor. Wastes generated by the soil investigation activities will be characterized for off-site disposal in accordance with applicable rules and regulations.

3.3 Ground-Water Investigation

The ground-water investigation will evaluate potential MGP-related impacts to ground water in the area hydraulically downgradient from the North Albany Service Center site. The ground-water investigation approach will initially consist of installing monitoring wells close to the eastern property boundary (which is the hydraulically downgradient direction based on the PSA/IRM Study). If the borings completed at the proposed monitoring well locations indicate the presence of LNAPL/DNAPL (based on soil screening as described above under Subsection 3.2.3 - Completion of Soil Borings), then the borings will be grouted to the surface and the monitoring well locations will be moved further downgradient from the site. The exact locations of the wells will be determined in the field based on ground-water flow direction, access, utility locations, and other considerations such as the former location of the Erie Canal, which has since been filled in and is now located beneath Erie Boulevard. Depending on the nature of the backfill material, the former canal could affect local ground-water flow patterns.

The overall objective of the ground-water investigation will be to provide data to evaluate the need for and practicability of remedial actions. The ground-water investigation will provide data to assess off-site migration of LNAPL, DNAPL, and dissolved phase constituents in ground water; physically and chemically characterize the LNAPL/DNAPL; physically and chemically characterize the ground-water flow system; and evaluate the potential recovery of LNAPL/DNAPL.

The ground-water investigation will consist of the following work efforts:

- Evaluation of existing monitoring wells;
- Installation of new monitoring wells;
- Physical characterization of the ground-water flow system; and
- Chemical characterization of the ground-water flow system and NAPL/DNAPL.

Work efforts associated with the ground-water investigation are described below.

3.3.1 Evaluation of Existing Monitoring Wells

This activity will consist of evaluating the general physical condition of the existing monitoring wells (including surface seals, protective casings, and well depths). The surface seals and protective casing will be evaluated for any evidence of deterioration or failure. Broken, missing, or rusted locks on monitoring wells will be replaced with new locks. Well depths will be measured and compared to previous well depth measurements (if available) to determine if the wells may need to be redeveloped. In addition, the levels of ground-water and LNAPL/DNAPL (if present) will be measured using the procedures presented in Appendix G. These levels will be used to evaluate the appropriateness of sampling each existing monitoring well for dissolved phase constituents. Ground-water samples will not be collected from monitoring wells containing LNAPL/DNAPL, as these samples would not be representative of dissolved-phase constituent concentrations in ground water. The on-site extent of LNAPL/DNAPL will be characterized using soil borings, as described above under Subsection 3.2.3. Based on the data presented in the PSA/IRM Report, it is anticipated that LNAPL/DNAPL may be encountered in the following existing monitoring wells at the facility:

Well Number	Observation (October 20, 1994/November 29, 1994)
MW-4	0.01/ 0.15 feet of LNAPL
MW-5	0.01 feet of LNAPL / Well casing coated with tar

Well Number	Observation (October 20, 1994/November 29, 1994)
MW-7	Well casing coated with tar
MW-10	0.0 / 0.47 feet of LNAPL
MW-13	0.0 feet of LNAPL / well casing coated with tar

Note: Observations obtained from Table 3-1 in the PSA/IRM Study Report (Foster Wheeler, May 1995).

Ground-water elevations obtained from the existing monitoring wells at the site will be used to develop a ground-water elevation contour map to determine ground-water flow direction and assist in locating the proposed new monitoring wells.

3.3.2 Installation of New Monitoring Wells

This activity will consist of installing up to nine new ground-water monitoring wells at the locations indicated on Figure 4. A summary of the new monitoring well locations is presented below.

- **Monitoring well MW-15S:** This will be a shallow water table monitoring well (assumed depth of 15 feet) located hydraulically downgradient of the area to the east of the newly-identified AOC near MW-10 (installed for the PSA/IRM Study). This well will be used to establish the hydraulically downgradient extent of the LNAPL observed at existing monitoring well location MW-10. In the event that the boring for this monitoring well indicates evidence of LNAPL, the boring will be grouted to the surface and the well location will be moved further downgradient from the site.

- **Monitoring Well MW-6A:** This will be a replacement monitoring well for MW-6 (assumed depth of 20 feet) which was inadvertently paved over by NMPC. This well will be used to further evaluate the presence of LNAPL in this area, including an assessment of whether the LNAPL is part of a larger plume originating from the north or a separate plume associated with the former USTs in this area.

- **Monitoring Well MW-16S:** This will be a shallow water table monitoring well (assumed depth of 15 feet) located hydraulically downgradient of the area to the east of SWMUs T-2 and T-9 near MW-6. This well will be used to establish the hydraulically downgradient extent of the LNAPL observed at well MW-6. In the event that the boring for this monitoring well indicates evidence of LNAPL, the boring will be grouted to the surface and the well location will be moved further downgradient from the site.

- **Monitoring Wells MW-18S and MW-19S:** These shallow water table monitoring wells (assumed depth of 15 feet) will be installed hydraulically downgradient of the area east of the former MGP facility (including the other SWMUs located in this area of the site). These wells will be used to assess the hydraulically downgradient extent of the LNAPL identified in the area north and northeast of Building 2 by the PSA/IRM Study. In the event that the borings for these monitoring wells indicate evidence of LNAPL, the borings will be grouted to the surface and the location of the wells will be moved further downgradient from the site.

- **Monitoring Well MW-20D:** This will be a deep off-site well (assumed depth of 25 feet) located hydraulically upgradient of the former gas holders and existing monitoring well MW-2. This well will be used to establish the western extent of the LNAPL and DNAPL observed at the site.

- **Monitoring Wells MW-16D, MW-17D, and MW-18D:** These deep monitoring wells (assumed depth of 25 feet) will be installed to the till/bedrock interface in the area hydraulically downgradient of the former MGP facility. These wells will be used to assess the downgradient extent of DNAPL associated with the former MGP facility. In the event that the borings for these monitoring wells indicate evidence of DNAPL, the borings will be grouted to the surface and the location of the wells will be moved further downgradient from the site.

The proposed locations for shallow monitoring wells MW-15S, MW-16S, MW-18S, and MW-19S and the replacement well MW-6A will be adjusted in the field based on ground-water flow direction, locations of existing monitoring wells which contain LNAPL, and physical access. Based on water levels observed during the PSA/IRM Study, the shallow wells will be screened from approximately 5 to 15 feet below ground level to straddle the water table and allow for anticipated water level fluctuations.

The exact location of the deep off-site monitoring well MW-20D will be based on observations from soil borings SB-109 and SB-110, locations of underground utilities, and access.

The proposed locations for the three deep on-site monitoring wells will be adjusted in the field based on ground-water flow direction, the till/bedrock surface orientation (a till/bedrock high is present near SB-10 and MW-7/MW-14, which may affect DNAPL migration), physical access, and the shallow monitoring well locations. Based on the occurrence of DNAPL at the till/bedrock interface and the depth to bedrock observed during the PSA/IRM Study, the deep wells will be screened from approximately 15 to 25 feet below ground surface to monitor for the presence of DNAPL and dissolved constituents, which could be associated with the DNAPL. Deep monitoring wells MW-16D and MW-18D will be installed adjacent to shallow monitoring wells MW-16S and MW-18S, respectively, to form two well clusters. This will allow for the evaluation of vertical hydraulic gradients in addition to monitoring for the presence of LNAPL/DNAPL at the well cluster locations.

Soil borings will be completed at each new monitoring well location using hollow-stem auger drilling methods. Continuous split-spoon sampling will be conducted at each of the proposed deep monitoring well locations (MW-16D, MW-17D, MW-18D, and MW-20D), at two of the shallow monitoring well locations (MW-15S and MW-19S) and at the location of replacement well MW-6A. At the two remaining shallow monitoring wells (MW-16S and MW-18S, installed as part of a cluster with a deep monitoring well), split-spoon samples will be recovered at five-foot intervals within each boring. The on-site geologist will visually characterize each sample and perform PID headspace screening on a portion of each sample, using the procedures presented in Appendix F. Soil samples will also be screened for the presence of LNAPL/DNAPL using UV fluorescence (using the procedures presented in Appendix F) and/or jar testing. If LNAPL/DNAPL is encountered in soil samples recovered from soil borings completed at any of the proposed monitoring well locations, the monitoring well will be moved further downgradient from the facility to a location that will provide a representative ground-water quality sample. Any off-site monitoring well locations will be discussed and coordinated with the NYSDEC, NMPC, and the appropriate property owner(s) prior to installation.

Representative soil samples of till and the overlying soils encountered within the borings completed for the monitoring wells will be submitted for geotechnical analysis (including up to ten soil samples for sieve analysis; five soil samples for Atterberg limits; five soil samples for hydrometer analysis; and two soil samples for analysis for bulk density, moisture, and specific gravity). The samples will be selected to physically characterize the geologic units, intervals where monitoring well screens have been installed, and units where LNAPL/DNAPL migration may occur in the subsurface.

In addition to collecting soil samples from the soil borings completed at the proposed monitoring well locations, two five-foot runs of NX coring will be performed at two deep soil borings to confirm the degree of competency of the underlying shale bedrock. The NX coring will be performed in deep soil borings located downgradient from areas where DNAPL is observed to minimize the potential for DNAPL migration into the bedrock during coring. The NX coring will be performed using the procedures presented in Appendix E. The NX rock cores will be used to assess the physical characteristics of the bedrock, including the following:

- Rock type;
- Thickness;
- Texture, hardness, color;
- Particle sizes and angularity/shape;
- Friability/fissility;
- Strength of intact rock;
- Strike/dip;
- Weathering;
- Voids;
- Water Content;
- Odors/discoloration;
- Structure/bedding (bedding planes, joints, fractures);
- Description of discontinuities and filings;
- Fossils;
- Formation name (if known);
- Rock Quality Designation (RQD); and
- Contacts when observed.

Based on the observed characteristics of the bedrock, NMPC will (in consultation with NYSDEC and BBL) determine whether it is necessary to install bedrock monitoring wells (either at the coreholes completed for the two planned NX core runs or at the other locations at the site). Bedrock monitoring wells may be installed if the bedrock characteristics indicate that the bedrock is a potential pathway for NAPL and/or dissolved physical constituents and/or if visual observations indicate the presence of NAPLs in the bedrock.

Each monitoring well will be constructed using 2-inch diameter PVC risers with 5- to 10-foot screens as described in Appendix H. A sump will be installed at each deep well to allow for the collection of DNAPL within the well. The deep well sump will be installed approximately 0.5 to 1 foot into the till or bedrock, whichever unit appears to confine the DNAPLs. Following installation, each new well will be developed to remove fine-grained materials that may have settled in or around the monitoring well during installation, and to ensure that the monitoring well will properly transmit ground water. Monitoring wells will be developed using the pump and surge method described in Appendix H. Pumping will continue until the turbidity is less than 50 Nephelometric Turbidity Units (NTUs). In the event that this turbidity level cannot be reached, then development will proceed until three consecutive measurements of ground-water pH, conductivity, and temperature agree within 10 percent. Calibration and maintenance procedures for field instruments used to measure turbidity, pH, conductivity, and temperature are presented in Appendix F. Development water will be containerized on-site for disposal by NMPC.

Drilling and sampling equipment will be cleaned prior to initiating drilling activities, between each boring location, and at the completion of drilling activities. Bedrock coreholes will be grouted at least to the top of rock prior to installing overburden monitoring wells at the drilling location. Soil cuttings generated at each boring location will be collected by the drilling subcontractor and placed into steel drums or a roll-off waste container (to be provided by NMPC) for off-site disposal by NMPC. Decontamination water and drilling fluids generated by the drilling activities will also be containerized by the drilling subcontractor for disposal by NMPC.

As described in the Work Plan, each monitoring well location will be surveyed relative to the State Plane Coordinate System of 1927, or an appropriate reference point located at or near the site. The ground surface and monitoring well casing elevations will be surveyed relative to the NGVD of 1929.

3.3.3 Physical Characterization of the Ground-Water Flow System

This activity will consist of performing in-situ hydraulic conductivity testing and ground-water level measurements to evaluate ground-water flow directions and tidal influences from the Hudson River. The in-situ hydraulic conductivity testing will provide data to physically characterize the ground-water flow system and evaluate the potential for off-site migration of dissolved phase constituents in ground water. In-situ hydraulic conductivity testing will be performed at each newly installed well following procedures included in Appendix I.

Prior to installation of the new monitoring wells, one round of ground-water level measurements will be obtained for each existing monitoring well (as described under Subsection 3.3.1). In addition, one complete round of ground-water level measurements will be obtained for the existing monitoring wells and for each new monitoring well at the time of sampling. These water level measurements will be used to evaluate ground-water flow directions at the facility. Procedures for measuring water levels are presented in Appendix G. To evaluate potential tidal influences that may cause daily water table fluctuations, ground-water level measurements will also be obtained at one downgradient monitoring well cluster for a period of up to 5 days using pressure transducers and an automatic data logger.

3.3.4 Chemical Characterization of Ground Water and LNAPL/DNAPL

This activity will consist of collecting ground-water samples for laboratory analysis and measuring field parameters to chemically characterize the ground-water flow system. This task will also consist of collecting LNAPL/DNAPL samples for laboratory analysis to characterize the physical and chemical properties of LNAPL/DNAPL encountered at the site.

Ground-water samples will be collected from each of the nine new monitoring wells, two existing upgradient wells (MW-1 and MW-3), one on-site well located in the storage yard area (MW-12), and three existing wells (e.g., MW-8, MW-11, MW-14) where NAPL/DNAPL was not observed during the PSA/IRM Study. Each ground-water sample will be submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and geochemical parameters including sulfate/sulfide and nitrate/nitrite. Field measurements of pH, temperature, conductivity, turbidity, dissolved oxygen (DO), and oxidation-reduction potential (ORP) will also be performed at the time of collecting each ground-water sample using the procedures presented in Appendix F.

Ground-water samples will be obtained using low-flow sampling procedures to minimize sample turbidity (to provide ground water samples which are representative of dissolved phase constituent concentrations). Ground-water sampling procedures are presented in Appendix G. Purge water will be containerizeed for off-site disposal by NMPC.

In addition to the collection of ground-water samples, up to two LNAPL samples and two DNAPL samples will be collected from existing wells where LNAPL/DNAPL is identified during the evaluation of existing monitoring wells (as described under Subtask 3.3.1). If more than one type of DNAPL or LNAPL is observed (based on differences in visual appearance, specific gravity, viscosity, odor, depth or stratigraphic placement, and/or PID readings), representative samples of each type of LNAPL/DNAPL encountered will be collected. Each LNAPL and DNAPL sample will be analyzed for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TPH. A portion of each DNAPL sample will also be submitted to Doble Engineering Company for analysis for physical parameters, including BTU content, viscosity, density, and interfacial tension. Procedures for collecting NAPL/DNAPL samples are presented in Appendix G. Purge fluids will be containerized for off-site disposal by NMPC.

QA/QC ground-water and LNAPL/DNAPL samples will be collected as described in Section 8.0. Table 2 presents the number of ground-water and LNAPL/DNAPL samples to be collected for laboratory analysis and the associated QA/QC sampling frequencies. The ground-water and LNAPL/DNAPL samples will be placed into the appropriate sample containers, preserved, and labeled as described in Section 4.0. The ground-water and LNAPL/DNAPL samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix B.

3.4 Storm Sewer Investigation

The storm sewer investigation described in the Work Plan consists of the following activities:

- Inspecting drainage structures and piping associated with the storm sewer system;
- Collecting dry-weather flow samples; and
- Collecting samples of accumulated debris within the drainage structures and piping.

Activities associated with the storm sewer investigation are described below.

3.4.1 Inspection of Drainage Structures and Piping

This activity will consist of visually inspecting each manhole and catch basin associated with the site storm sewer system. Prior to inspecting each manhole/catch basin, traffic cones will be placed around the structure, the cover will be removed, and the air inside the structure will be monitored for volatile organic vapors, oxygen, combustible gases, carbon monoxide, and hydrogen sulfide levels, as described in the HASP. The visual inspection will be performed by manned entry (as necessary) into the drainage structures to determine the following information:

- Dimensions of each manhole/catch basin (i.e., diameter of the cover, depth from the rim to the base of the structure, depth from the rim to the inverts for piping entering or leaving the structure);

- Size, orientation, and material of construction for all pipes entering or exiting each manhole/catch basin, including the joint composition of the pipes, if visible;

- Material(s) of construction for the sidewalls and base of each manhole/catch basin (i.e., pre-cast concrete, brick and mortar, etc.) and overall observed condition of each manhole/catch basin (i.e., cracks, corrosion, infiltration);

- The presence and depth of any accumulated water, the presence of any sheen on the surface of accumulated water, and/or the presence of any flowing water within the manhole/catch basin. The approximate dry-weather flow rate will be measured, if flow is observed; and

- Presence and amount of debris in the base of each manhole/catch basin and piping entering the manhole/catch basin.

The results of the visual inspection activities will be recorded on copies of the manhole inspection form included in Attachment A. Field personnel will also take a photograph of the interior of each manhole/catch basin for inclusion in the project file. Based on the inspection of each manhole/catch basin, field personnel will attempt to verify the layout of the storm sewer system, as shown on Figure 4 of the Work Plan.

After identifying the locations where dry-weather flow and debris are present, field personnel will coordinate with the BBL project manager to identify locations for collecting dry-weather flow samples and debris samples, as described below.

3.4.2 Collection of Dry Weather Flow Samples

Based on the results of the visual inspection, up to five dry-weather flow samples will be collected from pipes that discharge to manholes/catch basins associated with the site storm sewer system. The dry-weather flow sampling locations will be selected by the BBL project manager to provide information regarding sources and the potential extent of chemical constituents in dry-weather flow within the storm sewer system. The dry-weather flow samples will be collected by filling appropriate sample containers with water directly from the influent piping to the manholes/catch basins as described in Appendix J.

Each dry-weather flow sample will be submitted to Galson for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TSS in accordance with NYSDEC 1991 ASP-approved methods. At two dry-weather flow sampling locations, both filtered and unfiltered flow samples will be collected for analysis for PCBs and TAL inorganic constituents in accordance with the protocols presented in Appendix M. Filtration of dry-weather flow samples selected for filtered PCB analysis will be performed in the laboratory using a 0.5 micron Teflon filter. Filtration of dry-weather flow samples selected for filtered TAL inorganic constituent analysis will be performed in the field using a 0.45 micron pore cellulose-based membrane filter.

Collection of dry-weather flow samples will start at the most downstream sampling location in the storm sewer system and will then proceed to the upstream locations. The dry-weather flow sampling will be conducted at the same time as sampling of debris from manholes/catch basins and piping as described below under Subsection 3.4.3. The approximate flow rate discharged from each pipe that is sampled will be determined at the time of sampling by measuring the length of time required to fill a graduated cylinder (known volume) or by other methods, as appropriate.

QA/QC water samples will be collected during the dry-weather flow sampling program as described in Section 8.0. Table 2 presents the number of dry-weather flow samples to be collected and associated QA/QC water sampling frequencies.

The dry-weather flow sample containers will be preserved and labeled as described in Section 4.0. The dry-weather flow samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix B.

3.4.3 Collection of Drainage Structure Debris Samples

Based on the results of the visual inspection of the storm sewer system, up to ten samples of accumulated debris will be collected from manholes/catch basins associated with the system. The storm sewer debris sampling locations will be selected by BBL's project manager to provide specific information regarding the source and distribution of chemical constituents in accumulated debris within the site storm sewer system. The debris sampling locations will generally coincide with the dry-weather flow sampling locations, as described above in Subsection 3.4.2 (unless the drainage structure and piping inspections indicate a reason to sample debris at a location where dry-weather flow does not occur). Each debris sample will be submitted to Galson for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents in accordance with NYSDEC 1991 ASP-approved methods.

Samples of accumulated debris will be collected from the drainage structures/piping in conjunction with the dry-weather flow sampling activities. In order to obtain representative samples, dry-weather flow samples will be collected at each location prior to the collection of debris samples. Sampling will start at the most downstream location in the storm sewer system and will proceed to upstream locations.

The debris samples will be collected using a stainless steel scoop, as described in Appendix J. QA/QC debris samples will be collected during the drainage structure debris sampling program as described in Section 8.0. Table 2 presents the number of debris samples to be collected and associated QA/QC water sampling frequencies.

The debris sample containers will be preserved and labeled as described in Section 4.0. The debris samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix B.

4. Sample Handling and Documentation

4.1 General

This section presents field and laboratory procedures for the handling and documentation of samples collected for the MGP/RCRA Investigation. The field and laboratory sample handling and documentation procedures are presented below.

4.2 Field Procedures

This section presents field procedures for sample handling and documentation, including information related to sample containers and preservation methods; the sample designation system; sample custody; packing, handling, and shipping requirements; and documentation for each of the field sampling activities to be conducted as part of the MGP/RCRA Investigation. This subsection also presents methods for managing investigation-derived materials and wastes.

4.2.1 Sample Containers and Preservation

Appropriate sample containers, preservation methods, and laboratory holding times for soil, ground-water, LNAPL/DNAPL, dry-weather flow, and drainage structure debris are presented in Table 6. The laboratory will supply certified sample containers, as well as sample labels and preservatives. Field personnel will be responsible for properly labeling containers, preserving samples (as appropriate), and documenting sample preservation in the field notebook. Sample labeling and documentation procedures are described in Appendix B. Sample labels will be prepared prior to collection of samples, as appropriate. The sample designation system is presented in Subsection 4.2.2 below.

4.2.2 Sample Designation System

A five-digit sample designation code coupled with the sample date and time will provide each sample with a unique "name". This alpha-numeric system will apply to all soil, ground-water, LNAPL, DNAPL, dry-weather flow, and drainage structure debris samples collected during implementation of the MGP/RCRA Investigation, which are to be transmitted to the analytical laboratory. The five-digit designation code system includes a two digit letter prefix describing the sample matrix, a two digit number indicating the sample location, and a one digit letter suffix depicting the sample type. The letter prefix indicating the sample matrix will be taken from the following list:

- Surface Soil - "SS"
- Test Pit - "TP"
- Soil Boring - "SB"
- Ground Water - "MW"
- LNAPL - "LN"
- DNAPL - "DN"
- Dry-Weather Flow - "DW"
- Drainage Structure Debris Samples - "DB"

The two-digit sample location number will be assigned by the field sampling personnel prior to each sampling event. The one digit letter suffix, which designates the sample type, will be taken from the following list:

- Rinse Blank - "R"
- Trip Blank - "T"
- Distilled Water - "W"
- Filtered - "F"
- Unfiltered - "U"

Additional sample volumes collected for matrix spike ("MS") and matrix spike duplicate ("MSD") analysis will be noted on the chain-of-custody forms. The associated additional sample containers will be labeled as described above, with the appropriate suffix ("MS" or "MSD").

Blind duplicate samples will be collected for laboratory analysis at the frequency shown on Table 2. The blind duplicate samples will be labeled with the prefix "DUP" which will be followed by a two-digit number. Sampling personnel will record the duplicate sample number and the corresponding sampling location and depth in the field book. Sampling personnel will also note the matrix type of the blind duplicate sample on the chain-of-custody form (i.e., soil, ground-water, LNAPL/DNAPL, dry-weather flow, or drainage structure debris).

4.2.3 Sample Custody

The objective of field sample custody is to assure that samples are not tampered with from the time of sample collection through the time of transport to the analytical laboratory. Persons will have "custody of samples" when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel. A discussion of sample custody and directions for the field use of chain-of-custody forms are provided in the Data Management Plan. A sample field chain-of-custody form is also provided in Appendix B.

Any deviations from the analytical method will be delineated on chain-of-custody forms. Any special reporting requirements apart from this QAPjP will also be detailed on chain-of-custody forms.

4.2.4 Packing, Handling, and Shipping Requirements

Sample custody seals and packing materials for filled sample containers will be provided by the analytical laboratory. The filled, labeled, and sealed containers will be placed in a cooler on ice and carefully packed to eliminate the possibility of container breakage. Trip blanks of analyte-free water will be provided by the laboratory and included in each cooler containing ground-water and dry-weather flow samples to be analyzed for VOCs.

All samples will be packaged by the field personnel and transported as low-concentration environmental samples. The packaged samples will be either shipped via express overnight carrier (e.g., Federal Express or courier) or hand-delivered by sampling personnel to the laboratory within 24 to 48 hours of sample collection. General procedures for packing, handling, and shipping environmental samples are included in Appendix B.

4.2.5 Field Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field measurements, and chain-of-custody. This documentation includes a project field notebook(s), field sampling logs, sample chain-of-custody forms, field equipment calibration and maintenance logs, and daily field reports. The information to be recorded on these documents is described in the Data Management Plan and the appendices to this QAPjP. This information will constitute a record that allows reconstruction of all field events to aid in the data review and interpretation process.

All documentation relating to the performance of the field work will be retained in a project file at the BBL office in Syracuse, New York, as described below.

4.2.6 Management of Investigation-Derived Materials and Wastes

The management of investigation-derived materials and wastes is discussed below.

4.2.6.1 Excess Soil, Water, LNAPL/DNAPL, and Drainage Structure Debris

Soil cuttings generated during completion of soil borings will be collected and placed into 55-gallon drums for off-site disposal (by NMPC) in accordance with applicable regulations. Excess soil and/or drainage structure debris contained in sample screening jars will be placed into 55-gallon drums for off-site disposal (by NMPC) in accordance with applicable regulations. Purged ground water from the monitoring wells and excess NAPL will be collected and placed into 55-gallon drums for off-site disposal (by NMPC) in accordance with applicable regulations.

4.2.6.2 Disposable Equipment and Debris

Disposable equipment and debris, such as health and safety equipment, plastic sheeting, sampling equipment, and other equipment and/or sampling materials not reused in the investigation will be collected in plastic bags during the sampling events. The contents of the plastic bags will be transferred into appropriately labeled 55-gallon containers which will be stored in an on-site location suitable to NMPC. At the conclusion of the MGP/RCRA Investigation, the 55-gallon drums of disposable equipment and debris will be disposed of by NMPC in accordance with applicable regulations.

4.2.6.3 Decontamination Rinsate

Field sampling equipment will be decontaminated in accordance with the procedures outlined in Appendix D. Decontamination rinsate (e.g., tap and distilled water containing small amount of hexane, methanol, and nitric acid) will be containerized at each sampling location or group of locations. The decontamination rinsate will be transferred into appropriately labeled 55-gallon drums, which will be stored in an on-site location suitable to NMPC. At the conclusion of the MGP/RCRA Investigation, the 55-gallon drums of decontamination rinsate will be disposed of by NMPC in accordance with applicable regulations.

4.3 Laboratory Procedures

This subsection presents information related to laboratory sample custody, sample receipt and storage, sample analysis, laboratory documentation, and laboratory project files. As described in the Project Management Plan, Galson, Saybolt-Heinrici and SJB will perform the laboratory sample analyses required for the MGP/RCRA Investigation.

4.3.1 Sample Custody

Upon sample receipt, laboratory personnel will be responsible for sample custody. The original field chain-of-custody form will accompany all samples requiring laboratory analysis. The laboratory will use chain-of-custody guidelines described in the 1991 ASP. Samples will be kept secured in the laboratory until all stages of analysis are complete. All laboratory personnel having samples in their custody will be responsible for documenting and maintaining sample integrity.

4.3.2 Sample Receipt and Storage

Immediately upon sample receipt, the laboratory sample custodian will verify the package seal, open the package, and compare the contents against the field chain-of-custody. At this time, the laboratory sample custodian will also be responsible for logging the samples in, assigning a unique laboratory identification number to each sample, and labeling the sample bottle with the laboratory identification number. The project name, field sample code, date sampled, date received, analysis required, storage location and date, and action for final disposition will be recorded in the laboratory logbook. The sample will be moved into an appropriate storage location to await analysis. If a sample container is broken, the sample is in an inappropriate container, or the sample has not been preserved by appropriate means, BBL's project manager will be notified. A project file shall be created with all relevant custody documentation.

4.3.3 Sample Analysis

Analysis of samples will be initiated by worksheets which contain all pertinent information for analysis. The analyst will sign and date the laboratory chain-of-custody form when removing the samples from storage.

Samples will be organized into sample delivery groups (SDGs) by the laboratory. A SDG may contain up to 20 field samples (field duplicates, trip blanks, and rinse blanks are considered field samples for the purposes of SDG assignment) received by the laboratory over a maximum of seven-calendar days (less when seven-day holding times for extraction must be met), and must be processed through the laboratory (preparation, analysis, and reporting) as a group. Each SDG must include a minimum of one matrix spike/matrix spike duplicate (MS/MSD) or matrix spike/laboratory duplicate (MS/lab dup) pair, which shall be received by the laboratory at the start of the SDG assignment.

Each SDG will be self-contained for all of the required quality control samples. All parameters within an SDG will be extracted and analyzed together in the laboratory. At no time will the laboratory be allowed to run any sample (including QC samples) at an earlier or later time than the rest of the SDG unless dilution, reanalysis, and/or re-extraction of a sample is required. These procedures will be performed in accordance with NYSDEC guidelines. These rules for analysis will ensure that the quality control samples for an SDG are applicable to the field samples of the same SDG, and that the best possible comparisons may be made.

Information regarding the sample, analytical procedures performed, and the results of the testing will be recorded on laboratory forms or personal notebook pages by the analyst. These notes will be dated, and also identify the analyst, the instrument used, and the instrument conditions.

4.3.4 Laboratory Documentation

Workbooks, bench sheets, instrument logbooks, and instrument printouts, are used to trace the history of samples through the analytical process, and document and relate important aspects of the work, including the associated quality controls. All logbooks, bench sheets, instrument logs, and instrument printouts are part of the permanent record of the laboratory.

As required, each page or entry is to be dated and initialed by the analyst at the time the record is made. Errors in entry are to be crossed out in indelible ink with a single stroke and corrected without the use of white-out or by obliterating or writing directly over the erroneous entry. All corrections are to be initialed and dated by the individual making the correction. Pages of logbooks that are not completed as part of normal record keeping should be completed by lining out unused portions.

Laboratory notebooks are periodically reviewed by the laboratory section leaders for accuracy, completeness, and compliance to this QAPjP. All entries and calculations are verified by the laboratory section leader. If all entries on the pages are correct, then the laboratory section leader initials and dates the pages. Corrective action is taken for incorrect entries before the laboratory section leader signs.

4.3.5 Laboratory Project Files

During the MGP/RCRA Investigation, Galson/Doble /SJB will establish a file for all pertinent data. The file will include the chain-of-custody forms, raw data, chromatograms (required for all constituents analyzed by chromatography), and sample preparation information. Gas chromatography/mass spectrometry (GC/MS) and GC raw data files will be maintained on computer disk (or magnetic tape) for five years. Additional project records will be maintained on file for five years.

Samples will be stored by the laboratory for one month after the final report is delivered to BBL. After this waiting period, the samples will be disposed of in accordance with applicable regulations.

4.4 BBL Project File

MGP/RCRA Investigation documentation will be placed in a single project file at the BBL office in Syracuse, New York. The file will consist of the following components:

1. Agreements (filed chronologically);
2. Correspondence (filed chronologically);
3. Memos (filed chronologically); and
4. Notes and Data (filed by topic).

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation (when received) and field data will be filed with notes and data. Filed materials may be removed and signed out by authorized personnel on a temporary basis only.

5. Calibration Procedures and Frequency

5.1 Field Equipment Calibration Procedures and Frequency

Specific procedures for performing and documenting calibration and maintenance for the equipment measuring conductivity, temperature, dissolved oxygen, pH, turbidity, oxidation-reduction potential, ground-water level, and total organic vapors are provided in Appendix F of this QAPjP. Calibration checks will be performed daily when measuring conductivity, temperature, dissolved oxygen, pH, turbidity, oxidation-reduction potential, and total organic vapors. For ground-water sampling, the pH meter will be calibrated at each sampling location. Field equipment, frequency of calibration, and calibration standards are provided in Table 7.

As indicated in the HASP for the MGP/RCRA Investigation and Remedial Measures Evaluation, the equipment used to measure the levels of oxygen, carbon monoxide, hydrogen sulfide and combustible gas in the manholes/catch basins prior to entry will be calibrated prior to use on a daily basis according to the manufacturer's specifications.

5.2 Laboratory Equipment Calibration Procedures and Frequency

Instrument calibration will follow the specifications provided by the analytical method used or laboratory Standard Operating Procedures (SOPs) as identified in the table below.

Chemical Constituent/Supplemental Parameter	Analytical Method/SOP
Chemical Constituents	
PCBs	Instrument calibration procedures for PCB analyses will follow Galson's SOP (Attachment B)
TCL VOCs	USEPA SW-846 Method 8240 (modified for capillary column)
TCL SVOCs	USEPA SW-846 Method 8270
TAL Inorganic Constituents	USEPA SW-846 Method 6010/7000 with the following exceptions: Mercury will be analyzed using Method 7470/7471 and cyanide will be analyzed using Method 9010

Chemical Constituent/Supplemental Parameter	Analytical Method/SOP
BTEX (in soil)	USEPA SW-846 Method 8260
PAHs	USEPA SW-846 Method 8270
TPH	USEPA SW-846 Method 8015
Supplemental Parameters	
Particle Size Distribution (Sieve/Hydrometer)	ASTM Method D422-63
Atterberg Limits	ASTM Method D4318-84
Bulk Density	Corps of Engineers Method EM-1110-2-1906
Moisture	ASTM Method D2216
Specific Gravity	ASTM Method D854
BTU Content	ASTM Method D2015
Viscosity	ASTM Method D445
Density	ASTM Method D4052
Interfacial Tension	ASTM Method D971
Sulfate/Sulfide	Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, March 1983 Revision - Method 375.4/376.1
Nitrate/Nitrite	Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, March 1983 Revision - Method 352.1/354.1
TSS	Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, March 1983 Revision - Method 160.2

6. Analytical Procedures

6.1 Field Analytical Procedures

Field analytical procedures will include the measurement of conductivity, temperature, dissolved oxygen, pH, turbidity, oxidation-reduction potential, ground-water level, and total organic vapors. Specific field measurement protocols are provided in the Appendices of this QAPjP. Field measurement quality control limits in terms of precision and accuracy are presented in Table 8.

6.2 Laboratory Analytical Procedures

Laboratory analytical requirements presented in the subsections below include a general summary of requirements, specifics related to each sample medium to be analyzed, and details of the methods to be used for this project. The methods to be used include the following:

- NYSDEC 1991 ASP-approved methods and updates will be used for the analysis of PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, BTEX, PAHs, TPH, sulfate/sulfide, nitrate/nitrite, and TSS; and

- ASTM methods will be used for the analysis of particle size distribution, Atterberg limits, density, moisture, specific gravity, BTU content, viscosity, and interfacial tension.

6.2.1 General

The following tables summarize general analytical requirements:

Table	Title
2	Environmental and Quality Control Sample Analyses
3	Parameters, Methods, and Reporting Limits
6	Sample Containers, Preservation, and Holding Time Requirements

6.2.2 MGP/RCRA Investigation Sample Matrices

6.2.2.1 Soil

Analyses in this category relate to soil samples. Results will be reported as dry weight, in units presented in Table 3. Moisture content will be reported separately. QC limits for soil samples are presented in Table 4.

6.2.2.2 Water

Matrices in this category consist of ground water and dry-weather flow. Filtration of dry-weather flow samples selected for filtered TAL inorganic analysis will be performed in the field using a 0.45-micron pore cellulose-based membrane filter, or equivalent as described in Appendix J. Filtration of dry-weather flow samples selected for filtered PCB analysis will be performed in the laboratory using a 0.5 micron Teflon filter. Analytical results for all analyses will be reported in units identified in Table 3. QC limits for water samples are presented in Table 5.

6.2.2.3 LNAPL/DNAPL

Analyses in this category refer to LNAPL and DNAPL samples. Analytical results for all LNAPL/DNAPL analyses will be reported in units identified in Table 3. QC limits for LNAPL/DNAPL samples are presented in Table 4.

6.2.2.4 Debris

Analyses in this category relate to debris samples. Results will be reported as dry weight, in units presented in Table 3. Moisture content will be reported separately. QC limits for debris samples are presented in Table 4.

6.2.3 Analytical Requirements

The primary sources for methods used for this investigation are provided in the NYSDEC 1991 ASP documents and the ASTM "Annual Book of ASTM Standards, Volume 04.08, Soil and Rock, Building Stones, Geotextiles", dated 1995. Laboratory analyses will be performed by Galson, Doble, and SJB as listed below:

- Galson will perform analyses for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, BTEX, PAHs, TPH, nitrate/nitrite, sulfate/sulfide, TSS, and BTU content;

- Doble will perform analyses for viscosity, density, and interfacial tension; and

- SJB will perform analyses for particle size distribution, Atterberg limits, bulk density, moisture content, and specific gravity.

Tables summarizing QC limits required to evaluate analytical performance are provided as follows:

Table	Title
4	Soil, Debris, and LNAPL/DNAPL Analyses Quality Control Limits
5	Water Analyses Quality Control Limits

As identified in Tables 4 and 5, matrix spike/matrix spike duplicate precision for applicable organic analyses will be evaluated as noted on the tables. Also, assessment of the supplemental parameters will generally be based on duplicate sample results.

7. Data Reduction, Review, and Reporting

7.1 General

After field and laboratory data are obtained, the data will be subject to the following:

1. Reduction or manipulation mathematically or otherwise into meaningful and useful forms;
2. Review;
3. Organization, interpretation, and reporting; and
4. Validation/Data Usabiilty Summary.

The subsections below present descriptions of the data reduction, review, and reporting activities that will be conducted in the field and laboratory as part of the MGP/RCRA Investigation. In addition, a description of the data validation activities to be performed is presented below.

7.2 Field Data Reduction, Review, and Reporting

7.2.1 Field Data Reduction

Information collected in the field through visual observation, manual measurement and/or field instrumentation will be recorded in field notebooks, datasheets, and/or on forms. Such data will be reviewed by the appropriate Task Manager (MGP/RCRA Investigation Task Managers and other personnel involved with the management and implementation of this MGP/RCRA Investigation are identified in the Project Management Plan) for adherence to this QAPjP and for consistency. Concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and as necessary, incorporated into the data evaluation process. Data reduction activities that will be performed for the soil, ground-water, and storm sewer investigations are discussed in the subsections below.

7.2.1.1 Soil Investigation

Reduction of field data collected during the soil investigation will include the following:

- Determining the appropriate interval in test pits and soil borings (based on PID screening, UV fluorescence, and/or jar testing) from which to select subsurface soil samples for laboratory analysis.

7.2.1.2 Ground-Water Investigation

Reduction of field data collected during the ground-water investigation will include the following:

- Calculating water elevations in monitoring wells by subtracting the depth-to-water data from the surveyed elevation of the measuring point;

- Calculating in-situ hydraulic conductivities; and

- Producing hydrogeologic contour maps by contouring lines of equal water elevations using linear interpolation through known elevation points.

7.2.1.3 Storm Sewer Investigation

Reduction of field data collected during the storm sewer investigation will include the following:

- Calculating discharge flow rates in pipes inside manholes and catch basins, based on the flow velocity and flow depth or the time required to fill a known volume (i.e., graduated cylinder); and

- Calculating water elevations in manholes/catch basins by subtracting the depth-to-water data from the surveyed elevation of the rim of the manhole/catch basin.

7.2.2 Field Data Review

Field data calculations, transfers, and interpretations will be conducted by the field personnel and reviewed for accuracy by the appropriate Task Manager and the QAM. All logs and documents will be checked for:

1. General completeness;
2. Readability;
3. Use of appropriate procedures;
4. Appropriate instrument calibration and maintenance;
5. Reasonableness in comparison to present and past data collected;
6. Correct sample locations; and
7. Correct calculations and interpretations.

7.2.3 Field Data Reporting

Where appropriate, field data forms and calculations will be processed and included in appendices to the MGP/RCRA Investigation Report. The original field logs, documents, and data reductions will be kept in the project file at the BBL office in Syracuse, New York.

7.3 Laboratory Data Reduction, Review, and Reporting

7.3.1 Laboratory Data Reduction

The calculations used for data reduction are specified in each of the analytical methods referenced previously. Whenever possible, analytical data is transferred directly from the instrument to a computerized data system. Raw data is entered into permanently-bound laboratory notebooks. The data entered are sufficient to document all factors used to arrive at the reported value.

Concentration calculations for chromatographic analyses (i.e., PCBs, TCL VOCs, TCL SVOCs) are based on response factors. Quantitation is performed using either internal or external standards.

Inorganic analyses are based on regression analysis. Regression analysis is used to fit a curve through the calibration standard data. The sample concentrations are calculated using the resulting regression equations.

Standard data are fitted to an equation in the following form:

$$y = a + bx$$

Where:

y = instrument response

x = concentration of amount of analyte

a = y-intercept

b = slope of the line (sensitivity)

After the regression equation has been computed, the sample concentration (x) can be calculated by rearranging the regression equation to read:

$$x = (y-a) / b$$

Soil and debris values are reported on a dry-weight basis. Unless otherwise specified, all values are reported uncorrected for blank contamination.

7.3.2 Laboratory Data Review

Each laboratory section will provide extensive data review according to the methods used, prior to submission of results to BBL. The analyst will be responsible for primary review of data generated from sample analysis. If recoveries of all QC samples are within specified QC limits, then the data will be presented for secondary review. If recoveries of any QC samples exceed specified QC limits, then affected samples will be reanalyzed.

The laboratory Project Manager will determine if the analytical results of the sample(s) are consistent. If so, then the data will be presented in a final report. If discrepancies or deficiencies exist in the analytical results, then corrective action will be taken as discussed in Section 13.0. Deficiencies discovered as a result of internal data validation, as well as the corrective actions to be used to rectify the situation, will be documented on a Corrective Action Form (Attachment C). This form will be submitted to the BBL Project Manager.

7.3.3 Laboratory Data Reporting

The laboratory is responsible for reporting the data in tabular format. Data will be tabulated by method and sample with reference to the sample by both field and laboratory identifications. The data tables will provide a cross-reference between each sample and the appropriate QC data package.

The laboratory will prepare full ASP Category B data packages and case narratives for each sample delivery group for the laboratory analyses for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, BTEX, PAHs, TPH, sulfate/sulfide, nitrate/nitrite, and TSS. Reports will include all raw data required to recalculate any result, including sample and standard printouts, chromatograms, and quantitation reports. In addition, sample preparation records including extraction sheets, digestion sheets, percent solids, and logbook pages will also be provided in the data package.

7.4 Data Validation/Data Usability Summary

All analytical data for soil, ground-water, and drainage structure debris samples will be evaluated using either the Data Usability Summary Report (DUSR) format or full analytical data validation. NMPC envisions that the DUSR will be utilized for routine characterization samples and that data validation will be completed for specific groups of samples that are used to support conclusions or recommendations. The decision whether to utilize the DUSR or data validation for each sample delivery group will be made by NMPC's project manager (in consultation with the NYSDEC, as necessary) based on the anticipated use of the analytical results.

Data validation entails a review of the QC data and the raw data to verify that the laboratory was operating within required limits, the analytical results are correctly transcribed from the instrument read outs, and which, if any, environmental samples are related to any out-of-control QC samples. The objective of data validation is to identify any questionable or invalid laboratory measurements.

Review of laboratory data packages will include an assessment of compliance with method guidelines and project-specific requirements. Specifically included is an evaluation of holding times, calibration requirements (initial and continuing), blank contamination, surrogate spikes (where applicable), matrix spikes and duplicates (where applicable), and compound identification. The data validator will use USEPA Region II's Functional Guidelines and the most recent versions of the NYSDEC 1991 ASP documents available at the time of project initiation as guidance, where appropriate. Data validation will consist of data editing, screening, checking, auditing, reviewing , and data interpretation to determine if the data quality is sufficient to meet the DQOs. Data validation will include a review of completeness and compliance, including but not limited to, the elements provided in Table 9.

The data validator will verify that reduction of laboratory measurements and laboratory reporting of analytical parameters is in accordance with the procedures specified for each analytical method (i.e., perform laboratory calculations in accordance with the method-specific procedure) and/or as specified in this QAPjP. The data quality will be evaluated by application of the Functional Guidelines procedures and criteria modified as necessary to address project-specific and method-specific criteria, control limits, and procedures.

Upon receipt of the laboratory data, the following reduction, validation and reporting scheme will be executed by the data validator:

- Evaluate completeness of data package;

- Verify that field chain-of-custody forms were completed and that samples were handled properly;

- Verify that holding times were met for each parameter. Holding times exceedences, should they occur, will be documented. Data for all samples exceeding holding time requirements will be flagged as either estimated or rejected. The decision as to which qualifier is more appropriate will be made on a case-by-case basis;

- Verify that parameters were analyzed according to the methods specified;

- Review QA/QC data (i.e., make sure duplicates, blanks, and spikes were analyzed on the required number of samples, as specified in the method, verify that duplicate and matrix spike recoveries are acceptable);

- Investigate anomalies identified during review. When anomalies are identified, they will be discussed with the project manager and/or laboratory manager, as appropriate; and

- If data appears suspect, the specific data of concern will be investigated. Calculations will be traced back to raw data; if calculations do not agree, the cause will be determined and corrected.

Deficiencies discovered as a result of data validation, as well as the corrective actions implemented in response, will be documented and submitted in the form of a written report.

It should be noted that the existence of qualified results does not automatically invalidate data. The goal to produce the best possible data does not necessarily mean producing data without QC qualifiers. Qualified data can provide useful information.

Resolution of any issues regarding laboratory performance or deliverables will be handled between the laboratory and the data validator. Suggestions for reanalysis may be made to the BBL QAM at this point.

Upon completion of the validation of each sample delivery group/parameter, a data validation report addressing the following topics as applicable to each method will be prepared:

1. Assessment of the data package;

2. Description of any protocol deviations;

3. Failures to reconcile reported and/or raw data;

4. Assessment of any compromised data;

5. Laboratory case narrative;

6. Overall appraisal of the analytical data; and

7. Table of site name, sample quantities, data submitted to the laboratory, year of protocol used. date of extraction and analysis, matrix, and fractions analyzed.

Following completion of data validation reports for all sample delivery groups/parameters, BBL will prepare a data useability report that will present a detailed analysis of whether the data generated by implementation of the MGP/RCRA Investigation field activities achieves the DQOs contained in Section 1.3 of this QAPjP.

The data validation/useability reports will be included as an appendix to the MGP/RCRA Investigation Report, if appropriate, and kept in the project file at the BBL office in Syracuse, New York.

8. Field and Laboratory Quality Control Checks

8.1 General

Both field and laboratory quality control checks are proposed for the MGP/RCRA Investigation. In the event that there are any deviations from these checks, the BBL QAM will be notified. The proposed field and laboratory quality control checks are discussed below.

8.2 Field Quality Control Checks

Field quality control checks will include obtaining duplicate field measurements, using analyte-free water for the preparation of sample blanks, using certified-clean sample containers, collecting duplicate samples, preparing rinse blanks and trip blanks, and using zero and span gases, as described in the subsections below.

8.2.1 Field Measurements

To verify the quality of data using field instrumentation, duplicate measurements will be obtained and reported for all field measurements. A duplicate measurement will involve obtaining measurements a second time at the same sampling location (i.e., for measurement of dry-weather flow rates, water quality parameters, etc.).

8.2.2 Analyte-Free Water

All water that will be used for the preparation of rinse blanks, trip blanks, method blanks, spike blanks, and other blanks, as described in the following subsections will be laboratory-supplied ASTM II deionized/distilled water, which has been demonstrated to be analyte-free. The quantitation limits presented in Table 3 will be used as the criteria for the deionized/distilled analyte-free water. For parameters such as methylene chloride, acetone, toluene, 2-butanone, and phthalate (common laboratory contaminants), the allowable limits are three times the quantitation limits presented in Table 3. A minimum of one sample of the laboratory-supplied analyte-free water will be analyzed for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganics by the laboratory in order to demonstrate that the water is analyte-free.

8.2.3 Sample Containers

Sample containers for environmental samples to be analyzed during the MGP/RCRA Investigation will be certified-clean I-Chem Series 300, or equivalent. Groups of sample containers will be tracked according to lot number(s). The lot number(s) will be identified on each sample container for tracking purposes. One sample from each lot number is analyzed by the container supplier for the same analytical parameters as the environmental samples that will be placed in the containers. Examples of the certificates of analysis, which are provided by the container supplier, are provided in Attachment D. Certificates of analysis will be forwarded with the container shipment and will be placed in the laboratory and BBL project files.

8.2.4 Blind Field Duplicates

Blind field duplicates will be collected for soil, ground-water, dry-weather flow, and debris samples to check reproducibility of the sampling and analytical methods. The blind field duplicate samples will be designated as described in Subsection 4.2.2, such that the field samples which are duplicated cannot be determined by the laboratory based on the sample designations. In general, the field duplicates will be analyzed at a 5 percent frequency (every 20 samples) for the chemical constituents. Table 2 provides an estimated number of field duplicates to be prepared for each applicable parameter and matrix.

8.2.5 Rinse Blanks

Rinse blanks are used to monitor the cleanliness of the sampling equipment and the effectiveness of the cleaning procedures. Rinse blanks will be prepared and submitted for analysis at a frequency of one per day (when sample equipment cleaning occurs) or once for every 20 samples collected, whichever is more. Rinse blanks will be prepared by filling sample containers with analyte-free water (supplied by the laboratory) which has been routed through a cleaned sampling device. When dedicated sampling devices are used or sample containers are used to collect the samples, rinse blanks will not be necessary. Table 2 provides an estimated number of rinse blanks for environmental media samples to be collected during the MGP/RCRA Investigation.

8.2.6 Trip Blanks

Trip blanks will be used to assess whether site samples have been exposed to non-site-related volatile constituents during sample storage and transport. Trip blanks will be analyzed at a frequency of one per day, for each cooler containing ground-water and dry-weather flow samples to be analyzed for volatile organic constituents. A trip blank will consist of a container filled with analyte-free water (supplied by the laboratory) which remains unopened with field samples throughout the sampling event. Trip blanks will only be analyzed for volatile organic constituents. Table 2 provides an estimated number of trip blanks to be collected for each matrix and parameter during the MGP/RCRA Investigation.

8.2.7 Zero and Span Gases

A photoionization detector (PID) will be used during the MGP/RCRA Investigation to screen soil samples as described in Section 3.0 and to monitor air in the worker breathing zone as described in the HASP. The PID will be calibrated daily prior to use. Background ambient air will be the "zero gas" used to calibrate the PID to a reading of 0.0 parts per million (ppm). Isobutylene will be used to calibrate the span of the PID at 100 ppm. Detailed procedures for calibrating the PID are presented in Appendix F.

8.3 Analytical Laboratory Quality Control Checks

Internal laboratory quality control checks will be used to monitor data integrity. These checks will include method blanks, matrix spikes (and matrix spike duplicates), spike blanks, internal standards, surrogate samples, calibration standards, and reference standards. Project QC limits for duplicates and matrix spikes are identified in Tables 4 and 5. Laboratory control charts will be used to determine long-term instrument trends. Descriptions of the analytical laboratory quality control checks are presented below.

8.3.1 Method Blanks

Sources of contamination in the analytical process, whether specific analytes or interferences, need to be identified, isolated, and corrected. The method blank is useful in identifying possible sources of contamination within the analytical process. For this reason, it is necessary that the method blank is initiated at the beginning of the analytical process and encompasses all aspects of the analytical work. As such, the method blank would assist in accounting for any potential contamination attributable to glassware, reagents, instrumentation, or other sources which could affect sample analysis. One method blank will be analyzed with each analytical series associated with no more than 20 samples. ASP guidelines for acceptance will be used. Guidelines for non-standard methods are provided in the appropriate protocols.

8.3.2 Matrix Spikes/Matrix Spike Duplicates

Matrix spikes and matrix spike duplicates will be used to measure the accuracy of organic analyte recovery from the sample matrices. All matrix spikes and matrix spike duplicates will be site-specific. For organic constituents, matrix spike/matrix spike duplicate pairs will be analyzed at a 5 percent frequency (every 20 samples). For inorganics, a matrix spike will be analyzed at a 5 percent frequency.

For soil, LNAPL/DNAPL, ground-water, dry-weather flow, and debris organic matrix spike data, results will be examined in conjunction with spike blank (Subsection 8.3.3 of this QAPjP) data and surrogate spike (Subsection 8.3.4) data to assess the accuracy of the analytical method. When matrix spike recoveries are outside QC limits, associated spike blank and surrogate recoveries will be evaluated to attempt to verify the reason for the variance(s), and determine the effect on the reported sample results. Table 2 presents an estimated number of matrix spike and matrix spike duplicate analyses for each applicable matrix and parameter.

8.3.3 Matrix Spike Blanks

For soil, LNAPL/DNAPL, ground-water, dry-weather flow, and debris organic analyses, matrix spike blanks will be included to provide an additional assessment of data accuracy. The spike blanks provide an assessment of method performance without interferences which may be present in environmental samples. Matrix spike blanks will be analyzed at a frequency of one blank associated with no more than 20 samples. For spike blank analyses, clean matrix is spiked and recoveries are calculated similar to matrix spike recoveries. The clean matrix will consist of laboratory reagent water and clean, dried sand for water and soil analyses, respectively. Matrix spike blank data will be assessed in conjunction with matrix spike data, as discussed in Section 8.3.2 of this QAPjP. Table 2 presents an estimated number of matrix spike blanks for each matrix and parameter.

8.3.4 Surrogate Spikes

Surrogates are compounds unlikely to be found in nature that have properties similar to the analytes of interest. This type of control is primarily used for organic samples analyzed by GC/MS and GC methods and is added to the samples prior to purging or extraction. The surrogate spike is utilized to provide broader insight into the proficiency and efficiency of an analytical method on a sample specific basis. This control reflects analytical conditions which may not be attributable to sample matrix.

If surrogate spike recoveries exceed specified QC limits, then the analytical results need to be evaluated thoroughly in conjunction with other control measures. In the absence of other control measures (i.e., internal standard and matrix spikes), the integrity of the data may not be verifiable and reanalysis of the sample with additional controls would be necessary.

Surrogate spike compounds will be selected utilizing the guidance provided in the analytical methods summarized in Table 2.

8.3.5 Laboratory Duplicates

For inorganics, laboratory duplicates will be analyzed to assess laboratory precision. Laboratory duplicates are defined as a second aliquot of an individual sample which is analyzed as a separate sample. Table 2 provides an estimated number of laboratory duplicates for each applicable matrix and parameter.

8.3.6 Calibration Standards

Calibration check standards analyzed within a particular analytical series provide insight regarding the instruments' stability. A calibration check standard will be analyzed at the beginning and end of an analytical series, or periodically throughout a series containing a large number of samples.

In general, calibration check standards will be analyzed after every 12 hours, or more frequently as specified in the applicable analytical method. In analyses where internal standards are used, a calibration check standard will only be analyzed in the beginning of an analytical series. If results of the calibration check standard exceed specified tolerances, then all samples analyzed since the last acceptable calibration check standard will be reanalyzed.

Laboratory instrument calibration standards will be selected utilizing the guidance provided in the analytical methods summarized in Table 2.

8.3.7 Internal Standards

Internal standard areas and retention times are monitored for organic analyses performed by GC/MS methods. Method-specified internal standard compounds are spiked into all field samples, calibration standards and QC samples after preparation and prior to analysis. If internal standard areas in one or more samples exceeds the specified tolerances, the cause will be investigated, the instrument recalibrated (if necessary), and all affected samples reanalyzed.

The use of internal standards will be as provided within the analytical methods summarized in Table 2.

8.3.8 Reference Standards

Reference standards are standards of known concentration, which are independent in origin from the calibration standards. Reference standards, are generally available through the USEPA, the National Bureau of Standards, or as specified in the analytical methods. Reference standards are included in the analytical process, although in some aspects of sample handling and preparation, these standards may not reflect the analytical process. The intent of reference standard analysis is to provide insight into the analytical proficiency within an analytical series. This includes the preparation of calibration standards, the validity of calibration, sample preparation, instrument set-up, and the premises inherent in quantitation. Reference standards will be analyzed at the frequencies specified within the analytical methods summary in Table 2.

8.3.9 Laboratory Control Samples/Control Limits

Laboratory control samples consist of matrix spikes, matrix spike duplicates, spike blanks, laboratory duplicates, and other samples, as described above. These laboratory control samples will be analyzed for each analytical method, when appropriate for the method, and with each sample delivery group, as described in Subsection 4.3.3. The required frequency for analysis of laboratory control samples is presented on Table 2.

Control limits have been established for this MGP/RCRA Investigation which establish laboratory precision and accuracy requirements. These charts include Table 4, which presents Soil, Debris, and LNAPL/DNAPL Analyses Quality Control Limits, and Table 5, which presents Water Analyses Quality Control Limits. Laboratory personnel and the data validator will compare the results of the laboratory control samples to the control limits presented in Table 4 and Table 5 to determine the useability of the data.

9. Performance and Systems Audits

9.1 General

This section describes the performance and systems audits that will be completed in the field and the laboratory during the MGP/RCRA Investigation.

9.2 Field Audits

Field performance and systems audits that will be completed during this project are described in the subsections below.

9.2.1 Performance Audits

The appropriate Task Manager will monitor field performance. Field performance audit summaries will contain an evaluation of field measurements and field meter calibrations to verify that measurements are taken according to established protocols. The BBL QAM will review all field reports and communicate concerns to the BBL Project Manager and/or Task Managers, as appropriate. In addition, the BBL QAM will review the rinse and trip blank data to identify potential deficiencies in field sampling and cleaning procedures.

9.2.2 Internal Systems Audits

A field internal systems audit is a qualitative evaluation of all components of field QA/QC. The systems audit compares scheduled QA/QC activities from this document with actual QA/QC activities completed. The appropriate Task Manager and QAM will periodically confirm that work is being performed consistent with this QAPjP, the Work Plan, and the HASP.

9.3 Laboratory Audits

The analytical laboratory will perform internal audits consistent with NYSDEC ASP, 12/91 Revisions, Exhibit E. BBL reserves the right to conduct an on-site audit of the laboratory prior to the start of analyses for the project. Additional audits may be performed during the course of the project, as deemed necessary.

10. Preventative Maintenance

10.1 General

Preventive maintenance schedules have been developed for both field and laboratory instruments. A summary of the maintenance activities to be performed is presented below.

10.2 Field Instruments and Equipment

Prior to any field sampling, each piece of field equipment will be inspected to ensure it is operational. If the equipment is not operational, it must be serviced prior to use. All meters which require charging or batteries will be fully charged or have fresh batteries. If instrument servicing is required, it is the responsibility of the appropriate Field Task Manager or field personnel to follow the maintenance schedule and arrange for prompt service.

Field instrumentation to be used in this study includes meters to measure turbidity, conductivity, temperature, pH, dissolved oxygen, water level, organic vapors, and oxidation-reduction potential. Field equipment also includes sampling devices for ground water. A logbook will be kept for each field instrument. Each logbook contains records of operation, maintenance, calibration, and any problems and repairs. The BBL Task Managers will review calibration and maintenance logs.

Field equipment returned from a site will be inspected to confirm it is in working order. This inspection will be recorded in the logbook or field notebooks, as appropriate, by the last individual to use the equipment.

Non-operational field equipment will be either repaired or replaced. Appropriate spare parts will be made available for field meters. A summary of preventive maintenance requirements for field instruments is provided in Table 10. Details regarding field equipment maintenance, operation, and calibration, are provided in Appendix F.

10.3 Laboratory Instruments and Equipment

Laboratory instrument and equipment documentation procedures are provided in standard operating procedures (SOPs). Documentation includes details of any observed problems, corrective measure(s), routine maintenance, and instrument repair (which will include information regarding the repair and the individual who performed the repair). Preventive maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call from the manufacturer.

A sufficient supply of spare parts for laboratory instruments will be maintained to minimize downtime. Backup instrumentation will be retained for use, whenever possible.

11. Data Assessment Procedures

11.1 General

The analytical data generated during the MGP/RCRA Investigation will be evaluated with respect to precision, accuracy, and completeness and compared to the DQOs set forth in Sections 1.0 and 2.0 of this QAPjP. The following tables summarize QC limits required to evaluate analytical performance:

Table	Title
4	Soil, Debris, and LNAPL/DNAPL Analyses Quality Control Limits
5	Water Analyses Quality Control Limits

Following collection of the MGP/RCRA Investigation data, various statistical analyses can be performed to determine the data validity, sufficiency, and sensitivity of the data, as described below.

Data validity can be checked through not only standard data validation procedures, but also through statistical cross-validation procedures. These procedures involve predicting a data value for one point, based on results from other points. The difference between the measured and predicted number can indicate an invalid result.

An assessment of data sufficiency involves the determination of whether the confidence intervals for measured values are rigorous enough to satisfy regulatory or engineering requirements.

The sensitivity of the data can be measured by the use of methods, such as kriging, that can be used to calculate the range of probable values at non-sampled locations and to determine the effect of this uncertainty on site assessment.

The procedures utilized when assessing data precision, accuracy, and completeness are presented below.

11.2 Data Precision Assessment Procedures

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements.

Field duplicates will be used to assess precision for the entire measurement system including sampling, handling, shipping, storage, preparation, and analysis.

Laboratory data precision for organic analyses will be monitored through the use of matrix spike/matrix spike duplicate sample analyses. For other parameters, laboratory data precision will be monitored through the use of field duplicates and/or laboratory duplicates as identified in Table 2.

Precision will be measured by calculating of the relative percent difference (RPD) by the following equation:

$$RPD = \frac{(A-B) \times 100}{(A+B)/2}$$

Where:

A = Analytical result from one of two duplicate measurements
B = Analytical result from the second measurement.

Precision objectives for duplicate analyses are identified in Tables 4 and 5.

11.3 Data Accuracy Assessment Procedures

The accuracy of field measurements will be controlled by experienced field personnel, properly calibrated field meters, and adherence to established protocols. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

Laboratory accuracy will be assessed via the use of matrix spikes, surrogate spikes and reference standards. Where available and appropriate, QA performance standards will be analyzed periodically to assess laboratory accuracy. Accuracy will be calculated in terms of percent recovery as follows:

$$\% \text{ Recovery} = \frac{(A-X) \times 100}{B}$$

Where:

A = Value measured in spiked sample or standard
X = Value measured in original sample
B = True value of amount added to sample or true value of standard

This formula is derived under the assumption of constant accuracy between the original and spiked measurements. Accuracy objectives for matrix spike recoveries are identified in Tables 4 and 5.

11.4 Data Completeness Assessment Procedures

Completeness of a field or laboratory data set will be calculated by comparing the number of valid sample results generated with the total number of results generated.

$$\text{Completeness} = \frac{\text{Number Valid Results}}{\text{Total number of results generated} \times 100}$$

The data completeness goal is 100%. Any data deficiencies will be evaluated to assess impacts on project goals and requirements for resampling and/or reanalysis.

11.5 Calculation of Method Detection Limits

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero. The MDL achieved in a given analysis will vary depending on instrument sensitivity and matrix effects. MDL is calculated as follows:

$$\text{MDL} - t_{(n-1, 1-a = 0.99)}\, S$$

Where:

MDL = method detection limit;

s = standard deviation of replicate analyses; and

$t_{(n-1, 1-\alpha = 0.99)}$ = student's t-value for a one-sided 99% confidence level and a standard deviation estimate with n-1 degrees of freedom.

12. Corrective Action

12.1 General

Corrective actions are required when field or analytical data are not within the objectives specified in this QAPjP or the Work Plan. Corrective actions include procedures to promptly investigate, document, evaluate, and correct data collection and/or analytical procedures. Field and laboratory corrective action procedures for the MGP/RCRA Investigation are described below.

12.2 Field Procedures

When conducting the MGP/RCRA Investigation field work, if a condition is noted that would have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action implemented will be documented on a Corrective Action Form (Attachment C) and reported to the appropriate BBL Task Manager, QAM, and Project Manager.

Examples of situations which would require corrective actions are provided below:

1. Protocols as defined by the QAPjP have not been followed;
2. Equipment is not in proper working order or properly calibrated;
3. QC requirements have not been met; and
4. Issues resulting from performance or systems audits.

Project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

12.3 Laboratory Procedures

In the laboratory, when a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action to be taken will be documented, and reported to the appropriate project manager and QAM. The laboratory will verify that the corrective action has eliminated the adverse condition.

Corrective action may be initiated, at a minimum, under the following conditions:

1. Protocols as defined by this QAPjP have not been followed;

2. Predetermined data acceptance standards are not obtained;
3. Equipment is not in proper working order or calibrated;
4. Sample and test results are not completely traceable;
5. QC requirements have not been met; and
6. Issues resulting from performance or systems audits.

Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

13. Quality Assurance Reports to Management

13.1 Internal Reporting

The BBL data validator will submit validation report(s) to the BBL QAM. The BBL QAM will review analytical concerns identified by the independent data validator with the laboratory. For data qualified by the data validator, data useability will be assessed by data users relative to project decision-making requirements. Supporting data (i.e., historic data, related field or laboratory data) will be reviewed to assist in determining data quality, as appropriate. The BBL QAM will incorporate results of data validation reports and assessments of data useability into a summary report that will be submitted to the BBL Project Manager and appropriate Task Managers. This report will be filed in the project file at BBL's office and will include the following:

1. Assessment of data accuracy, precision, and completeness for both field and laboratory data;
2. Results of the performance and systems audits;
3. Significant QA/QC problems, solutions, corrections, and potential consequences; and
4. Analytical data validation report.

13.2 MGP/RCRA Investigation Reporting

The MGP/RCRA Investigation Report prepared by BBL will contain a separate QA/QC section(s) summarizing the quality of data collected and/or used as appropriate to the project DQOs which are discussed in Section 1.3 of this QAPjP. The BBL QAM will prepare the QA/QC summaries using reports and memoranda documenting the data assessment and validation.

In addition, records will be maintained to provide evidence of the QA activities. A QA records index will be initiated at the beginning of the project, and all information received from outside sources or developed during the project will be retained by BBL. Upon termination of an individual task or work assignment, working files will be forwarded to the project files.

14. Acronyms and Abbreviations

The list below presents acronyms/abbreviations and the corresponding terms which are used in this QAPjP (definitions of each term are provided when first referenced within sections of the QAPjP):

- ASP - Analytical Services Protocol;
- ASTM - American Society for Testing and Materials;
- BBL - Blasland, Bouck & Lee, Inc.;
- BTEX - Benzene, toluene, ethylbenzene, and xylenes;
- BTU - British Thermal Unit;
- CLP - Contract Laboratory Procedures;
- CRQL - Contract Required Quantitation Limit;
- CRP - Community Relations Plan;
- DMP - Data Management Plan;
- DNAPL - Dense Non-aqueous Phase Liquid;
- DO - Dissolved Oxygen;
- Doble - Doble Engineering Company;
- DQOs - Data Quality Objectives;
- Galson - Galson Laboratories;
- GC/MS - Gas Chromatography/Mass Spectrometry;
- HASP - Health and Safety Plan;
- IRMs - Interim Remedial Measures;
- LNAPL - Light Non-aqueous Phase Liquid;
- MDL - Method Detection Limit;
- MGP - Manufactured gas plant;
- mg/L - Milligrams per liter;
- mS/cm - Millisiemens per centimeter;
- MS - Matrix spike;

- MSB - Matrix spike blank;
- MSD - Matrix spike duplicate;
- NMPC - Niagara Mohawk Power Corporation;
- NGVD - National Geodetic Vertical Datum;
- NTU - Nephelometric Turbidity Units;
- NYSDEC - New York State Department of Environmental Conservation;
- ORP - Oxidation-Reduction Potential Meter;
- PAHs - Polynuclear aromatic hydrocarbons
- PARCC - Precision, Accuracy, Representativeness, Completeness, and Comparability;
- PCBs - Polychlorinated Biphenyls;
- PID - Photoionization Detector;
- PMP - Project Management Plan;
- ppb - Parts per billion;
- ppm - Parts per million;
- PVC - Polyvinyl chloride;
- QAM - Quality Assurance Manager;
- QAPjP - Quality Assurance Project Plan;
- QA/QC - Quality Assurance/Quality Control;
- RCRA - Resource Conservation Recovery Act;
- RQD - Rock Quality Designation;
- RPD - Relative percent difference;
- SDG - Sample delivery group;

SJB - SJB Services, Inc.;

- SOP - Standard operating procedures;
- SU - Standard units;
- SVOCs - Semi-volatile organic compounds;
- SWMUs - Solid waste management units;

- TAL - Target Analyte List;
- TCL - Target Compound List;
- TPH - Total Petroleum Hydrocarbons;
- TSS - Total Suspended Solids;
- TSDF - Treatment, Storage, and Disposal Facility;
- USEPA - United States Environmental Protection Agency;
- UV - Ultraviolet;
- VOC - Volatile Organic Compound; and
- VTSR - Verified time of sample receipt.

TABLE 1

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

ESTIMATED ENVIRONMENTAL SAMPLE QUANTITIES

Laboratory Parameter	Surface Soil	Subsurface Soil									LNAPL	DNAPL	Ground Water	Dry-Weather Flow		Drainage Structure Debris
		TP-101-TP-112	SB-101 - SB-106	SB-107 & SB108	SB-109 - SB-111	SB-112 - SB-115 & SB-120	SB-116 - SB-118	SB-119	Back-ground	Monitoring Well Installations				Unfiltered	Filtered	
Chemical Constituents																
PCBs	18	12	6	3	5	12	4	4	--	--	2	2	15	5	2	10
TCL VOCs	--	6	3	--	--	--	--	--	--	--	2	2	15	5	--	10
TCL SVOCs	9	6	3	--	--	--	--	--	--	--	2	2	15	5	--	10
TAL Inorganic Constituents	18	12	6	3	5	12	4	4	2	--	2	2	15	5	2	10
BTEX	--	--	--	3	5	12	4	4	--	--	--	--	--	--	--	--
PAHs	--	--	--	3	5	12	4	4	--	--	--	--	--	--	--	--
TPH	-	--	--	3	5	12	4	4	--	--	2	2	--	--	--	--
Supplemental Parameters																
Sieve Analysis	--	--	--	--	--	--	--	--	--	10	--	--	--	--	--	--
Hydrometer Analysis	--	--	--	--	--	--	--	--	--	5	--	--	--	--	--	--
Atterberg Limits	--	--	--	--	--	--	--	--	--	5	--	--	--	--	--	--
Bulk Density	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--
Moisture	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--
Specific Gravity	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--
BTU Content	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--
Viscosity	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--

TABLE 1
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

ESTIMATED ENVIRONMENTAL SAMPLE QUANTITIES

Laboratory Parameter	Surface Soil	Subsurface Soil									LNAPL	DNAPL	Ground Water	Dry-Weather Flow		Drainage Structure Debris
		TP-101-TP-112	SB-101 - SB-106	SB-107 & SB108	SB-109 - SB-111	SB-112 - SB-115 & SB-120	SB-116 - SB-118	SB-119	Back-ground	Monitoring Well Installations				Unfiltered	Filtered	
Density	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--
Interfacial Tension	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--
Sulfate/Sulfite	--	--	--	--	--	--	--	--	--	--	--	--	15	--	--	--
Nitrate/Nitrite	--	--	--	--	--	--	--	--	--	--	--	--	15	--	--	--
TSS	--	--	--	--	--	--	--	--	--	--	--	--	--	5	--	--

Notes:

1 Estimated QA/QC sample quantities are not included in this table
2 TP = Test Pit
3 SB = Soil Boring
4 MW = Monitoring well
5 LNAPL = Light non-aqueous phase liquid
6 DNAPL = Dense non-aqueous phase liquid
7 TCL = Target Compound List
8 VOC = Volatile organic compounds
9 SVOCs = Semi-volatile organic compounds
10 TAL = Target Analyte List
11 BTEX Compounds = Benzene, Toluene, Ethylbenzene, Xylenes
12 PAHs = Polynulcear Aromatic Hydrocarbons
13 TPH = Total petroleum hydrocarbons
14 BTU = British thermal units
15 TSS = Total suspended solids

Table 2

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICES CENTER

QUALITY ASSURANCE PROJECT PLAN
ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

Environmental Sample Matrix/ Laboratory Parameters	Estimated Environmental Sample Quantity	Field QC Analyses							Laboratory QC Analyses								Estimated Overall Total
		Trip Blank		Field Duplicate		Rinse Blank		Estimated Matrix Total	MS		MSD		MSB		Lab Duplicate		
		Freq	No.	Freq	No.	Freq.	No.		Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	
Soil																	
PCBs	64	--	--	1/20	4	1/20	4	72	1/20	4	1/20	4	1/20	4	--	--	84
TCL VOCs	9	--	--	1/20	1	1/20	1	11	1/20	1	1/20	1	1/20	1	--	--	14
TCL SVOCs	18	--	--	1/20	1	1/20	1	20	1/20	1	1/20	1	1/20	1	--	--	23
TAL Inorganic Constituents	66	--	--	1/20	4	1/20	4	74	1/20	4	--	--	--	--	1/20	4	82
BTEX	28	--	--	1/20	2	1/20	2	32	1/20	2	1/20	2	1/20	2	--	--	38
PAHs	28	--	--	1/20	2	1/20	2	32	1/20	2	1/20	2	1/20	2	--	--	38
TPH	28	--	--	1/20	2	1/20	2	32	1/20	2	1/20	2	1/20	2	--	--	38
LNAPL/DNAPL																	
PCBs	4	--	--	1/20	1	1/20	1	6	1/20	1	1/20	1	1/20	1	--	--	9
TCL VOCs	4	--	--	1/20	1	1/20	1	6	1/20	1	1/20	1	1/20	1	--	--	9
TCL SVOCs	4	--	--	1/20	1	1/20	1	6	1/20	1	1/20	1	1/20	1	--	--	9
TAL Inorganic Constituents	4	--	--	1/20	1	1/20	1	6	1/20	1	--	--	--	--	1/20	1	8
TPH	4	--	--	1/20	1	1/20	1	6	1/20	1	1/20	1	1/20	1	--	--	9
BTU Content	2	--	--	1/20	1	--	--	3	--	--	--	--	--	--	--	--	3
Visocity	2	--	--	--	--	--	--	2	--	--	--	--	--	--	--	--	2
Density	2	--	--	--	--	--	--	2	--	--	--	--	--	--	--	--	2
Interfacial Tension	2	--	--	--	--	--	--	2	--	--	--	--	--	--	--	--	2

TA[illegible] 2
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICES CENTER

QUALITY ASSURANCE PROJECT PLAN

ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

Environmental Sample Matrix/ Laboratory Parameters	Estimated Environmental Sample Quantity	Field QC Analyses							Laboratory QC Analyses								Estimated Overall Total
		Trip Blank		Field Duplicate		Rinse Blank		Estimated Matrix Total	MS		MSD		MSB		Lab Duplicate		
		Freq	No.	Freq	No.	Freq.	No.		Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	
Ground-Water																	
PCBs	15	--	--	1/20	1	1/20	1	17	1/20	1	1/20	1	1/20	1		--	20
TCL VOCs	15	1/day	5	1/20	1	1/20	1	22	1/20	2	1/20	2	1/20	2	--	--	28
TCL SVOCs	15	--	--	1/20	1	1/20	1	17	1/20	1	1/20	1	1/20	1	--	--	20
TAL Inorganic Constituents	15	--	--	1/20	1	1/20	1	17	1/20	1	--	--	--	--	1/20	1	19
Sulfate/Sulfide	15	--	--	1/20	1	--	--	--	--	--	--	--	--	--	1/20	1	17
Nitrate/Nitrite	15	--	--	1/20	1	--	--	--	--	--	--	--	--	--	1/20	1	17
Dry-Weather Flow																	
PCBs	7	--	--	1/20	1	--	--	8	1/20	1	1/20	1	1/20	1	--	--	11
TCL VOCs	5	1/day	1	1/20	1	--	--	7	1/20	1	1/20	1	1/20	1	--	--	10
TCL SVOCs	5	--	--	1/20	1	--	--	6	1/20	1	1/20	1	1/20	1	--	--	9
TAL Inorganic Constituents	7	--	--	1/20	1	--	--	8	1/20	1	--	--	--	--	1/20	1	10
TSS	5	--	--	1/20	1	--	--	6	--	--	--	--	--	--	1/20	1	7
Drainage Structure Debris																	
PCBs	10	--	--	1/20	1	--	--	11	1/20	1	1/20	1	1/20	1	--	--	14
TCL VOCs	10	--	--	1/20	1	--	--	11	1/20	1	1/20	1	1/20	1	--	--	14
TCL SVOCs	10	--	--	1/20	1	--	--	11	1/20	1	1/20	1	1/20	1	--	--	14
TAL Inorganics Constituents	10	--	--	1/20	1	--	--	11	1/20	1	--	--	--	--	1/20	1	13

NIAGARA MOHAWK POWER CORPORATION
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QUALITY ASSURANCE PROJECT PLAN

ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

Notes:

1. Abbreviations used in this table and the corresponding terms are listed below:

- PCBs = Polychlorinated biphenyls;
- TCL = Target Compount List;
- VOCs = Volatile organic compounds;
- SVOCs = Semi-volatile organic compounds;
- TAL = Target Analyte List;
- BTEX = Benzene, toluene, ethylbenzene, and xylenes;
- PAHs = Polynuclear aromatic hydrocarbons;
- TPH = Total petroleum hydrocarbons;
- LNAPL = Light non-aqueous phase liquids;
- DNAPL = Dense non-aqueous phase liquids;
- BTU = British Thermal Unit;
- TSS = Total suspended solids;
- MS = Matrix spike;
- MSD = Matrix spike duplicate; and
- MSB = Matrix spike blank.

2. Table 2 does not include additional QA/QC subsurface samples that may be collected from test pits or soil borings. Additional samples may require additional QC analyses based on additional sample quantity compared to QC sample frequencies shown on the table.

3. 1/day = One trip blank per day of volatile organic sampling media. One rinse blank per day of sampling with sampling device which requires field cleaning. Dedicated sampling equipment will be used to collect soil, ground-water, dry-weather flow, and drainage structure debris samples.

4. One sample of tap water and one sample of distilled water used to clean equipment in the field will be collected for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents.

5. Table assumes that samples will be processed in groups of 20 samples for QC analyses. If smaller groups are processed, then one MS/MSD (or MS/lab duplicate) per sample delivery group (up to 20 samples) will be prepared for each sample delivery group.

6. NYSDEC 1991 ASP guidelines will be used for the laboratory analysis of the following constituents:

- **PCBs:** USEPA SW-846 Method 8081;
- **TCL VOCs:** USEPA SW-846 Method 8260;
- **TCL SVOCs:** USEPA SW-846 Method 8270;
- **TAL Inorganic Constituents:** USEPA SW-846 Method 6010 with the following exceptions: Mercury will be analyzed using Method 7470/7471 and cyanide will be analyzed using Method 9010;
- **BTEX:** USEPA SW-846 Method 8260;
- **PAHs:** USEPA SW-846 Method 8270;
- **TPH:** USEPA SW-846 Method 8015;
- **Sulfate/Sulfide:** Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, March 1983 Revision - Method 375.4/376.1;
- **Nitrate/Nitrite:** Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, March 1983 Revision - Method 352.1/354.1; and

ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

- **TSS:** Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, March 1983 Revision - Method 160.2.

7. ASTM methods (from the "Annual Book of ASTM Standards, Volume 04.08, Soil and Rock, Building Stones, Geotextiles", dated 1995) will be used for analysis of the following:

- **Particle Size Distribution (Sieve/Hydrometer):** ASTM Method D422-63;
- **Atterberg Limits:** ASTM Method D4318-84;
- **Bulk Density:** Corps of Engineers Method EM-1110-2-1906;
- **Moisture:** ASTM Method D2216;
- **Specific Gravity:** ASTM Method D854;
- **BTU Content:** ASTM Method D2015;
- **Viscosity:** ASTM Method D445;
- **Density:** ASTM Method D4052; and
- **Interfacial Tension:** ASTM Method D971.

8. Laboratory analyses will be performed by the following laboratories:

- **Galson Laboratories** will perform the analyses for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, BTEX compounds, PAHs, TPH, nitrate/nitrite, sulfate/sulfide, TSS, and BTU content;
- **Saybolt-Heinrici, Inc.** will perform analyses for viscosity, density, and interfacial tension; and
- **SJB Services, Inc.** will perform analyses for particle size distribution, Atterberg limits, bulk density, moisture content, and specific gravity.

TABLE 3

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, Debris, and LNAPL/DNAPL Samples Chemical Constituents			
Constituent	**Quantitation Limits[A] (ppb)**		
	Water	**Low Soil/Debris**	**Medium Soil/Debris and NAPL**
TCL VOCs (USEPA SW-846 Method 8260)			
Chloromethane	10	10	1,200
Bromomethane	10	10	1,200
Vinyl Chloride	10	10	1,200
Chloroethane	10	10	1,200
Methylene Chloride	5	5	1,200
Acetone	10	10	1,200
Carbon Disulfide	5	5	1,200
1,1-Dichloroethene	5	5	1,200
1,1-Dichloroethane	5	5	1,200
1,2-Dichloroethene (total)	5	5	1,200
Chloroform	5	5	1,200
1,2-Dichloroethane	5	5	1,200
2-Butanone	10	10	1,200
1,1,1-Trichloroethane	5	5	1,200
Carbon Tetrachloride	5	5	1,200
Bromodichloromethane	5	5	1,200
1,2-Dichloropropane	5	5	1,200
cis-1,3-Dichloropropane	5	5	1,200
Trichloroethene	5	5	1,200
Dibromochloromethane	5	5	1,200
1,1,2-Trichloroethene	5	5	1,200
Benzene	5	5	1,200
trans-1,3-Dichloropropane	5	5	1,200
Bromoform	5	5	1,200
4-Methyl-2-pentanone	10	10	1,200
2-Hexanone	10	10	1,200
Tetrachloroethene	5	5	1,200

TABLE 3
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, Debris, and LNAPL/DNAPL Samples Chemical Constituents			
Constituent	Quantitation Limits[A] (ppb)		
	Water	Low Soil/Debris	Medium Soil/Debris and NAPL
Toluene	5	5	1,200
1,1,2,2-Tetrachloroethane	5	5	1,200
Chlorobenzene	5	5	1,200
Ethylbenzene	5	5	1,200
Styrene	5	5	1,200
Total Xylenes	5	5	1,200
TCL SVOCs (USEPA SW-846 Method 8270)			
Phenol	10	330	10,000
bis(2-chloroethyl) ether	10	330	10,000
2-Chlorophenol	10	330	10,000
1,3-Dichlorobenzene	10	330	10,000
1,4-Dichlorobenzene	10	330	10,000
1,2-Dichlorobenzene	10	330	10,000
2-Methylphenol	10	330	10,000
2,2'-oxybis (1-chloropropane)	10	330	10,000
4-Methylphenol	10	330	10,000
N-Nitroso-di-n-propylamine	10	330	10,000
Hexachloroethane	10	330	10,000
Nitrobenzene	10	330	10,000
Isophorone	10	330	10,000
2-Nitrophenol	10	330	10,000
2,4-Dimethylphenol	10	330	10,000
bis(2-chloroethoxy)methane	10	330	10,000
2,4-Dichlorophenol	10	330	10,000
1,2,4-Trichlorobenzene	10	330	10,000
Naphthalene	10	330	10,000
4-Chloroaniline	10	330	10,000
Hexachlorobutadiene	10	330	10,000

TABLE 3
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, Debris, and LNAPL/DNAPL Samples Chemical Constituents			
Constituent	Quantitation Limits[A] (ppb)		
	Water	Low Soil/Debris	Medium Soil/Debris and NAPL
4-Chloro-3-methylphenol	10	330	10,000
2-Methylnapthalene	10	330	10,000
Hexachlorocyclopentadiene	10	330	10,000
2,4,6-Trichlorophenol	10	330	10,000
2,4,5-Trichlorophenol	25	800	25,000
2-Chloronaphthalene	10	330	10,000
2-Nitroaniline	25	800	25,000
Dimethylphthalate	10	330	10,000
Acenaphthylene	10	330	10,000
2,6-Dinitrotoluene	10	330	10,000
3-Nitroaniline	25	800	25,000
Acenaphthene	10	330	10,000
2,4-Dinitrophenol	25	800	25,000
4-Nitrophenol	25	800	25,000
Dibenzofuran	10	330	10,000
2,4-Dinitrotoluene	10	330	10,000
Diethylphthalate	10	330	10,000
4-Chlorophenyl phenyl ether	10	330	10,000
Fluorene	10	330	10,000
4-Nitroaniline	25	800	25,000
4,6-Dinitro-2-methylphenol	25	800	25,000
N-nitrosodiphenylamine	10	330	10,000
4-Bromophenyl phenyl ether	10	330	10,000
Hexachlorobenzene	10	330	10,000
Pentachlorophenol	25	800	25,000
Phenanthrene	10	330	10,000
Anthracene	10	330	10,000
Carbazole	10	330	10,000

TABLE 3
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
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QUALITY ASSURANCE PROJECT PLAN

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, Debris, and LNAPL/DNAPL Samples Chemical Constituents			
Constituent	Quantitation Limits[A] (ppb)		
	Water	Low Soil/Debris	Medium Soil/Debris and NAPL
Di-n-butyl phthalate	10	330	10,000
Fluoranthene	10	330	10,000
Pyrene	10	330	10,000
Butyl benzyl phthalate	10	330	10,000
3,3'-Dichlorobenzidine	10	330	10,000
Benz(a)anthracene	10	330	10,000
Chrysene	10	330	10,000
bis(2-Ethylhexyl)phthalate	10	330	10,000
Di-n-octyl phthalate	10	330	10,000
Benzo(b)fluoranthene	10	330	10,000
Benzo(k)fluoranthene	10	330	10,000
Benzo(a)pyrene	10	330	10,000
Indeno(1,2,3-cd)pyrene	10	330	10,000
Dibenzo(a,h)anthracene	10	330	10,000
Benzo(g,h,i)perylene	10	330	10,000
BTEX (USEPA SW-846 Method 8260)			
Benzene	5	5	1,200
Toluene	5	5	1,200
Ethylbenzene	5	5	1,200
Xylenes	5	5	1,200
Polynuclear Aromatic Hydrocarbons (USEPA SW-846 Method 8270)			
Naphthalene	–	330	10,000
Acenaphthylene	–	330	10,000
Acenaphthene	–	330	10,000
Fluorene	–	330	10,000
Phenanthene	–	330	10,000
Anthracene	–	330	10,000
Fluoranthene	–	330	10,000

TABLE 3
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, Debris, and LNAPL/DNAPL Samples Chemical Constituents			
Constituent	**Quantitation Limits[A] (ppb)**		
	Water	**Low Soil/Debris**	**Medium Soil/Debris and NAPL**
Pyrene	–	330	10,000
Benzo(a)anthracene	–	330	10,000
Chrysene	–	330	10,000
Benzo(b)fluroanthene	–	330	10,000
Benzo(k)fluoranthene	–	330	10,000
Benzo(a)pyrene	–	330	10,000
Indeno(1,2,3-cd)prene	–	330	10,000
Dibenzo(a,h)anthracene	–	330	10,000
Benzo)g,h,i)perylene	–	330	10,000
Total Petroleum Hydrocarbons (USEPA SW-846 Method 8015)			
Total Petroleum Hydrocarbons [Gas chromatography/flame ionization detection (GC/FID)]	–	–	25 mg/kg

TABLE 3
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, Debris, and NAPL Samples Chemical Constituents		
Constituent (USEPA SW-846 6010/7000 Series)[a]	Quantitation Limit[b]	
	Water (ppb)	Soil/Debris and NAPL (ppm)
Aluminum	200	40
Antimony	60	6
Arsenic	10	1
Barium	200	20
Beryllium	5	0.5
Cadmium	5	0.5
Calcium	5,000	1,000
Chromium	10	1
Cobalt	50	5
Copper	25	2.5
Iron	100	20
Lead	5	0.5
Magnesium	5,000	1,000
Manganese	15	3
Mercury	0.2	0.02
Nickel	40	4
Potassium	5,000	1,000
Selenium	5	0.5
Silver	10	1
Sodium	5,000	1,000
Thallium	10	1
Vanadium	50	5
Zinc	20	2
Cyanide	40	4

TABLE 3
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, Debris and NAPL Chemical Constituents		
Constituent	Reporting Limit[C] (ppb)	
	Water	Soil/Debris and NAPL
Aroclor 1016	0.5	33
Aroclor 1221	0.5	67
Aroclor 1232	0.5	33
Aroclor 1242	0.5	33
Aroclor 1248	0.5	33
Aroclor 1254	0.5	33
Aroclor 1260	0.5	33
Total PCBs[4]	0.5	67

Supplemental Parameters	Method	Reporting Limit[D]
Sulfate	USEPA Method 375.4	1.0 ppb
Sulfide	USEPA Method 376.1	2.0 ppb
Nitrate	USEPA Method 352.1	0.1 ppb
Nitrite	USEPA Method 354.1	0.005 ppb
Total Suspended Solids	USEPA Method 160.2	1 ppm

Notes:

1. [A] = Reporting limits presented for VOCs and BTEX are based on USEPA SW-846 Method 8260 and reporting limits presented for SVOCs and polynuclear aromatic hydrocarbons (PAHs) are based on USEPA SW-846 Method 8270 contract required quantitation limits (CRQLs). Quantitation limits for soil and debris are based on wet weight. The quantitation limits calculated by the laboratory for soil and debris on a dry weight basis will be higher. Specific quantitation limits are highly matrix dependent. The quantitation limits shown are provided for guidance and may not always be achievable.

2. [B] = USEPA SW-846 6010/7000 Series Methods will be used for analysis for TAL inorganic constituents with the following exceptions: mercury will be analyzed using Method 7470/7471 and cyanide will be analyzed using Method 9010. Reporting limits presented are based on RCRA TCL CRQLs. CRQLs shown for inorganics are provided for guidance and may not always be achievable.

3. [C] = Reporting limits presented for PCBs are based on NYSDEC 1991 ASP CRQLs and are for guidance purposes. The quantitation limits calculated by the laboratory for soil and debris, calculated on dry weight basis, will be higher. Quantitation limits shown for total PCBs are equal to those for each individual Aroclor listed. The quantitation limits shown for PCBs are provided for guidance and may not always be achievable.

4. [D] = Reporting limits shown are from "Methods for Chemical Analyses of Water and Wastes," EPA-600/4/79-020, March 1983 Revision. The quantitation limits shown are provided for guidance and may not always be achievable.

5. PCBs = polychlorinated biphenyls.

6. TCL = Target Compound List.

7. VOCs = Volatile Organic Compounds.

8. SVOCs = Semi-Volatile Organic Compounds.

9. TAL = Target Analyte List.

10. BTEX = Benzene, toluene, ethylbenzene, and xylenes.

11. NAPL = Non-aqueous phase liquid.

12. ppb = parts per billion.

13. ppm = parts per million.

14. -- = not applicable/analysis will not be performed.

15. Columns in the table above labeled low soil/debris present quantitation limits applicable for soil/debris samples with low levels of constituents. Columns in the table above labeled medium soil/debris present quantitation limits applicable for soil/debris samples with medium levels of constituents.

TABLE 4

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

SOIL, DEBRIS, AND LNAPL/DNAPL ANALYSES QUALITY CONTROL LIMITS

Constituent	Accuracy, % Recovery	Precision, RPD
PCBs[A,B]		
Aroclor 1242	39-159	–
Arclor 1254	29-131	–
Volatile Organic Compounds[B,C]		
1,1-Dichloroethane	59-172	22
Trichloroethane	62-137	24
Benzene	66-142	21
Toluene	59-139	21
Chlorobenzene	60-133	21
Semi-Volatile Organic Compounds[B,C]		
2-Chlorophenol	25-102	50
1,4-Dichlorobenzene	28-104	27
N-nitroso-di-n-propylamine	41-126	38
1,2,4-Trichlorobenzene	38-107	23
4-chloro-3-methylphenol	26-103	33
Acenapthene	31-137	19
4-nitrophenol	11-114	50
2,4-dinitrotoluene	28-89	47
Pentachlorophenol	17-109	47
Pyrene	35-142	36
Phenol	26-90	35
Inorganics[D]		
All TAL Inorganics	75-125	20

Notes:

1. [A] = QC limits for Aroclors 1242 and 1250 are from SW-846 Method 8081, as referenced in the NYSDEC 1991 ASP.
2. [B] = QC limits shown on table are advisory; however, failure to meet the QC limits warrants investigation of the laboratory.
3. [C] = Available QC limits presented for VOCs are as presented in the NYSDEC 1991 ASP.
4. [D] = QC limits presented for inorganic constituents are as presented in the NYSDEC 1991 ASP.
5. QC limits for moisture, specific gravity, BTU content, viscosity, density, and interfacial tension consist of a 25% relative percent difference in duplicate samples.
6. QC limits to be used for the BTEX will be taken from the listing of QC limits for volatile organic compounds presented above.
7. QC limits to be used for PAHs will be taken from the listing of QC limits for semi-volatile organic compounds presented above.
8. RPD = Relative percent difference.

TABLE 5

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

WATER ANALYSES QUALITY CONTROL LIMITS

Constituent	Accuracy, % Recovery	Precision, RPD
PCBs[A,B]		
Aroclor 1242	39-150	–
Aroclor 1254	39-150	–
Volatile Organics[B,C]		
1,1-Dichloroethane	61-145	14
Trichloroethane	71-120	14
Benzene	76-127	11
Toluene	76-125	13
Chlorobenzene	75-130	13
Semi-Volatile Organic Compounds[B,C]		
2-Chlorophenol	27-123	40
1,4-Dichlorobenzene	36-97	28
N-nitroso-di-n-propylamine	41-116	38
1,2,4-Trichlorobenzene	39-98	28
4-chloro-3-methylphenol	23-97	42
Acenapthene	46-118	31
4-nitrophenol	10-80	50
2,4-dinitrotoluene	24-96	38
Pentachlorophenol	9-103	50
Pyrene	26-127	31
Phenol	12-110	42
Inorganics[D]		
All TAL Inorganics	75-125	20

Notes:

1. [A] = QC limits for Aroclors 1242 and 1250 are from SW-846 Method 8081, as referenced in the NYSDEC 1991 ASP.
2. [B] = QC limits shown on table are advisory; however, failure to meet the QC limits warrants investigation of the laboratory.
3. [C] = Available QC limits presented for VOCs are as presented in the NYSDEC 1991 ASP.
4. [D] = QC limits presented for inorganic constituents are as presented in the NYSDEC 1991 ASP.
5. QC limits for total suspended solids, sulfate/sulfide, and nitrate/nitrite consist of a 25% relative percent difference in duplicate samples.
6. RPD = relative percent difference.

TABLE 6

NIAGARA MOHAWK POWER CORPORATION
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QUALITY ASSURANCE PROJECT PLAN

SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter	Sample Container	Preservation	Maximum Holding Time from Time of Sampling
Soil, Debris, and NAPL Samples			
PCBs	(1) 250 mL widemouth amber glass, cap lined with Teflon	Cool 4°C	Extract within 7 days. Analyze within 40 days following the start of extraction.
TCL VOCs	(1) 250 mL widemouth glass container, cap lined with Teflon	Cool 4°C, minimize headspace	7 days
TCL SVOCs	(1) 250 mL widemouth amber glass container, cap lined with Teflon	Cool 4°C	Extract within 7 days. Analyze within 40 days following the start of extraction.
TAL Inorganic Constituents	(1) 250 mL widemouth glass container, cap lined with Teflon	Cool 4°C	180 days (28 days for mercury, 14 days for cyanide)
BTEXs	(1) 250 mL widemouth glass container, cap lined with Teflon	Cool 4°C	7 days
PAHs	(1) 250 mL widemouth amber glass container, cap lined with Teflon	Cool 4°C	Extract within 7 days. Analyze within 40 days following the start of extraction.
Particle Size Distribution	(1 to 3) 250 mL widemouth glass or plastic container	NA	NA
Atterberg Limits	(1 to 3) 250 mL widemouth glass or plastic container	NA	NA
Bulk Density	(1 to 2) 250 mL widemouth glass or plastic container	NA	NA
Moisture	(1) 250 mL widemouth glass or plastic container	NA	NA
Specific Gravity	(1) 250 mL widemouth glass or plastic container	NA	NA
BTU Content	(1) 250 mL glass or plastic container	NA	NA
Viscosity	(1 to 2) 250 mL glass or plastic container	NA	NA
Density	(1 to 2) 250 mL glass or plastic container	NA	NA
Interfacial Tension	(1 to 2) 250 mL glass or plastic container	NA	NA
Water Samples			
PCBs	(1) 1 liter amber glass container, cap lined with Teflon	Cool 4°C	Extract within 7 days. Analyze within 40 days following the start of extraction.
TCL VOCs	(2) 40 mL glass vials, caps lined with Teflon	No headspace, Cool 4°C	7 days
TCL SVOCs	(2) 1 liter amber glass containers, caps lined with Teflon	Cool 4°C	Extract within 7 days. Analyze within 40 days following the start of extraction.
TAL Inorganic Constituents (excluding cyanide)	(1) 500 mL plastic container, cap lined with Teflon	HNO_3, Cool 4°C	180 days (28 days for mercury)

TABLE 6
(Cont'd)
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter	Sample Container	Preservation	Maximum Holding Time from Time of Sampling
Cyanide	(1) 500 mL plastic container, cap lined with Teflon	NaOH	14 days
Sulfate/Sulfide	(1) 250 mL glass container, cap lined with Teflon	Cool 4°C	28 days for sulfate,7 days for sulfide
Nitrate/Nitrite	(1) 250 mL glass container, cap lined with Teflon	H_2SO_4, Cool 4°C	28 days
Total Suspended Solids	(1) 250 mL plastic or glass container, caps lined with Teflon	Cool 4°C	7 days

Notes:

1. PCBs = Polychlorinated biphenyls.
2. TCL = Target Compound List.
3. VOCs = Volatile organic compounds.
4. SVOCs = Semi-volatile organic compounds.
5. TAL = Target Analyte List.
6. BTEXs = Benzene, toluene, ethylbenzene, and xylenes.
7. PAHs = Polynuclear aromatic hydrocarbons.
8. TPH = Total petroleum hydrocarbons.
9. NAPL = Non-aqueous phase liquids.
10. BTU = British Thermal Unit.

[illegible] TSS = Total suspended solids.

Dry-weather flow samples to be analyzed for TAL inorganic constituents will be field filtered prior to the addition of preservatives. Dry-weather flow samples for TAL inorganics analysis will be filtered in the laboratory. All other water samples will not be filtered.

13. Sampler must ensure that samples are delivered to the laboratory within 24 to 48 hours after collection.
14. NA = Not applicable.

TABLE 7

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

FIELD CALIBRATION FREQUENCY

Equipment	Calibration Check	Calibration Standard	Calibration Standard Holding Time
pH Meter	Prior to use - daily[1]	pH 4.0 pH 7.0 pH 10.0	One Month
Conductivity Meter	Prior to use - daily	1,000 mg/l Sodium Chloride	One Month
Flow Meter	Prior to use - daily	N/A	N/A
Water Level Meter	Prior to implementing field work	100-foot engineer's tape	N/A
Dissolved Oxygen Meter	Per sampling event	Air	N/A
Turbidity	Prior to use - daily	Formazin 0.5 NTU, 5.0 NTU, 40.0 NTU	N/A
Oxidation-Reduction Potential Meter	Prior to use - daily	Zobell	N/A

Notes:

1 The pH meter will also be calibrated at each well prior to ground-water sampling.
N/A = not applicable.
3 NTU = nephelometric turbidity units.
4 mg/l = milligrams per liter.

TABLE 8

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

FIELD MEASUREMENTS QUALITY CONTROL

Field Parameter	Matrix	Precision[1]	Accuracy
Water Temperature	Ground Water	± 1°C	± 1°C instrument capability
pH	Ground Water	± 0.1 S.U.	± 0.1 S.U. (instrument capability)
Conductivity	Ground Water	± 0.010 mS/cm	± 5% standard
Dissolved Oxygen	Ground Water	± 0.02 mg/l	± 5%
Turbidity	Ground Water	± 1.0 NTU	± 2% standard
Water Velocity	Dry-Weather Flow	N/A	± 2% standard
Water Level	Ground Water	± 0.1 foot	± 0.01 foot
Oxidation-Reduction-Potential	Ground Water	N/A	± 2% of reading plus 1 count

Notes:

1 Precision units presented in applicable significant figures.
N/A = not applicable.
3 S.U. = standard units.
4 mS/cm = millisiemens per centimeter.
5 mg/l = milligrams per liter.

3/28/96
1196999H

TABLE 9

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

DATA VALIDATION CHECKLIST - LABORATORY ANALYTICAL DATA

REVIEW FOR COMPLETENESS	
1.	All chain-of-custody forms included.
2.	Case narratives including sample preparation and analysis summary forms*
3.	QA/QC summaries of analytical data including supporting documentation.
4.	All relevant calibration data including supporting documentation.
5.	Instrument and method performance data.
6.	Documentation showing laboratory's ability to attain specified method detection limits.
7.	Data report forms of examples for calculations of concentrations.
8.	Raw data used in identification and quantification of the analysis required.
REVIEW OF COMPLIANCE	
1.	Data package completed as described above.
2.	QAPP requirements for data production and reporting have been met.
3.	QA/QC criteria have been met.
4.	Instrument type and calibration procedures have been met.
5.	Initial and continuing calibration have been met.
6.	Data reporting forms are completed.
7.	Problems and corrective actions documented.

Note:

* These forms appear as an Addendum to the NYSDEC ASP forms package and will be required for all data submissions regardless of the protocol requested.

TABLE 10

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER

QUALITY ASSURANCE PROJECT PLAN

PREVENTIVE MAINTENANCE SUMMARY

Maintenance	Frequency
Turbidity Meter	
-Store in protective casing	D
-Inspect equipment after use	D
-Clean sample cells	D
-Clean lens	M or X
-Check and recharge batteries	D
-Keep log book on instrument	D
-Have replacement meter available	D
-Return to manufacturer for service	X
-Calibration	D
Conductivity, pH ORP, Dissolved Oxygen Meters	
-Store in protective casing	D
-Inspect equipment after use	D
-Clean probe	D
-Keep log book in instrument	D
-Have replacement meter available	D
-Replace probes	X
-Return to manufacturer for service	X
-Calibration	D
Velocity Meter	
-Store in protective casing	D
-Inspect equipment after use	D
-Check and recharge batteries	D
-Keep log book on instrument	D
-Have replacement meter available	D
-Return to manufacturer	X
-Calibration	D
Thermometer	
-Store in protective casing	D
-Inspect equipment after use	D
-Have a replacement thermometer available	D
Water Level Meter	
-Store in protective covering	D
-Inspected equipment after use	D
-Check indicators/batteries	D
-Keep log book on instrument	D
-Have a replacement meter available	X
Photoionization Detector	
-Store in protective casing	D
-Inspect equipment after use	D
-Check and recharge batteries	D
-Clean UV lamp and ion chamber	M or X
-Keep log book on instrument	D
-Have replacement meter available	D
-Return to manufacturer for service	X
-Calibration	D

Notes:
D = Daily
M = Monthly
X = Operator's discretion.

FIGURE 1

Laboratory Data Flow

Contractor contact
|
Sample container prep and shipment by Sample Management
|
Sample collection
|
Sample receipt and inspection by Sample Custodian ——> Problem resolution with contractor
|
Sample log-in
|
Sample preparation by Extractions Group
|
Sample analysis by Lab Analysts
|
Raw data analysis by Lab Analysts
|
data approved? no ——> Review raw data, reanalyze where indicated
yes
|
Data review by Group Manager
|
data approved? no ——> (Review raw data, reanalyze where indicated ^ | v Review data, take corrective action where indicated)
yes
|
Report Production
|
Report review by Group Manager
|
data approved? no ——> Review data, take corrective action where indicated
yes
|
Report compilation by Document Control
|
Report review by Quality Assurance
|
data approved? no ——> Review report, take corrective action where indicated
yes
|
Report issued

Attachment A - Manhole Inspection Form

BLASLAND & BOUCK ENGINEERS, P.C.

MANHOLE INSPECTION REPORT

Client: ____________

Job Number: ____________

Municipality: ____________
Street: ____________

Date: ____________
Weather: ____________
Temp.: ____ Time: ____________

Manhole I.D.: ____________

Mini-Area: ____________
Inpsector: ______ Other: ______
Recorder: ____________

Manhole Not Inpsected ☐ Buried ☐ Not Located ☐ Safety ☐ Surcharged ☐ Surface Inspection Only ☐ Physical Inpsection Only

1. Manhole Cover:

☐ In Pavement ☐ ℄ ☐ Edge

☐ In Grassed Area

☐ In Sidewalk

☐ In R.O.W.

☐ ____________

Distance Above Grade ____ Below Grade ____
Pick Holes Water Tight ☐ Yes ☐ No
Number of Vent Holes Open ____ Total ____
Diameter of Vent Holes ____
Bearing Surfaces "m ____ nm ____

Manhole:

Construction: ☐ Precast ☐ Block

☐ Brick ☐ ____

Size: ☐ 4' Diameter (approx.)

____

Benchwalls: ☐ Yes ☐ No

Channel: ☐ Yes ☐ No

Signs of Surcharge: ☐ Yes ☐ No
Height: ____

Roots: ☐ Yes ☐ No

Spout (S) or Trickle (T)	Exact Location of Leakage	GPM

4. Sanitary Pipe Inspections:

O'Clock Position	12:00			
Pipe Size				
Rim to Invert				
Tape Distance	to manhole			
Pipe Material				
Velocity S-A-F**				
Clarity C-A-M***				
Flow Depth				
Sediment in Pipes:				
None	☐	☐	☐	☐
Firm Silt	☐	☐	☐	☐
Paper	☐	☐	☐	☐
Rocks, Gravel, Sand	☐	☐	☐	☐
Other	☐	☐	☐	☐
Depth				
Mirroring Results:				
Not Mirrored Explain	☐	☐	☐	☐
Leakage Estimated GPM	☐	☐	☐	☐
Estimated Distance:				
To Leakage				
To Blockage				
To Roots				
% of Dia. Blocked				
To Settlement (Dip)				
To Curve				
Inpsected				

3. Sketch: Label upstream/downstream MH of all pipes

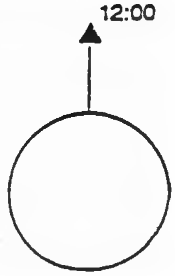


Photo ID Number

5. Other Pipes (Laterals, Non-Sanitary):

O'Clock Position ____________
Pipe Size ____________
Rim to Invert ____________
Source ____________

Unknown ☐ ☐ ☐ ☐

10.3.89

6. Miscellaneous Information:

7. Velocity or Weir Results:

O'Clock Position	Flow Measurement Time	Number of Upstream MH Plugged	Velocity or Weir Reading	Flow Depth Before	Flow Depth After	Clarity C-A-M	Samples Taken Yes/No

8. Detailed Sketch:

*m - machined nm - not machined
**S - slow velocity A - average velocity F - fast velocity P - ponded water
***C - clear A - average M - murky

Attachment B - Instrument Calibration Procedures for PCB Analysis

The following modifications of NYSDEC ASP Category B quality control specifications will be made in cases where pesticide data are not required. These modifications are necessary to minimize costs, as well as enhance Aroclor recovery and quantitation information.

Analytical GC Sequence:

AR1016 through AR1260	0.1 ug/ml
AR1248	0.05 ug/ml
AR1248	0.5 ug/ml
AR1248	1.0 ug/ml
Samples	
Instrument Blank	<12 hrs from second AR1248
AR1248	D% <= 25% from 2nd AR1248
Samples	
Instrument Blank	<12 hours
AR1248	
Etc.	End with Instr BlK & AR1248

The initial Aroclors standards analyzed at the beginning of the sequence will be used for sample quantitation. A standard of the identified Aroclor will be analyzed within 72 hours of any samples requiring quantitation. In the above scenario, the continuing standard is AR1248. If historical knowledge of the samples indicates probable contamination of another Aroclor, this suspected Aroclor may be substituted for AR1248. Retention time windows of Aroclor peaks are 0.07 minutes. Dual column analysis will be performed. Resolution checks and PEM standards will not be analyzed; breakdown calculations will not be performed. An Aroclor matrix spiking solution will be prepared; pesticides will not be spiked.

SUBJECT: AROCLOR ANALYTICAL METHOD SW846 8080

SOP ID:	REV NO/DATE:	AUTHOR: Pat Steele LM
EG-8080A.R00	0 9/93	SECTION SUPERVISOR: Linda Waters LM
		QC/QA OFFICER:
COPYRIGHT		LABORATORY DIRECTOR:

1.0 PURPOSE

The analysis, quantitation, and confirmation of multicomponent Aroclors using electron capture detectors (ECD) and megabore chromatography columns is described.

2.0 RESPONSIBILITIES

2.1 All pesticide residue analyst performing this method are required to read and understand the method as written in the SW846 Method 8080 and general requirements in the 8000 section before attempting analysis of samples.

2.2 The section supervisor is required to read and understand the method as written but is also responsible for the training and continued education of pesticide residue technicians performing this method.

2.3 The section supervisor and QC personnel are required to review reports and packages ensuring all data is valid prior to client receipt.

3.0 DEFINITIONS

3.1 GC/ECD: Gas Chromatography/Electron capture detector.

3.2 Megabore: Analytical column with an internal diameter greater than or equal to 0.53 mm.

3.3 Method SW846 8000/8080: Analytical method for the analysis pesticides and Aroclors.

3.4 LAS: Laboratory Automation Systems (Hewlett Packard computer system).

3.5 LIMS: Laboratory Information Management Systems (ACS).

4.0 METHOD SUMMARY

4.1 This procedure describes the analytical method for the detection, confirmation, and quantitation of Aroclors in water or soil matrices. Cleanup on the extracted sample is helpful. The analysis is performed using a GC/ECD techniques. Initial calibration of the analytical system is required before sample analysis. Analytical data is collected on the LAS system and the data can be transferred to the LIMS for quantitation and report production.

5.0 SAFETY

5.1 Aroclors are considered hazardous, always wear gloves when handling stocks and solutions.

5.2 Safety glasses with side shields and lab coats are required whenever you are in the laboratory.

5.3 Solvents and solutions should be handled in the fume hood.

5.4 The ECDs have an outlet hose from the detector that must be vented to the outside.

5.5 The ECD contains a radioactive source which must be tested for leaks every six months of use. Perform wipe tests as required and perform the necessary documentation (see SOP ID: EG-WIPET).

5.6 Removal of the ECD is performed by service personnel under maintenance contract. To have the ECD reconditioned call HP (see SOP ID: EG-EXECD).

6.0 MATERIALS AND APPARATUS

6.1 Instrument HP5890 or 5880 with ECDs using helium as a carrier gas and nitrogen as a makeup gas.

6.2 Analytical Chromatography columns: J&W DB608, DB1701, or DB5 0.53mm id x 30 M length.

6.3 Set column flow between 3 to 7 mls/minute. The makeup flow will vary with instrument but 60 to 70 mls/minute seems to work most of the time. The linearity of the Aroclor curve is affected by the makeup gas flow.

7.0 CHEMICALS AND REAGENTS

7.1 Aroclor stock standards: 3/90 CLP SOW or SW846 SOW mixtures from Accustandard, Restek, or Supelco. Obtain stock solutions of at least 200 ug/ml in methanol or isoctane.

7.2 Pesticide Grade Solvents: Hexane, Acetone, and Methanol.

8.0 PROCEDURE

8.1 Before any samples are analyzed, a 5 point calibration curve for each Aroclor must be analyzed.

8.1.1 Prepare an intermediate stock standard for each Aroclor at 10 ug/ml including the two surrogate compounds Tetrachloro-m-xylene and Decachlorobiphenyl (TCMX and DCB) at 2 ug/ml. Dilute the intermediate as indicated below to obtain the 5 point curve concentrations in hexane.

Aroclors/Surrogates	Volume of 10 ug/ml	Final Volume
0.05/.01 ug/ml	50 ul	10 ml
0.1/.02 ug/ml	250 ul	25 ml
0.2/.04 ug/ml	200 ul	10 ml
0.5/0.1 ug/ml	500 ul	10 ml
1.0/0.2 ug/ml	1000 ul	10 ml

8.1.2 Analyze the five levels for the following Aroclors:

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260

8.2 The RSD for each analyte must be less than or equal to 20%. In addition to the curve, analyze a QC check standard for each analyte. Prepare the check standard at 0.4 ug/ml using a stock standard acquired from a different vendor then the calibration curve stock standard.

8.3 Initial and Continuing Standards

8.3.1 The calibration must be checked daily by analyzing all the Aroclors at 0.1 ug/ml except AR1221 which should be run at 0.2 ug/ml.

8.3.2 Analytes must be within 15 % difference from the average response factors in the calibration.

8.3.3 The daily standard response factors are used to quantitate samples analyzed on the same working day. Up to 20 % difference is acceptable if quantitation is not performed and a QC check standard is analyzed. The QC check standard is acceptable if the value calculated using the daily standard is 15 % of the true value.

8.3.4 Analyze an Aroclor continuing calibration standard (AR1248 or AR1260) between every 10 samples. The response factor for each analyte in the continuing standard must be less than or equal to 15 % difference from the daily standard response factor for that analyte. If another Aroclor is present in the samples use that Aroclor as a continuing standard.

NOTE: If the instrument has been idle for at least 24 hours, prime or deactivate the GC column by injecting a pesticide standard mixture approximately 20 times more concentrated than the mid-level standard. Always inject this prior to beginning initial or daily calibration.

8.3.5 Establish retention time windows by injecting standards throughout a 72 hour period. For Aroclors, select the largest peak from each pattern. Calculate the window value by taking 3 times the standard deviation of the selected peak retention times injected over a 72 hour period. The windows are established using the initial standard retention time plus and minus calculated value above. Although the surrogates are individual peaks and should elute within the established windows the Aroclor identification should be based on pattern recognition not solely on retention time windows.

8.3.6 If the identification of the Aroclor is ambiguous, reanalyze the sample on a different analytical column than the primary analysis. Confirm the identification of the Aroclor by analyzing standards resembling the Aroclor pattern. Once the identification is established quantitate each Aroclor from the calibrated primary analysis.

8.4 Sample Analysis

8.4.1 Analyze the QC samples first (method blank, blank spike, etc.).

8.4.2 Analyze samples keeping in mind that if target analytes are present their calculated concentrations must be within the concentration range of the curve (initial calibration). If any analytes are outside the concentration range dilute the sample as required to put the analytes in the linear range. Quantitate analytes from both analyses if necessary. If analyte identification is questionable, second column confirmation must be performed. Confirm only those peaks that are questionable.

8.4.3 Once all samples are analyzed, quantitate each analyte and calculate surrogate recoveries. Report sample results and surrogate recoveries in a Galson standard report format. Nonprotocol standard reports are generated using "dpak" in the LIMS.

9.0 CALCULATIONS:

9.1 $$\%RSD = \frac{\text{Standard Deviation}}{\text{Mean CF}} \times 100$$

standard deviation = use (n-1) in the denominator of the standard deviation calculation

9.2 Calibration Factor (CF)

$$CF = \frac{\text{Peak Area (or Height) of the Standard}}{\text{Mass Injected (ng)}}$$

9.3 Water Concentration

$$ug/L = \frac{(Ax)(A)(Vt)(Df)}{(As)(Vo)(Vi)}$$

Where:

Ax = Area of the peak for the compound to be measured
As = Area of the peak in the standard
A = Amount of standard injected (ng)
Vo = Volume of water extracted in milliliters
Vi = Volume of extract injected in microliters
Vt = Volume of the concentrated extract in microliters
Df = Dilution Factor.

9.4 For soil concentrations in ug/Kg

$$ug/KG = \frac{(Ax)(A)(Vt)(Df)(2.0)}{(As)(Vi)(Ws)(D)}$$

Where:

Ax, As, and A are the same as above
Vt = Volume of the concentrated extract in microliters
Vi = Volume of extract injected in microliters
D = $\frac{100 - \%\ \text{moisture}}{100}$
Ws = Weight of sample extracted in grams
Df = Dilution factor (same as above).

The two in the numerator is the GPC dilution if GPC was performed.

9.5 Surrogate Recovery

$$\frac{\text{Area in Sample}}{\text{Area in Standard}} \times \text{Conc. of Std(ug/ml)} \times \text{Vt(ml)} = \text{ug recovered}$$

$$\frac{\text{ug recovered}}{\text{ug spiked}} \times 100 = \%\ \text{surrogate recovery}$$

9.6 QC Check Standard Recovery

$$\frac{\text{Cnom} - \text{Ccalc}}{\text{Cnom}} \times 100 = \%\ \text{Check Standard Difference}$$

Where:
Cnom: the true value of the standard
Ccalc: the calculated value of the standard

10.0 QUALITY CONTROL

10.1 Method blank analysis must be performed once for each SDG, each 7 calendar day period during which samples in an SDG are received, each 20 samples in an SDG, or whenever samples are extracted by the same procedure. In order to be acceptable the method blank analysis cannot contain any of the analytes listed at greater than the CRQL.

10.2 Analysis of a quality control check sample is required. If the method is only to be used to analyze for PCBs, the QC check sample concentrate should contain the most representative multi-component parameter at a concentration of 5 ug/ml in acetone. Usually we use Aroclor 1016, although any Aroclor is acceptable.

10.3 Surrogate and matrix spike recoveries should fall within the established limits. If recoveries are outside the established limits, check calculations, reanalyze the extract, or reextract the sample and reanalyze. If none of these correct the problem then flag the data and explain in the client letter.

10.4 Analysis of a QC check standard after the curve is required. The standard should contain all analytes and be purchased from a different vendor than the curve standards. The calculated value of the QC check standard must be within ±15% of the actual value.

10.5 For precision and accuracy purposes a QC check sample analysis should be performed by spiking 4 one liter aliquots of reagent water or 4 thirty gram aliquots of sodium sulfate with 1.0 ml of Aroclor standard at 5.0 ug/ml. Calculate the average percent recovery for each matrix and establish recovery limits by adding and subtracting 3 times the standard deviation to the average recovery.

10.6 Analysis of a matrix spike and matrix spike duplicate is required for every 20 samples of a similiar matrix. If less than 20 samples are extracted the QC must be performed at least once per month. Recoveries should meet the limits established by the QC check sample data for accuracy and precision. If the recoveries do not fall within the limits then a QC check sample must be analyzed. Since the matrix spike recoveries are highly dependent on the matrix itself, extraction of the QC check at the same time as the matrix spikes is suggested. The QC check sample recoveries should fall within the established limits.

11.0 CORRECTIVE ACTIONS

11.1 Continuing calibration standards will fail for several reasons but sometimes the calibration may just have to be rerun. A few procedures can be performed in order to keep the calibration current:

11.1.1 Perform instrument maintenance, especially if samples are colored and very contaminated. Instrument maintenance should include clipping the column at the inlet, changing the septum, and replacing the column liner. A bake out of at least 4 to 6 hours should be performed after maintenance.

NOTE: Usually this maintenance is performed at the end of the working day so that the bake out takes place over night.

11.1.2 Bake out the column, detector, and inlets by raising the temperatures of each. Column = 250c Detector = 350c Inlet = 250c.

Do this over night and you should see a reduced background signal on each detector.

11.1.3 Always cool the inlet and column temperatures to < 100 before opening up the GC to the atmosphere. This will help keep active sites from developing on the liner and the column.

11.1.4 Inject hexane several times after an overnight bakeout to check baseline and background noise.

12.0 WASTE DISPOSAL

12.1 Place all used standard vials in the holding bag labeled Pest/PCB in the fume hood in the GC lab. Once the bag is full give directly to waste disposal, currently Anne Giddings.

12.2 Store all extracts in refrigerator #6 for 30 days after submission of data packages to client. Once the waiting period is up, the samples are debulked in the same manner as the standards. When debulking samples, go back to the original chain of custody to sign and document the day of debulking. Remove the chain of custody from the log book and place in the Samples Debulked Chain of Custody log.

13.0 REFERENCES

13.1 EPA SW846 Method 8000/8080

Attachment C - Corrective Action Form

ATTACHMENT C

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER
ALBANY, NEW YORK

CORRECTIVE ACTION FORM

CA No.: ______________________________ Date: ______________________________

To: ______________________________ cc: Task Manager

You are hereby requested to take corrective actions indicated below and as otherwise determined by you (A) to resolve the noted condition, and (B) to prevent it from recurring. Your written response is to be returned to the Quality Assurance Manager (QAM).

Condition

Reference Documents

Recommended Corrective Actions

Originator Date QAM Approval Date P.M. Approval Date

Response

Corrective Action

A. Resolution
B. Pretention
C. Affected Documents

Signature ______________________________ Date: ______________________________

Follow-up

Corrective Action Verified:

By: ______________________________ Date: ______________________________

Attachment D - Sample Container Example Certificates of Analysis

Scientific Specialties Service Inc.
Certificate of Analysis

Analysis of lot number

Z-2041-17

The above lot number has been analyzed for the following Volatile Organic Chemicals which were either not found or were found in concentrations less than 1 µg/L.

Acetone*
Benzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
2-Butanone*
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
Dibromochloromethane
1,2-Dibromoethane
1,2-Dibromo-3-Chloropropane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
trans-1-3 Dichloropropene
cis-1,3-Dichloropropene
Ethlybenzene
2-Hexanone*
4-Methyl-2-Pentanone*
Methylene Chloride

1,1,2,2-Tetrachloroethane
Tetrachlorethene
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl Chloride
Xylenes

Analytical Method: EPA Method 524.2

M. Greboul/VP

* Reported to 5 ug/l

Scientific Specialties Service Inc.

Certificate of Analysis

Analysis of: 3277015

The above lot number has been analyzed by GC/MS for the following organic compounds which were either not found or were found in concentrations less than 5 µg/L unless noted.

Acenaphthene	Acenaphthylene	Anthracene
Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
Benzo(k)fluoranthene	Benzo(ghl)perylene	Benzoic Acid
Benzyl alcohol	4-Bromophenyl-phenylether	Butylbenzylphthalate
Di-n-butylphthalate	4-Chloroaniline	4-Chloro-3-methylphenol
bis-(2-Chloroethoxy)methane	bis-(2-Chloroethyl)ether	2,2-oxybis-(1-Chloropropane)
2-Chloronapthalene	2-Chlorophenol	4-Chlorophenyl-phenylether
Chyrsene	Dibenz(a,h)anthracene	Dibenzofuran
1,4-Dichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene
3,3-Dichlorobenzidine	2,4-Dichlorophenol	Diethlyphthalate
2,4-Dimethylphenol	Dimethylphthalate	*4,6-Dinitro-2-methylphenol
*2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene
bis-(2Ethylhexyl)phthalate	Fluoranthene	Fluorene
Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene
Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone
2-Methylnaphthalene	2-Methylphenol	4-Methylphenol
Napthalene	*2-Nitroaniline	*3-Nitroaniline
*4-Nitroaniline	Nitrobenzene	2-Nitrophenol
*4-Nitrophenol	N-Nitrosodiphenylamine	N-Nitroso-di-n-propylamine
Di-n-octylphthalate	*Pentachlorophenol	Phenanthrene
Phenol	Pyrene	1,2,4-Trichlorobenzene
*2,4,5-Trichlorophenol	2,4,6-Tricholorphenol	

* less than 20 ug/L

The above lot number has also been analyzed by GC/ECD for the following pesticide compounds which were either not found or were found in concentrations less than the quantation limits listed below (ug/L):

Alpha BHC 0.01	Beta BHC 0.01	Delta BHC 0.01
Aldrin 0.01	Gamma Chlordane 0.01	Alpha Chlordane 0.01
4,4'-DDE 0.02	Endrin 0.02	4,4'-DDD 0.02
Endosulfan Sulfate 0.02	Gamma BHC[Lindane] 0.01	Heptachlor 0.01
Heptachlor Epoxide 0.01	Endosulfan I 0.01	Dieldrin 0.02
Endosulfan II 0.02	4,4'-DDT 0.02	Endrin Aldehyde 0.02
Toxaphene 1.0	Methoxychlor 0.10	Endrin Ketone 0.02
Aroclor 1016 0.20	Aroclor 1221 0.20	Aroclor 1232 0.40
Aroclor 1242 0.20	Aroclor 1248 0.20	Aroclor 1254 0.20
Aroclor 1260 0.20		

The above lot number has also been analyzed by Furnace Atomic Absorption, Flame Atomic Absorption, Cold-Vapor Atomic Absorption, or ICP/MS and the elements below were either not found or found in concentrations less than those listed below.

Element	Concentration (ugL)	Element	Concentration (ugL)
Aluminum	100	Antimony	5
Arsenic	2	Barium	20
Beryllium	1	Cadmium	1
Calcium	500	Chromium	10
Cobalt	10	Copper	10
Iron	500	Lead	2
Magneseulm	500	Manganese	10
Mercury	0.2	Nickel	20
Potassium	750	Selenium	3
Silver	10	Thallium	10
Vanadium	10	Zinc	20

Keep this certificate for your records.

Grebow, VP

APPENDIX A - SURFACE SOIL SAMPLING PROTOCOL

I. Introduction

This appendix presents protocols by which surface soil samples will be collected and composited at the site.

II. Equipment

- Shovel
- Photoionization Detector (PID)
- Camera

III. Materials

- Health and safety equipment (as required by the Health and Safety Plan);
- Cleaning equipment;
- Dedicated aluminum or stainless steel tray;
- Dedicated stainless steel scoops;
- Measuring device;
- Appropriate sample containers and forms;
- Coolers with ice;
- Field book.

IV. Procedure

The following procedures will be employed to collect surface soil samples:

1. Put on personal protective equipment (as required by the Health and Safety Plan).

2. Identify sample locations from sample location plan and note locations in field notebook.

3. If the sample location is a vegetated area, the vegetation should be removed prior to sample collection.

4. The soil subsamples will be collected by carefully cutting into the soil with a dedicated stainless steel scoop and placing the subsample in a dedicated stainless steel or aluminum tray.

5. Gently mix the soil in the tray and obtain one surface soil sample and place it into an 8 ounce glass jar and screen the headspace with a PID. Record PID reading in field book. Visually characterize the soil for presence of stains and classify according to ASTM soil classification procedures.

6. Obtain one discrete sample that will be submitted for laboratory analysis (for PCBs and TAL inorganic constituents from each surface soil sample location and for TCL SVOCs from up to nine surface soil sampling locations). Place the sample into the appropriate widemouth glass jar with teflon-lined cap.

7. Label sample container and cap in accordance with procedures in Section 4.0 and Appendix B.

8. Place sample container in a transportation cooler

9. Discard gloves and stainless steel scoop in designated location. The portion of the soil sample used for PID headspace screening and visual characterization shall be placed back on the ground at the sampling location.

10. Handle, pack, and ship the samples with appropriate chain-of-custody procedures in accordance with Section 4.0 and Appendix B.

11. Record all other appropriate information in the field log book.

V. Disposal Methods

Materials generated during the above activities will be disposed of as described in Section 4.2.6.

APPENDIX B - SAMPLE PACKING, HANDLING, AND SHIPPING PROCEDURES

I. Handling

1. After collecting a sample, record the following information on the daily field log or in the field notebook, as appropriate:

   a. Project name and number;
   b. Sample number and depth;
   c. Sample method;
   d. Date;
   e. Name of sampler(s);
   f. Sample collection time (military);
   g. Location (project reference);
   h. Analyses to be completed;
   i. Preservative;
   j. Head space reading; and
   k. Any comments.

2. Fill in sample label (sample label in Exhibit 1) with:

   a. Project number and site name;
   b. Sample identification code and other sample identification information, if applicable;
   c. Date;
   d. Sample matrix (soil, sediment, surface water, ground water);
   e. Sample type (composite or grab);
   f. Time sampled (military);
   g. Analysis required;
   h. Initials of sampling personnel;
   i. Preservative added, if applicable; and
   j. Name, affiliation, and contact phone number.

3. Cover the label with clear packing tape to secure the label onto the container.

4. Check the caps on the sample containers to ensure that they are tightly sealed.

5. Mark the level of the sample in the container using an indelible ink marker or grease pencil (liquid samples only).

6. Wrap the sample container cap with clear packing tape to prevent it from becoming loose.

7. Initiate chain-of-custody by designated sampling personnel responsible for sample custody (Exhibit 2) (after sampling or prior to sample packing). Note: If the designated sampling person relinquishes the samples to other sampling or field personnel for packing or other purposes, the samplers will complete the chain-of-custody prior to this transfer. The appropriate personnel will sign and date the chain-of-custody form to document the sample custody transfer.

II. Packing

1. Using duct tape, secure the outside and inside of the drain plug at the bottom of the cooler that is used for sample transport.

2. Place each sample container or package in individual polyethylene bags (Ziploc^{R}-type) and seal.

3. Place one to two inches of vermiculite at the bottom of the cooler as a cushioning material.

4. Package the sealed sample containers upright in the cooler.

5. Repackage ice (if required) in small Ziploc[R]-type plastic bags and place loosely in the cooler. Do not pack ice so tightly that it may prevent addition of sufficient cushioning material.

6. Fill the remaining space in the cooler with vermiculite.

7. Place the completed chain-of-custody forms (sample form in Exhibit 2) in a large Ziploc[R]-type bag and tape the forms to the inside of the cooler lid.

8. Close the lid of the cooler and fasten with duct tape.

9. Wrap strapping tape around both ends of the cooler at least twice.

10. Mark the cooler on the outside with the following information: shipping address, return address, "Fragile" labels on the top and on one side, and arrows indicating "This Side Up" (sample labels in Exhibit 3) on two adjacent sides.

11. Place custody seal evidence tape (sample custody seal in Exhibit 4) over front right and back left of the cooler lid and cover with clear plastic tape.

III. Shipping

1. All samples will be hand delivered or delivered by an express carrier within 48 hours or less from the date of sample collection.

2. The following chain-of-custody procedures will apply to sample shipping:

   a. Relinquish the sample containers to the laboratory via express carrier. The signed and dated forms should be included in the cooler. The express carrier will not be required to sign the chain-of-custody forms. The sampler should retain the express carrier receipt or bill of lading.

   b. When the samples are received by the laboratory, the laboratory personnel shall complete the chain-of-custody forms by recording receipt of samples, measure and record the internal temperature of the shipping container, and then check the sample identification numbers on the containers to the chain-of-custody forms.

EXHIBIT 1

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

		PROJECT #
SAMPLE I.D.		DATE
SAMPLE TYPE ☐ Soil/Sediment ☐ Water	COLLECTION MODE ☐ Composite ☐ Grab	TIME
ANALYSIS		
SAMPLER(S)	PRESERVATIVE	

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists
6723 Towpath Road, P.O. Box 66
Syracuse, New York 13214-0066
TEL: (315) 446-9120

EXHIBIT 2

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
SAMPLERS: *(Signature)*	

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers							REMARKS

Relinquished by: *(Signature)*	DATE	TIME	Received by: *(Signature)*	Relinquished by: *(Signature)*	DATE	TIME	Relinquished by: *(Signature)*
Relinquished by: *(Signature)*	DATE	TIME	Received by: *(Signature)*	Relinquished by: *(Signature)*	DATE	TIME	Relinquished by: *(Signature)*
Relinquished by: *(Signature)*	DATE	TIME	Received for Laboratory by: *(Signature)*	DATE	TIME	Remarks:	

10/23/95
5951188L.CDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

EXHIBIT 3

EXHIBIT 4

CUSTODY SEAL	BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists *6723 Towpath Road, Box 66, Syracuse, N.Y. 13214-0066* *TEL (315) 446-9120*	SEALED BY ______________________ DATE______TIME ______

APPENDIX C - PROTOCOL FOR TEST PIT EXCAVATION AND SOIL SAMPLE COLLECTION

I. Introduction

This appendix presents protocols which will be used to excavate test pits and collect soil samples from test pits at the site. The procedures which will be utilized to excavate test pits and collect soil samples are discussed below.

II. Equipment

- Backhoe with bucket (supplied by subcontractor)
- Shovel
- Photoionization detector (PID); HNU or similar instrument
- Camera
- Stainless steel hand trowel
- Hand auger with extensive handle

III. Materials

- 4' x 8' sheets of plywood
- Plastic sheeting
- Stainless steel hand trowel
- Appropriate sample containers (supplied by laboratory)
- Sample labels, sample tags, and sample custody seal labels (Appendix B)
- Chain-of-Custody forms and field notebooks (Appendix B)
- Insulated transport containers with ice or "blue ice"
- Measuring tape - 50 feet
- Wristwatch
- Distilled water
- Cleaning solvent and laboratory-type soap (i.e., Alconox, etc.)
- Clean, disposable paper towels
- Disposable gloves (vinyl inner and nitrile outer)
- Hard hats
- Safety glasses
- Caution tape and stakes
- Test pit log (Exhibit 1)
- Plastic bags

Health and safety equipment as required by the Health and Safety Plan

IV. Procedure

1. Identify the test pit location number in the field sampling notebook. Also indicate the temperature, weather, date, time, and personnel at the site at the start of excavation of the test pit.

2. Set up cleaning station and clean the backhoe and bucket prior to excavating test pits and between each test pit (if necessary, as determined by the on-site sampling personnel). Decontaminate reusable sampling equipment as described in Appendix E - Equipment Decontamination and Cleaning Procedures, prior to, between, and following the collection of soil samples.

3. Put on a new pair of disposable inner and outer gloves, along with hard hat and safety glasses.
4. Screen ambient air to obtain background PID readings prior to excavating test pits.

5. Excavate the soil with the backhoe in 2-foot intervals. The soil shall be staged on plastic sheeting or plywood. At each 2-foot interval, examine and classify the soils according to ASTM standard soils classification procedures. At each interval, collect approximately eight ounces of soil and place in

a glass jar for PID screening. Record in the field notebook observations, PID measurements, and the presence or absence of visible staining or odors noticed in the test pit.

6. The test pits will be excavated to the water table or to a maximum depth of 8-feet below ground surface (whichever is encountered first).

7. If pockets of oil-stained soil, MGP residuals, and/or buried debris are encountered, excavation activities may be temporarily discontinued in order to assess site conditions and evaluate the need for any potential IRMs.

8. If any visible staining, odors, and/or elevated PID headspace screening measurements are encountered at a test pit location, one soil sample from the test pit will be selected for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents. If no visible staining, odors, or PID measurements above background concentrations are encountered in the soil from the test pit excavation, one soil sample from the 6- to 18-inch depth interval will be selected for laboratory analysis for PCBs and TAL inorganic constituents. For the purpose of estimating the number of QA/QC samples to be collected, it is assumed that up to six soil samples will be selected for laboratory analysis for TCL VOCs and TCL SVOCs from the test pits.

9. Soil samples from the test pit for PID screening will be collected from the backhoe bucket. Soil samples from the test pit for laboratory analysis will be collected from the sidewall of the pit using a stainless-steel scoop or decontaminated hand bucket auger with an extension handle, depending on the depth of the test pit and stability of the sides of the test pit. Care will be taken to ensure that the samples are relatively undisturbed.

10. Soil samples collected for laboratory analysis will be transferred from the auger into the appropriate sample container presented on Table 7.

11. All samples will be stored in a cooler at approximately 4°C and transferred to the laboratory for analysis.

12. All sampling activities and sample handling procedures used at the site will follow the protocols outlined in Appendix B - Sample Packing, Handling, and Shipping Procedures.

13. A labeled stake denoting the test pit number will be placed at the test pit location following backfilling of the excavation.

14. Each test pit location will be photographed before, during, and after excavation. The number and location of each photograph will be recorded in the field notebook.

15. At the conclusion of the test pit activities, information recorded in the field book will be copied onto test pit logs. A sample test pit log is included as Exhibit 1.

V. Survey

1. A field survey control program will be conducted by a qualified survey crew using standard instrument survey techniques to document test pit locations to the State Plane Coordinate System of 1927 (or other appropriate reference) and the ground elevation to the National Geodetic Vertical Datum of 1929.

VI. Disposal Methods

1. Materials generated during the above activities will be disposed of as described in Section 4.2.6.

EXHIBIT 1

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists
6723 Towpath Road, Box 66, Syracuse, N.Y. 13214-0066
TEL (315) 446-9120

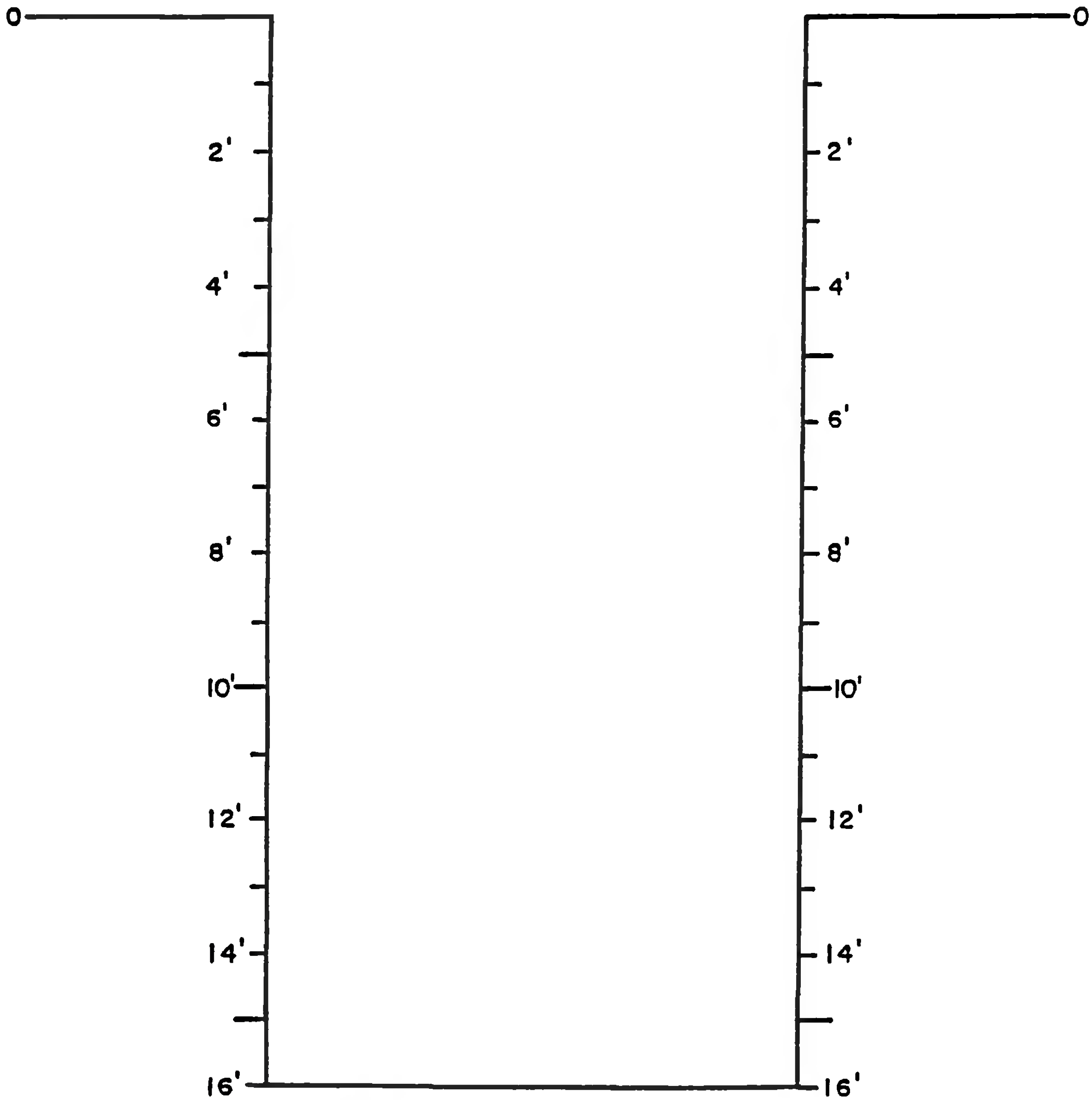
PROJECT NAME ____________________

PROJECT NUMBER ____________________

LOCATION ____________________

LOGGED BY ____________ DATE ____________

TEST PIT LOG



NOTES: ____

APPENDIX D - EQUIPMENT DECONTAMINATION AND CLEANING PROCEDURES

I. Introduction

This appendix presents procedures which will be used to decontaminate equipment used to collect soil, ground-water, LNAPL, DNAPL, dry-weather flow, and debris samples. In addition, this appendix presents the procedures to be followed in cleaning equipment used to excavate test pits, complete soil borings, and install monitoring wells. The adequacy of cleaning procedures will be monitored through the collection of QA/QC rinse blank samples which will be submitted for laboratory analysis.

II. Sampling Equipment Decontamination

Generally, dedicated sampling equipment will be used during the investigations (e.g., stainless-steel trowels, plastic scoops, ground-water sample bailers). However, equipment that is not dedicated (e.g., split-spoon sampler) will be decontaminated prior to each use to mitigate the potential for cross-contamination of the samples collected for laboratory analysis. The decontamination procedures to be utilized during the investigation are presented below:

1. Non-phosphate detergent solution wash.
2. Tap water rinse.
3. 10 percent nitric acid rinse (for inorganics sampling only).
4. Distilled water rinse.
5. Methanol rinse (for organics sampling only).
6. Distilled water rinse.
7. Hexane rinse (for PCB sampling only).
8. Distilled water rinse.
9. Allow to air-dry to the extent practicable.
10. Any sampling equipment (including split spoons) that is not immediately used following decontamination will be wrapped in aluminum foil or polyethylene.

III. Drilling and Test Pit Excavation Equipment Cleaning

In addition to the above-discussed decontamination procedures, the drilling rig and all downhole equipment associated with the drilling of soil borings and the installation of monitoring wells will be steam cleaned prior to arrival on site and between each drilling location. The bucket of the backhoe used to excavate test pits will also be steam cleaned prior to arrival on site, between test pit locations (if necessary, as determined by the on-site engineer), and prior to leaving the site. Steam cleaning of equipment will take place over a plastic-lined decontamination pad. Water generated during steam cleaning will be pumped from the decontamination pad into steel 55-gallon drums or a portable aboveground tank (to be provided by NMPC).

APPENDIX E - PROCEDURES FOR SOIL BORING AND SOIL SAMPLE COLLECTION

I. Introduction

All soil borings performed shall be completed with a truck- or track-mounted drill rig using the hollow-stem auger drilling method to a depth specified by the supervising geologist. When bedrock coring is to be performed, a 3-inch diameter casing will be spun into the top of bedrock to seal off the overburden and the rock coring will be advanced with a NX or NQ core barrel.

Prior to commencing drilling activities, the locations will be cleared for underground utilities by contacting the Underground Facility Protection Organization (UFPO) to have appropriate utilities representatives mark the location of underground lines. Private utilities may be delineated by field personnel using appropriate devices and/or by a private utility locating contractor (if necessary). This contractor will survey the project area to determine the presence of known, as well as unknown, utilities/underground piping at the project area, especially in those areas where drilling is proposed.

During the completion of the soil borings, a sheet of plywood or basin will be placed next to (or around) the auger to minimize the contact of subsurface soil cuttings with the ground surface.

II. Soil Sampling

Samples of the encountered subsurface material will be collected continuously using standard 2-inch diameter, 2-foot split spoons driven by a 140-lb. hammer, unless otherwise specified. The sampling method employed will be ASTM D-1586/Split-Barrel Sampling (Standard Method for Penetration Test and Split-Barrel Sampling of Soils, ASTM D 1586-84) published in Annual Book of ASTM Standards, Volume 04.08. Upon retrieval of the split-barrel sampler, representative portions of each soil sample will be placed in the appropriate laboratory containers and a 1-pint container for visual observations and headspace screening. This container will be labeled with: 1) site; 2) boring number; 3) sample interval; 4) date; and 5) initials of sampling personnel. All split-barrel samples will be screened for organic vapors with a photoionization detector (PID), using the procedures described in Section III below. In addition, a supervising geologist will be on site during the drilling operations to fully describe each soil sample including the following:

- Principal and minor components;
- Color;
- Moisture and organic content;
- Particle sizes, angularity and shape;
- Density/consistency;
- Hardness of gravel (Mohs hardness scale);
- Plasticity of fines;
- Cohesiveness;
- Pliability;
- Odors/discoloration;
- Mottling/staining;
- Weathering;
- Fill or geologic origin of deposit (local name of deposit, if known);
- Items that may indicate age of deposit (i.e., archaeological artifacts, newspapers, etc.);
- Fill component description (i.e., cinder, clay, metal, tires, etc.); and
- Unified Soil Classification System group symbol.

The descriptions will be recorded in a dedicated field notebook. The supervising geologist will be responsible for documenting drilling events in the field notebook.

The Drilling Contractor will be responsible for obtaining accurate and representative samples, informing the supervising geologist of changes in drilling pressure and loss of circulation, and keeping a separate general log of soils encountered, including blow counts (i.e., the number of blows from a soil sampling drive weight [140 pounds] required to drive the split-barrel sampler in 6-inch increments).

Soils generated during drilling of the test borings will be containerized and properly disposed.

III. Field Screening Procedures

All soil samples will be field screened upon collection with the PID for a relative measure of the total volatile concentration. In addition, field screening will be conducted on the headspace of soil samples with a PID. A representative portion of the sample will be obtained to fill approximately one half of a 1-pint container. The top of the container will be covered with aluminum foil. These samples will be screened as follows:

1. The headspace of the sample will be measured directly from the sample container with the PID;
2. The PID probe will be inserted through the aluminum foil covering the 1-pint container; and
3. The readings will be recorded in the field note book.

The PID meter will be calibrated to isobutylene daily or more frequently if field conditions warrant.

Select soil samples will also be evaluated for the presence of LNAPL/DNAPL via ultraviolet (UV) fluorescence and/or jar testing. UV fluorescence testing is conducted by screening soil in a dark room or box for evidence of fluorescence. The approximate percentage of soil exhibiting fluorescence should be noted and compared to a "clean" soil from the same geologic unit. Jar testing will be conducted by filling a jar approximately 50 percent full with soil and approximately 90 percent full with water. The jar will be covered and shaken for several seconds. The contents of the jar will then be observed for evidence of a sheen or globules of separate-phase materials (i.e., NAPL).

IV. Procedures for Collecting Soil Samples for Laboratory Analysis

Samples designated for laboratory analysis will be placed in the appropriate containers. Sample containers for volatile organic analysis will be filled first. Next, a sufficient amount of the remaining soil will be homogenized by mixing in a stainless steel bowl with a clean stainless steel trowel, and distributed to the appropriate sample containers.

V. Bedrock Coring

Bedrock cores will be completed using a wire line corer or a double tubed split-barrel corer in accordance with ASTM Method D2113-83, Volume 04.08, "Standard Practice for Diamond Core Drilling for Site Investigation."

Continuous bedrock core samples will be obtained, labeled, preserved, and classified as outlined below.

A. Materials

- Wire Line or a Double Tubed Core Barrel;
- Coring Rods;
- Coring Bits;
- Wooden Core Boxes;
- Permanent Marking Pen for Labeling Boxes;
- Wood Blocks to Separate Core Runs in Core Boxes;
- Wrenches;
- Field Book with Logs;
- Hand Lens;
- Engineer's Rule; and
- Rubber Hammer for Tapping Rock Core Out of Core Barrel.

B. Procedures

Prior to core barrel introduction into the hole, circulation of water will be maintained for a short time to remove any cuttings that may clog the barrel. Drilling rods will be carefully centered to prevent core breakage. Drilling bit pressure and water pressure will be maintained at a consistent level throughout borings and runs will be completed without interruption so penetration rates can be determined.

Core samples will be rinsed with clean water and placed in wood boxes with increasing depths aligned left to right and core runs separated by wood blocks. Man-made breaks will be marked with a pen across the break. Wood blocks will be labeled and placed at the end of each core run to indicate run. A wooden spacer will be inserted if no sample is recovered and labeled "L.C." (lost core) with corresponding depth. The core box will be labeled on the outside top and inside lid for:

1) Client;
2) Date;
3) Job number;
4) Boring number;
5) Run number;
6) Run interval; and
7) Box number/total box number.

A diagram of core box labeling is included in Exhibit 1.

The supervising geologist will be responsible for recording rock core mechanical and geological characteristics. The mechanical characteristics will include:

1) Penetration rates;
2) Rock quality designation (RQD);
3) Percent recovery;
4) Water loss; and
5) Bit type and size.

A geologic classification will include the following parameters:

- Lithology
- Friability/feasibility
- Thickness
- Particle angularity/shape
- Particle sizes
- Rock Quality Designation (RQD)
- Rock type
- Color
- Strength of intact rock
- Weathered state
- Voids
- Structure/bedding (bedding planes, joints, fractures)
- Description of discontinuities and filings
- Formation name (if known)

- Additional petrographic information
- Water content
- Texture
- Odors/discoloration
- Hardness
- Fossils
- Strike/dip
- Contacts when observed

A partial key to the rock core descriptions is shown in Exhibit 2.

The supervising geologist will be responsible for documenting drilling events in the field log book. A documentation of drilling events will include:

1) Start and finish dates of drilling;

2) Name and location of project;

3) Project number, client, and project location;

4) Sample number and depth;

5) Type and size of samples;

6) Depth to water;

7) Type of drilling equipment;

8) Size of casing;

9) Names of contractor's drillers, inspectors, or people at the project area; and

10) Weather conditions.

VI. Survey

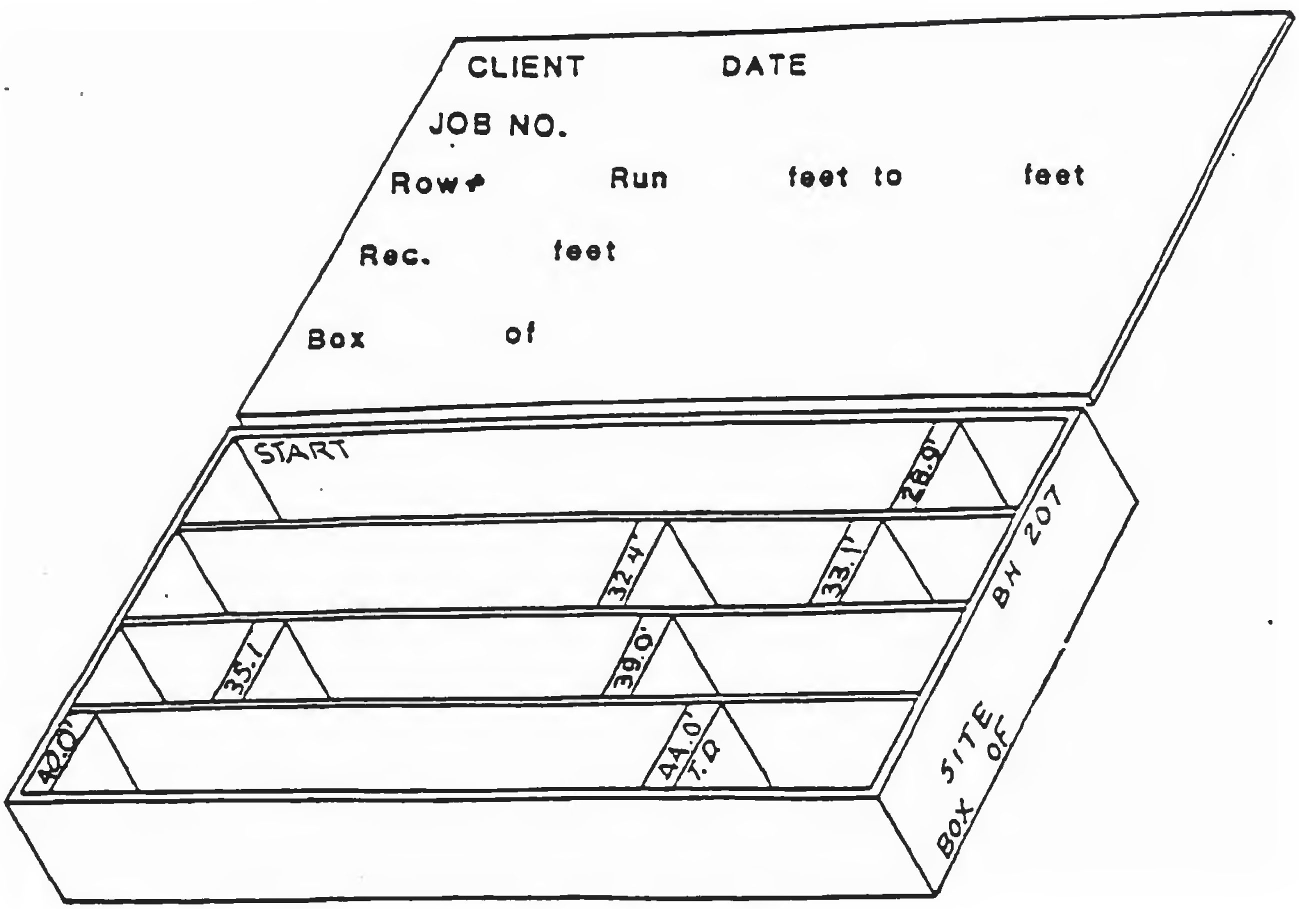
A field survey control program will be conducted using standard instrument survey techniques to document soil boring and rock coring locations to the State Plane Coordinate System of 1927 (or other appropriate reference) and the ground elevation to the National Geodetic Vertical Datum (NGVD) of 1929.

VII. Equipment Cleaning

Equipment cleaning will occur prior to use on the site, between each drilling location, and upon completion of the drilling prior to leaving the site. All drilling equipment and associated tools including augers, drill rods, core barrels, sampling equipment, wrenches, and any other equipment or tools that may have come in contact with the soil will be cleaned with high-pressure steam cleaning equipment using a tap water source or manual scrubbing. The drilling equipment will be cleaned in an area designated by the supervising geologist. Cleaning water and residual materials will be collected and transferred to a central location for subsequent disposal. Equipment cleaning procedures are described in Appendix D.

EXHIBIT 1

SAMPLE CORE BOX LAYOUT



NOT TO SCALE

EXHIBIT 2
KEY TO ROCK CORE DESCRIPTION LOGS

Core Conditions

% Recovery - Length of core recovered divided by length of core run.

RQD - Rock Quality Designation, a percent, the sum of the length of pieces four inches long or greater divided by the length of the core run.

Rock Hardness Scale

VERY HARD - surface cannot be scratched by a knife.

HARD - Difficult to scratch with a knife.

MODERATELY HARD - Surface is easily scratched by a knife. Difficult to scratch with a fingernail.

SOFT - Surface is easily scratched by a fingernail.

Morphology

S - Straight
C - Curved
I - Irregular

Surface Condition

1 - Slick
2 - Smooth
3 - Rough

N° - Angle of fracture surface from horizontal.

H - Horizontal fracture (perpendicular to core run).

V - Vertical fracture (parallel to core run).

JxF - Joint (fracture) crosses foliation.

JIIF - Joint is parallel to foliation.

U - Joint in unfoliated rock.

hf/ - Horizontal fracture.

vf/ - Vertical fracture.

wz - Weathered zone.

v - Vuggy.

bp/ - Bedding plane.

l/ - Laminae.

s/ - Stylolite.

/o - Oxidized.

/w - Weathered.

/is - Iron stained.

/s - Solution enlargement.

/p - Solution enlargement with a patina.

/m - Mud in opening.

/rm - Red mud in opening.

/gm - Green mud in opening.

/bkzn - Broken zone.

Example: J 30° x F, C-2 (Joint 30° from horizontal crossed foliation, joint is curved and surface is smooth).

APPENDIX F - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, GROUND-WATER, AND STORM SEWER INVESTIGATIONS

APPENDIX F - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, GROUND-WATER, AND STORM SEWER INVESTIGATIONS

APPENDIX F-1

HNU Photoionization Detector Calibration,
Operation, and Maintenance Procedures

I. Introduction

Field screening with a photoionization detector (PID), HNU meter, is a procedure to measure relative concentrations of volatile organic compounds (VOCs) and other compounds. The HNU meter is certified by Factory Mutual for use in Class 1, Division 2, Group A, B, C, and D environments. The characteristics of the PID are presented in Exhibit F-1.1, compounds which it can detect are presented in Exhibit F-1.2. Field screening will be conducted on the following:

- work area air to assess exposure to on-site workers of air contaminants via the air pathway;
- well headspace as a precautionary measure each time the well cover is opened; and
- headspace of soil samples to assess the relative concentration of volatile organics in the sample.

II. Materials

The following materials, as required, shall be available while performing PID field screening:

- Personal protective equipment (as required by the Health and Safety Plan);
- PID and operating manual;
- Isobutylene calibration gas tank with pressure regulator;
- Plastic tubing to connect the PID probe to the calibration gas tank;
- Sample jars;
- Aluminum foil;
- Field notebook; and
- PID calibration log.

III. PID Calibration

PID field instruments will be calibrated and operated to yield "total organic vapor" in ppm (v/v) as benzene. Operation, maintenance, and calibration shall be performed in accordance with the manufacturers instructions and entered on the PID calibration and maintenance log (Exhibit F-1.3).

1. Don personal protective equipment (as required by the Health and Safety Plan).

2. Turn the FUNCTION switch to the BATTERY CHECK position. Check that the indicator is within or beyond the green battery arc. If indicator is below the arc or the red LED is lit, the battery must be charged.

3. Turn the FUNCTION switch to the STANDBY position and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15 to 20 seconds to confirm the adjustment. If unstable, readjust.

4. Check to see that the SPAN POTENTIOMETER is adjusted for the probe being used (e.g., 9.8 for 10.2 eV).

5. Set the FUNCTION switch to the desired ppm range (0-20, 0-200, or 0-2,000). A violet glow from the UV source should be visible at the sample inlet of the probe/sensor unit.

6. Listen for the fan operation to verify fan function.

7. Connect one end of the sampling hose to the calibration canister regulator outlet and the other end to the sampling probe of the PID. Crack the regulator valve and take a reading after 5 to 10 seconds. Adjust the span potentiometer to produce the concentration listed on the span gas cylinder. Record appropriate information on the field calibration log (Exhibit F-1.3 or equivalent).

8. If so equipped, set the alarm at desired level.

IV. Work Area Air Monitoring Procedure

1. Measure and record the background PID reading.

2. Measure and record breathing space reading.

V. Well Headspace Screening Procedure

1. Measure and record the background PID reading.

2. Unlock and open the well cover while standing upwind of the well.

3. Remove the well cap.

4. Place the PID probe approximately 6 inches above the top of the casing.

5. Record all PID readings and proceed in accordance with the site Health and Safety Plan.

VI. Maintenance Procedures

1. At the end of each day of after 8 hours of monitoring with the PID, recharge the batteries for 12 hours.

2. Store the instrument in protective case when not in use.

3. Keep records of operation, maintenance, calibration, problems, and repairs.

4. After use, the instrument will be inspected and the inspection recorded in the field notebook.

5. A replacement instrument will be available on-site or ready for overnight shipment, if necessary.

6. The PID will be sent back to the manufacturer for service, if needed.

7. Record calibration information on PID Calibration and Maintenance Log (Exhibit F-1.3).

VII. Equipment Cleaning

After each use, the readout unit should be wiped down with a clean cloth or paper towel.

The UV light source window and ionization chamber should be cleaned in the following manner once a month:

1. With the PID off, disconnect the sensor/probe from the unit.

2. Remove the exhaust screw, grasp the end cap in one hand and the probe shell in the other, and pull apart.

3. Loosen the screws on the top of the end cap, and separate the end cap and ion chamber from the lamp and lamp housing.

4. Tilt the lamp housing with one hand over the opening so that the lamp slides out into your hand.

5. Clean the lamp with lens paper and HNu cleaning compound (except 11.7 eV). For the 11.7 eV lamp, use a chlorinated organic solvent.

6. Clean the ion chamber using methanol on a Q-tip[R] and then dry gently at 50°C to 60°C for 30 minutes.

7. Following cleaning, reassemble by first sliding the lamp back into the lamp housing. Place ion chamber on top of the housing, making sure the contacts are properly aligned.

8. Place the end cap on top of the ion chamber and replace the two screws, tighten the screws only enough to seal the o-ring.

9. Line up the pins on the base of the lamp housing with pins inside the probe shell and slide the housing assembly into the shell.

EXHIBIT F-1.1
Characteristics of the Photoionization Detector (PID)

EXHIBIT F-1.1
CHARACTERISTICS OF THE PHOTOIONIZATION DETECTOR (PID)

I. Introduction

Photoionization detectors (PIDs) are used in the field to detect a variety of compounds in air. PIDs can be used to detect leaks of volatile substances in drums and tanks, to determine the presence of volatile compounds in soil and water, and to make ambient air surveys. If personnel are thoroughly trained to operate the instrument and to interpret the data, these PID instruments can be a valuable tool. Its use can help in deciding the level of protection to be worn, assist in determining the implementation of other safety procedures, and in determining subsequent monitoring or sampling locations.

Portable PIDs detect the concentration of organic gases as well as a few inorganic gases. The basis for detection is the ionization of gaseous species. The incoming gas molecules are subjected to ultraviolet (UV) radiation, which ionizes molecules that have an ionization potential (IP) less than or equal to that rated for the UV source. Every molecule has a characteristic IP, which is the energy required to remove an electron from the molecule, thus yielding a positively charged ion and the free electron. These ions are attracted to an oppositely charged electrode, causing a current and an electric signal to the LED display. Compounds are measured on a parts per million (ppm) volume basis.

II. HNu PI-101

The HNu portable photoionizer detects the concentration of organic gases as well as a few inorganic gases. The basis for detection is the ionization of gaseous species. The incoming gas molecules are subjected to UV radiation, which is energetic enough to ionize many gaseous compounds. Each molecule is transformed into charged ion pairs, creating a current between two electrodes. Every molecule has a characteristic IP, which is the energy required to remove an electron from the molecule, yielding a positively charged ion and the free electron.

Three probes, each containing a different UV light source, are available for use with the HNu. Energies are 9.5, 10.2, and 11.7 electron volts (eV), respectively. All three probes detect many aromatic and large-molecule hydrocarbons. The 10.2 eV and 11.7 eV probes, in addition, detect some smaller organic molecules and some halogenated hydrocarbons. The 10.2 eV probe is the most useful for environmental response work, as it is more durable that the 11.7 eV probe and detects more compounds than the 9.5 eV probe. The 10.2 eV probe will be used for all PID screenings related to field activities at this site. A listing of molecules and compounds that the HNu can detect is presented in Exhibit F-1.2.

The primary HNu calibration gas is either benzene or isobutylene. The span potentiometer knob is turned to 9.8 for benzene calibration. A knob setting of zero increases the sensitivity to benzene approximately tenfold. Its lower detection limit is in the low ppm range. Additionally, response time is rapid; the dot matrix liquid crystal displays 90 percent of the indicated concentration in three seconds.

III. Limitations

The PID instrument can monitor several vapors and gases in air. Many non-volatile liquids, toxic solids, particulates, and other toxic gases and vapors, however, cannot be detected with PIDs. Since the PIDs cannot detect all the chemicals that may be present at a sample location, a zero reading on either instrument does not necessarily signify the absence of air contaminants.

The PID instrument is generally not specific, and their response to different compounds is relative to the calibration gases. Instrument readings may be higher or lower than the true concentration. This effect can be observed when monitoring total contaminant concentrations if several different compounds are being detected at once. In addition, the response of these instruments is not linear over the entire detection range. Therefore, care must be taken when interpreting the data. Concentrations should be reported in terms of the calibration gas and span potentiometer or gas-select-knob setting.

PIDs are small, portable instruments and may not yield results as accurate as laboratory instruments. PIDs were originally designed for specific industrial applications. They are relatively easy to use and interpret when detecting total concentrations of known contaminants in air, but interpretation becomes more difficult when trying to identify the individual components of a mixture. Neither instrument can be used as an indicator for combustible gases or oxygen deficiency.

This QAPjP intends for the PIDs to be used only as a guide for work area air monitoring to establish action levels (as defined in the Health and Safety Plan).

EXHIBIT F-1.2
Molecules and Compounds Detected by a Photoionization Detector (PID)

ATTACHMENT F-1.2
MOLECULES AND COMPOUNDS DETECTED BY A PHOTOIONIZATION DETECTOR (PID)

Some Atoms and Simple Molecules

	IP(eV)		IP(eV)
H	13.595	I_2	9.28
C	11.264	HF	15.77
N	14.54	HCl	12.74
O	13.614	HBr	11.62
Si	8.149	HI	10.38
S	10.357	SO_2	12.34
F	17.42	CO_2	13.79
Cl	13.01	COS	11.18
Br	11.84	CS_2	10.08
I	10.48	N_2O	12.90
H_2	15.426	NO_2	9.78
N_2	15.580	O_3	12.80
O_2	12.075	H_2O	12.59
CO	14.01	H_2S	10.46
CN	15.13	H_2Se	9.88
NO	9.25	H_2Te	9.14
CH	11.1	HCN	3.91
OH	13.18	C_2N_2	13.8
F_2	15.7	NH_3	10.15
Cl_2	11.48	CH_3	9.840
Br_2	10.55	CH_4	12.98

Paraffins and Cycloparaffins

Molecule	IP(eV)
methane	12.98
ethane	11.65
propane	11.07
n-butane	10.63
i-butane	10.57
n-pentane	10.35
i-pentane	10.32
2,2-dimethylpropane	10.35
n-hexane	10.18
2-methlypentane	10.12
3-methlypentane	10.08
2,2-dimethlybutane	10.06
2,3-dimethlybutane	10.02
n-heptane	10.08
2,2,4-trimethlypentane	9.86
cyclopropane	10.06
cyclopentane	10.53
cyclohexane	9.88
methlycyclohexane	9.85

EXHIBIT F-1.2 (Cont'd)
Molecules and Compounds Detected by a Photoionization Detector (PID)

Alkyl Halides

Molecule	IP(eV)
HCl	12.74
Cl_2	11.48
CH_4	12.98
methyl chloride	11.28
dichloroemethane	11.35
trichloromethane	11.42
tetrachloromethane	11.47
ethyl chloride	10.98
1,2-dichloroethane	11.12
1-chloropropane	10.82
2-chloropropane	10.78
1,2-dichloropropane	10.87
1,3-dichloropropane	10.85
1-chlorobutane	10.67
2-chlorobutane	10.65
1-chloro-2-methylpropane	10.66
2-chloro-2-methylpropane	10.61
HBr	11.62
Br_2	10.55
methyl bromide	10.53
dibromomethane	10.49
tribromomethane	10.51
CH_2BrCl	10.77
$CHBr_2Cl$	10.59
ethyl bromide	10.29
1,1-dibromoethane	10.19
1-bromo-2-chloroethane	10.63
1-bromopropane	10.18
2-bromopropane	10.075
1,3-dibromopropane	10.07
1-bromobutane	10.13
2-bromobutane	9.98
1-bromo-2-methylpropane	10.09
2-bromo-2-methylpropane	9.89
1-bromopentane	10.10
HI	10.38
I_2	9.28

Alkyl Halides

Molecule	IP(eV)
methyl iodide	9.54
diiodomethane	9.34
ethyl iodide	9.33
1-iodopropane	9.26
2-iodopropane	9.17
1-iodobutane	9.21
2-iodobutane	9.09
1-iodo-2-methylpropane	9.18
2-iodo-2-methylpropane	9.02
1-iodopentane	9.19
F_2	15.7
HF	15.77
$CFCl_3$ (Freon 11)	11.77
CF_2Cl_2 (Freon 12)	12.31
CF_3Cl (Freon 13)	12.91
$CHClF_2$ (Freon 22)	12.45
$CFBR_3$	10.67
CF_2Br_2	11.07
CH_3CF_2Cl (Genetron 101)	11.98
$CFCl_2CF_2Cl$	11.99
CF_3CCl_3 (Freon 113)	11.78
$CFHBrCH_2Cr$	10.75
CF_2BrCH_2Br	10.83
CF_3CH_2I	10.00
n-C_3F_7I	10.36
n-$C_3F_7CH_2Cl$	11.84
n-$C_3F_7CH_2I$	9.96

EXHIBIT F-1.2 (Cont'd)
Molecules and Compounds Detected by a Photoionization Detector (PID)

Aliphatic Alcohol, Ether, Thiol, and Sulfides

Molecule	IP(eV)
H_2O	12.59
methyl alcohol	10.85
ethyl alcohol	10.48
n-propyl alcohol	10.20
i-propyl alcohol	10.16
n-butyl alcohol	10.04
dimethyl ether	10.00
diethyl ether	9.53
n-propyl ether	9.27
i-propyl ether	9.20
H_2S	10.46
methanethiol	9.440
ethanethiol	9.285
1-propanethiol	9.195
1-butanethiol	9.14
dimethyl sulfide	8.685
ethyl methyl sulfide	8.55
diethyl sulfide	8.430
di-n-propyl sulfide	8.30

EXHIBIT F-1.2 (Cont'd)
Molecules and Compounds Detected by a Photoionization Detector (PID)

Aliphatic Aldehydes and Ketones

Molecule	IP(eV)
CO_2	13.79
formaldehyde	10.87
acetaldehyde	10.21
propionaldehyde	9.98
n-butyraldehyde	9.86
isobutyraldehyde	9.74
n-valeraldehyde	9.82
isovaleraldehyde	9.71
acrolein	10.10
crotonaldehyde	9.73
benzaldehyde	9.53
acetone	9.69
methyl ethyl ketone	9.53
methyl n-propyl ketone	9.39
methyl i-propyl ketone	9.32
diethyl ketone	9.32
methyl n-butyl ketone	9.34
methyl i-butyl ketone	9.30
3,3-dimethyl butanone	9.17
2-heptanone	9.33
cyclopentanone	9.26
cyclohexanone	9.14
2,3-butanedione	9.23
2,4-pentanedione	8.87

Aliphatic Acids and Esters

Molecule	IP(eV)
CO_2	13.79
formic acid	11.05
acetic acid	10.37
propionic acid	10.24
n-butyric acid	10.16
isobutyric acid	10.02
n-valeric acid	10.12
methyl formate	10.815
ethyl formate	10.61
n-propyl formate	10.54
n-butyl formate	10.50
isobutyl formate	10.46
methyl acetate	10.27
ethyl acetate	10.11
n-propyl acetate	10.04
isopropyl acetate	9.99
n-butyl acetate	10.01
isobutyl acetate	9.97
sec-butyl acetate	9.91
methyl propionate	10.15
ethyl propionate	10.00
methyl n-butyrate	10.07
methyl isobutyrate	9.98

EXHIBIT F-1.2 (Cont'd)
Molecules and Compounds Detected by a Photoionization Detector (PID)

Aliphatic Amines and Amides

Molecule	IP(eV)
NH_3	10.15
methyl amine	8.97
ethyl amine	8.86
n-propyl amine	8.78
i-propyl amine	8.72
n-butyl amine	8.71
i-butyl amine	8.70
s-butyl amine	8.70
t-butyl amine	8.64
dimethyl amine	8.24
diethyl amine	8.01
di-n-propyl amine	7.84
di-i-propyl amine	7.73
di-n-butyl amine	7.69
trimethyl amine	7.82
triethyl amine	7.50
tri-n-propyl amine	7.23
formamide	10.25
acetamide	9.77
N-methyl acetamide	8.90
N,N-dimethyl formamide	9.12
N,N-dimethyl acetamide	8.81
N,N-diethyl formamide	8.89
N,N-diethyl acetamide	8.60

Other Aliphatic Molecules with N Atom

Molecule	IP(eV)
nitromethane	11.08
nitroethane	10.88
1-nitropropane	10.81
2-nitropropane	10.71
HCN	13.91
acetonitrile	12.22
propionitrile	11.84
n-butyronitrile	11.67
acrylonitrile	10.91
3-butene-nitrile	10.39
ethyl nitrate	11.22
n-propyl nitrate	
methyl thiocyanate	10.065
ethyl thiocyanate	9.89
methyl isothiocyanate	9.25
ethyl isothiocyanate	9.14

EXHIBIT F-1.2 (Cont'd)
Molecules and Compounds Detected by a Photoionization Detector (PID)

Olefins, Cyclo-ofefins, Acetylenes

Molecule	IP(eV)
ethylene	10.515
propylene	9.73
1-butene	9.58
2-methylpropene	9.23
trans-2-butene	9.13
cis-2-butene	9.13
1-pentene	9.50
2-methyl-1-butene	9.12
3-methyl-1-butene	9.51
3-methyl-2-butene	8.67
1-hexene	9.46
1,3-butadiene	9.07
isoprene	8.845
cyclopentene	9.01
cyclohexene	8.945
4-methylcyclohexene	8.91
4-cinylcylohexene	8.93
cyclo-octatetraene	7.99
acetylene	11.41
propyne	10.36
1-butyne	10.18

Some Derivatives of Olefins

Molecule	IP(eV)
vinyl chloride	9.995
cis-dichloroethylene	9.65
trans-dichloroethylene	9.66
trichloroethylene	9.45
tetrachloroethylene	9.32
vinyl bromide	9.80
1,2-dibromoethylene	9.45
tribromoethylene	9.27
3-chloropropene	10.04
2,3-dichloropropene	9.82
1-bromopropene	9.30
3-bromopropene	9.7
$CF_3CCl=CClCF_3$	10.36
n-$C_5F_{11}CF=CF_2$	10.48
acrolein	10.10
crotonaldehyde	9.73
mesityl oxide	9.08
vinyl methyl ether	8.93
allyl alcohol	9.67
vinyl acetate	9.19

EXHIBIT F-1.2 (Cont'd)
Molecules and Compounds Detected by a Photoionization Detector (PID)

Aromatic Compounds

Molecule	IP(eV)
benzene	9.245
toluene	8.82
ethyl benzene	8.76
n-propyl benzene	8.72
i-propyl benzene	8.69
n-butyl benzene	8.69
s-butyl benzene	8.68
t-butyl benzene	8.68
o-xylene	8.56
m-xylene	8.56
p-xylene	8.445
mesitylene	8.40
durene	8.025
styrene	8.47
alpha-methyl styrene	8.35
ethynylbenzene	8.815
napthalene	8.12
1-methylnapthalene	7.69
2-methylnapthalene	7.955
biphenyl	8.27
phenol	8.50
anisole	8.22
phenetole	8.13
benzaldehyde	9.53
acetophenone	9.27
benzenethiol	8.33
phenyl isocyanate	8.77

Aromatic Compounds

Molecule	IP(eV)
phenyl isothiocyanate	8.520
benzonitrile	9.705
nitrobenzene	9.92
aniline	7.70
fluoro-benzene	9.195
chloro-benzene	9.07
bromo-benzene	8.98
iodo-benzene	8.73
o-dichlorobenzene	9.07
m-dichlorobenzene	9.12
p-dichlorobenzene	8.94
1-chloro-2-fluorobenzene	9.155
1-chloro-3-fluorobenzene	9.21
1-chloro-4-fluorobenzene	8.99
o-fluorotoluene	8.915
m-fluorotoluene	8.915
p-fluorotoluene	8.785
o-chlorotoluene	8.83
m-chlorotoluene	8.83
p-chlorotoluene	8.70
o-bromotoluene	8.79
m-bromotoluene	8.81
p-bromotoluene	8.67
o-iodotoluene	8.62
m-iodotoluene	8.61
p-iodotoluene	8.50
benzotrifluoride	9.68
o-fluorophenol	8.66

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EXHIBIT F-1.2 (Cont'd)
Molecules and Compounds Detected by a Photoionization Detector (PID)

Heterocyclic Molecules

Molecule	IP(eV)
furan	8.89
2-methyl furan	8.39
2-furaldehyde	9.21
tetrahydrofuran	9.54
dihydropyran	8.34
tetrahydropyran	9.26
thiophene	8.860
2-chlorothiophene	8.68
2-bromothiophene	8.63
pyrrole	8.20
pyridine	9.32
2-picoline	9.02
3-picoline	9.04
4-picoline	9.04
2,3-lutidine	8.85
2,4-lutidine	8.85
2,6-lutidine	8.85

Miscellaneous Molecules

Molecule	IP(eV)
ethylene oxide	10.565
propylene oxide	10.22
p-dioxane	9.13
dimethoxymethane	10.00
diethoxymethane	9.70
1,1-dimethoxyethane	9.65
propiolactone	9.70
methyl disulfide	8.46
ethyl disulfide	8.27
diethyl sulfite	9.68
thiolacetic acid	10.00
acetyl chloride	11.02
acetyl bromide	10.55
cyclo-$C_6H_{11}CF_3$	10.46
$(n\text{-}C_3F_7)(CH_3)C=O$	10.58
trichlorovinylsilane	10.79
$(C_2F_5)_3N$	11.7
isoprene	9.08
phosgene	11.77

Notes:

Reference: HNu Systems, Inc., 1985
IP = Ionization Potential

EXHIBIT F-1.3

PHOTOIONIZATION DETECTOR CALIBRATION AND MAINTENANCE LOG

INSTRUMENT MANUFACTURER ____________________

INSTRUMENT MODEL ____________________

IDENTIFICATION NUMBER ____________________

LAMP (Circle One) 9.5eV 10.2eV 11.7eV

DATE/ TIME	INITIALS	BATTERY CHECK	CALIBRATION STANDARD			SPAN POTENTIOMETER SETTING	COMMENTS
			SOURCE	TYPE	CONCENTRATION		

APPENDIX F - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, GROUND-WATER, AND STORM SEWER INVESTIGATIONS

APPENDIX F-2

pH Meter Calibration, Operation, and Maintenance Procedures

I. Introduction

The pH meter will be calibrated daily prior to use.

II. Materials

- 10.0, 7.0, 4.0 pH buffer solutions
- Thermometer
- Distilled water
- Disposable plastic beakers
- Calibration and maintenance log

III. Calibration Procedures

The pH meter will be calibrated as follows:

1. Switch on instrument.

2. Connect electrode to meter and remove protective cap.

3. Rinse electrode in distilled water.

4. Measure and record temperature of buffer solutions.

5. Immerse pH electrode in pH buffer 7.00, set the temperature control to that of the buffer 7.00 and allow sufficient time for the electrode to stabilize. Adjust the Standardize Control for the correct readout.

6. Rinse electrode with distilled water.

7. Immerse pH electrode in buffer 4.0, set the temperature control to that of the buffer 4.0 and allow sufficient time for the electrode to stabilize. Adjust the Slope Control for the correct readout.

8a. Rinse the electrode with distilled water. The meter is calibrated and ready for use.

8b. (Optional step) If the pH is expected or could be between 7.0 to 10.0, then immerse the pH electrode in buffer 10.0, set temperature control, and allow sufficient time for the electrode to stabilize. Adjust the slope control for the correct read out.

9. Record calibration information on the Temperature/pH/DO/ORP/Conductivity Meter Calibration and Maintenance Log (Exhibit F-2).

IV. Operation Procedures

1. Calibrate pH meter.

2. Rinse probe in distilled water.

3. Fill a disposable beaker with the water sample.

4. Insert probe into one sample beaker and obtain a reading. The meter will read between 0 and 14, in 0.01 increments.

5. Repeat Step 4.

6. Log results in field notebook and the average will be the actual result.

7. Rinse probe off in distilled water.

V. Maintenance Procedures

1. Replace batteries on a regular basis.

2. Store electrode in protective casing when not in use.

3. Keep records of operation, maintenance, calibration, problems, and repairs.

4. After use, the meter will be inspected and the inspection recorded in the field notebook.

5. A replacement meter will be available on-site or ready for overnight shipment, if necessary.

6. pH meter will be sent back to manufacturer for service, if needed.

7. Record maintenance information on the Temperature/pH/DO/ORP/Conductivity Meter Calibration and Maintenance Log (Exhibit F-2).

EXHIBIT F-2

TEMPERATURE/pH/DO/ORP/CONDUCTIVITY METER CALIBRATION AND MAINTENANCE LOG

INSTRUMENT MANUFACTURER ______________________

INSTRUMENT MODEL ______________________

IDENTIFICATION NUMBER ______________________

DATE/TIME	INITIALS	TEMP.	STANDARD USED/EXPIRATION			DO	BATTERY CHECK	COMMENTS
			pH	CONDUCT.	ORP			

APPENDIX F - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, GROUND-WATER, AND STORM SEWER INVESTIGATIONS

APPENDIX F-3

Temperature/Conductivity Meter Calibration,
Operation, and Maintenance Procedures

I. Introduction

The temperature/conductivity meter (HACH Model 44600 or equivalent) will be calibrated daily prior to use.

II. Materials

Beaker capable of submerging the entire probe in a calibration liquid standard
Calibration liquid standard (NaCl, 1,000 mg/L or equivalent)
Fine end screw driver
Disposable plastic beakers

III. Calibration Procedures

The conductivity meter will be calibrated as follows:

1. Be sure the probe is clean.

2. Soak the probe in distilled water for at least 30 minutes.

3. Remove the probe from the water and shake off distilled water.

4. Immerse the probe to or beyond the vent holes in a disposable beaker containing Sodium Chloride Standard Solution, 1,000 mg/L. Agitate vertically to remove trapped air.

5. Repeat Steps 3 and 4 at least once more.

6. Press the Power key and CND key. Verify that the LO BAT indicator does not appear.

7. Press the 2 milliSiemens per centimeter (mS/cm) range key.

8. Check the reading on the display. It should be 1.990 mS/cm. If adjustment is needed, use a small screwdriver to adjust the CAL control next to the display. Counterclockwise adjustment increases the reading.

9. Record calibration information on Temperature/pH/DO/ORP/Conductivity Meter Calibration and Maintenance Log (Exhibit F-2).

IV. Operation Procedures - Temperature/Conductivity

1. Calibrate the conductivity meter.

2. Rinse probe in distilled water.

3. Fill a disposable beaker with water.

4. Turn meter to read temperature and record the temperature of the water twice.

5. Turn meter on to the 2 mS/cm scale.

6. Insert probe into sample beaker and obtain a reading. The meter will read between 0 and 20 mS/cm, in 0.001 increments.

7. Repeat Step 6.

8. Record results in the field notebook and the average will be the actual result.

9. Rinse probe off in distilled water.

VI. Maintenance Procedures

1. Replace batteries on a regular basis.

2. Store electrode in protective casing when not in use.

3. Keep records of operation, maintenance, calibration, and of any problems and repair.

4. After use, the meter will be inspected and the inspection recorded in the log book.

5. A replacement meter will be available on-site or ready for overnight shipment, if necessary.

6. Conductivity meter will be sent back to manufacturer for service when needed.

APPENDIX F-4

Dissolved Oxygen Meter Calibration, Operation, and Maintenance Procedures

I. Introduction

Dissolved oxygen (DO) will be measured using a YSI Model 50 Series or equivalent meter which will be calibrated prior to each field event.

II. Calibration Procedure

The dissolved oxygen meter will be calibrated as follows:

1. Prepare the probe with a thin Teflon[R] membrane stretched over the sensor.
2. Perform a battery check.
3. Set mode switch to operate and the operation switch to zero, and zero the instrument.
4. Take a temperature measurement and determine the calibration value from the provided table for the appropriate atmospheric pressure.
5. Select the desired range and adjust the instrument to an appropriate calibration value (determined in Step 4).
6. Place the probe in a water sample with a known dissolved oxygen level and read mg/L-dissolved oxygen.
7. Record temperature and dissolved oxygen calibration information on the Dissolved Oxygen Meter Calibration and Maintenance Log (Exhibit F-2).

III. Operation Procedure

1. Calibrate the dissolved oxygen meter.
2. Perform the battery check.
3. Fill a disposable beaker with water.
4. Set mode switch to operate and the operation switch to the desired range.
5. Place probe into water sample.
6. Take a temperature measurement and adjust temperature dial.
7. Switch to dissolved oxygen content measurement and allow reading to stabilize.
8. Record results in the field notebook.
9. Repeat procedure and record second reading. Average results and record.

10. Rinse the probe with distilled water.

IV. Maintenance Procedures

1. Replace batteries on a regular basis.

2. Store electrode in protective casing when not in use.

3. Keep records of operation, maintenance, calibration, and any problems and repair.

4. A replacement dissolved oxygen meter will be ready for overnight shipment, if necessary.

5. Dissolved oxygen meter will be sent back to manufacturer for service when needed.

6. Record maintenance information on the Dissolved Oxygen Meter Calibration and Maintenance Log (Exhibit F-2).

APPENDIX F - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, GROUND-WATER, AND STORM SEWER INVESTIGATIONS

APPENDIX F-5

Water Level Probe Calibration Procedures

I. Introduction

The water level probe cable will be checked once to a standard to assess if the meter has been correctly calibrated by the manufacturer.

II. Materials

Water level probe and cable
Six-foot engineer's rule

III. Procedures

1. Each water level probe will be calibrated prior to using.
2. To calibrate, the lengths between each increment markers on the cable will be measured with a six-foot engineer's rule. The cable will be checked for the first 150 feet.
3. If markers are incorrect, the probe will be sent back to the manufacturer.
4. Record verification on form (Exhibit F-5).

EXHIBIT F-5

WATER LEVEL PROBE MAINTENANCE LOG

Instrument Model Number ____________________

Instrument Serial Number ____________________

Date/Time	Initials	Battery Check	Sound Indicator Check	Light Indicator Check	Case	6-Foot Ruler	Comments

APPENDIX G - FLUID LEVEL MEASUREMENT AND SAMPLING PROCEDURES FOR MONITORING WELLS

I. Introduction

This protocol describes the procedures to be used to collect ground-water samples. No wells will be sampled until well development has been performed. During precipitation events, ground-water sampling will be discontinued until precipitation ceases. When a round of water levels is taken for the purpose of generating water elevation data, the water levels will be taken consecutively at one time prior to sampling or other activities.

II. Materials

The following materials, as required, shall be available during ground-water sampling:

- Sample pump;
- Sample tubing;
- Power source (i.e. generator)
- Photoionization detector (PID);
- Appropriate health and safety equipment as specified in the Health and Safety Plan;
- Plastic sheeting (for each sampling location);
- Dedicated or disposable bailers;
- Polypropylene rope;
- Buckets to measure purge water;
- Water level probe;
- 6' rule with gradation in hundredths of a foot;
- Conductivity/temperature meter;
- pH meter;
- Turbidity meter;
- DO meter;
- ORP meter;
- Appropriate water sample containers;
- Appropriate blanks (trip blank supplied by the laboratory);
- Appropriate transport containers (coolers) with ice and appropriate labeling, packing, and shipping materials;
- Ground-water sampling logs;
- Chain-of-Custody forms;
- Indelible ink pens;
- Site map with well locations and ground-water contours maps;
- Peristaltic pump and dedicated tubing; and
- Keys to wells.

III. Procedures

A. The procedures to sample monitoring wells will be as follows:

1. Review materials check list (Part II) to ensure the appropriate equipment has been acquired.

2. Identify site and well sampled on sampling log sheets, along with date, arrival time, and weather conditions. Identify the personnel and equipment utilized and other pertinent data requested on the logs (Exhibit 1).

3. Label the sample containers as described in Section 4.0 and Appendix B. Cover the sample label with clear packaging tape to secure the label to the container.

4. Don safety equipment, as required in the Health and Safety Plan.

5. Place plastic sheeting adjacent to well to use as a clean work area.

6. Establish the background reading with the PID and record the reading on the field log (Exhibit 1).

7. Remove lock from well and if rusted or broken replace with a new brass keyed-alike lock.

8. Unlock and open the well cover while standing upwind of the well. Remove well cap and place on the plastic sheeting. Insert PID probe in the breathing zone above the well casing following instructions in the Health and Safety Plan.

9. Set out on plastic sheeting the dedicated or disposable sampling device and meters.

10. Prior to sampling, ground-water elevations will be measured at each monitoring well and the presence of LNAPL/DNAPL (if any) within the well will be evaluated. Obtain a water level depth and bottom of well depth using an electric well probe and record on sampling log sheet. Clean the well probe before and after each use with a soapy (Alconox) water wash and a tap water rinse. [Note: water levels may be measured at all wells prior to initiating any sampling activities].

11. If LNAPL and DNAPL are determined not to be present at the well, three well volume will be purged. If LNAPL or DNAPL are found in the well, a ground-water sample will not be collected; instead, a representative sample of the LNAPL/DNAPL will be collected (as described in Section 3.0, up to two LNAPL samples and up to two DNAPL samples will be collected at the site).

12. Pump, safety cable, tubing, and electrical lines will be lowered slowly into the well to a depth corresponding to the center of the saturated screen section of the well, or at a location determined to either be a preferential flow path, or zone where contamination is present. The pump intake must be kept at least two feet above the bottom of the well to prevent mobilization of any sediment present in the bottom of the well.

13. Measure the water level again with the pump in well before starting the pump. Start pumping the well at 200 to 500 milliliters per minute. Ideally, the pump rate should cause little or no water level drawdown in the well (less than 0.3 feet and the water level should stabilize). The water level should be monitored every three to five minutes (or as appropriate) during pumping. Care should be taken not to cause pump suction to be broken or entrainment of air in the sample. Record pumping rate adjustments and depths to water. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to avoid pumping the well dry and/or to ensure stabilization of indicator parameters. If the recharge rate of the well is very low, purging should be interrupted so as not to cause the drawdown within the well to advance below the pump. However, a steady flow rate should be maintained to the extent practicable. Sampling should commence as soon as the volume in the well has recovered sufficiently to permit collection of samples.

14. During purging of the well, monitor the field indicator parameters (turbidity, temperature, specific conductance, pH, etc.) every three to five minutes (or as appropriate). The well is considered stabilized and ready for sample collection once all the field indicator parameter values remain within 10% for three consecutive readings. If the parameters have stabilized, but the turbidity is not in the range of the 50 NTU goal, the pump flow rate should be decreased to no more than 100 ml/min. Measurement of the indicator parameters should continue every three to five minutes. Measurements for DO and ORP must be obtained using a flow through cell. Other parameters may be taken in a clean container such as a glass beaker.

15. After the appropriate purge volume of ground water in the well has been removed obtain the ground water sample needed for analysis directly from the sampling device in the appropriate container and tightly screw on the caps.

16. Secure with packing material and store at 4°C on wet ice in an insulated transport container provided by the laboratory.

17. After all sampling containers have been filled, remove an additional volume of ground water. Check the calibration of the meters and then measure and record on the field log physical appearance, pH, ORP, DO, temperature, turbidity, and conductivity.

18. If using a dedicated bailer, replace dedicated bailer in the well and replace the well cap and lock well.

19. Record the time sampling procedures were completed on the field logs.

20. Place all disposable sampling materials (plastic sheeting, disposable bailers, and health and safety equipment) in appropriately labeled containers. Go to next well and repeat Step 1 through Step 20 until all wells are sampled.

21. Complete the procedures for packaging, shipping, and handling with associated chain-of-custody.

B. The following procedures apply to monitoring water levels for possible tidal fluctuation:

1. Obtain automatic data logger and pressure transducer(s).

2. Follow Steps 1 and 4 through 9 from III.A above.

3. Measure ground-water elevation using electric well probe and record in field book.

4. Lower cleaned pressure transducer to an appropriate depth below the water table. This depth is dependent on the psi-rating of the transducer, but should be at least two feet below the water table.

5. Connect the transducer to the data logger and set to record the water level in feet at an appropriate frequency (e.g., once per hour).

6. Start the data logger and confirm that it is functioning.

EXHIBIT 1

GROUND-WATER SAMPLING FIELD LOG

Project ______________________________

Sampling Purpose ______________________

Well No. _____________________________

Key No. ______________________________

HNu Background _____ Well ____________

Project No. ___________________________

Site Name ____________________________

Sampling Personnel ____________________

Date/Time ___ In ___ Out ______________

Weather ______________________________

I. Well Information

Reference Point Marked
on Casing Y N
Well Diameter ___ ID ___ OD
Well depth _______ from RP
Water table depth ____ from RP
Slug test Y N

Length of Inner Casing
___ above grade
Length of Outer Casing
___ above grade
Redevelop Y N

II. Well Water Information

Length of water column ______________________
Volume of water in well ______________________
Volume of bailer ____________________________

III. Evacuation Information

Volume of water removed
from well __________
Did well go dry? Y N

Evacuation method
Bailer ( )
Evacuation rate ______________

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis

V. Ground-Water Characteristics/After Well Evacuation

Temperature _____
Conductivity _____
pH _____
ORP ______

DO _____
Film _____

VI. Miscellaneous Observations/Problems

VII. Sample Destination

Laboratory Via _______ By ________

____
Field Personnel

APPENDIX H - MONITORING WELL INSTALLATION AND DEVELOPMENT PROCEDURES

I. Introduction

Prior to commencing work, all underground utilities will be located by UFPO, by field personnel with appropriate devices, and/or by a private contractor specializing in this type of work.

Soil boring and rock coring procedures set forth in Appendix E, will be implemented prior to well installation.

II. Procedures - Monitoring Wells in Overburden

Overburden monitoring wells will be installed by placing the screen and casing assembly with bottom cap into the auger string once the screen interval has been selected. At that time, a washed silica sand pack will be placed in the annular space opposite the screen to 1 to 2 feet above the top of the screen. A graded filter sand pack will be used that is appropriate to the size of the screened soil interval. Hydrated bentonite will then be added to the annulus between the casing and the borehole wall for at least 2 feet. A cement/bentonite grout will then be added above the bentonite during the extraction of the augers to ground surface. During placement of sand and bentonite, frequent measurements will be made to check the height of the sand pack and thickness of bentonite by a weighted tape measure.

Monitoring wells will be constructed of 2-inch PVC well screen and riser. Slot size will be 0.010-inch. Each new monitoring well will have a blank section of riser pipe, and a sump attached below the screened interval. This sump will be used as a potential collection point for DNAPLs which may be present, and allow for the sampling and analysis of DNAPL. The well screen of a shallow overburden well will span the uppermost 10 feet of saturated overburden. The well screen in the deeper overburden well will span a 10-foot zone and will depend on the zones of source areas and the PID screening results.

A vented protective steel casing shall be located over the riser casing extending at least 1.5 feet below grade and 2 feet to 3 feet above grade secured by a neat Portland Cement seal. The cement seal shall extend approximately 1.5 feet below grade and laterally at least 1 foot in all directions from the protective casing and shall slope gently away to drain water away from the well. A vented slip-on steel cap will be fitted on and around the protective casing. Monitoring wells will be labeled with the appropriate designation both on the inner and outer well casings. A typical overburden monitoring well detail is shown on Exhibit 1.

The supervising geologist shall specify the monitoring well designs to the drilling contractor before installation.

The supervising geologist is responsible for recording the exact construction details as relayed by the drilling contractor and actual measurements. Both the supervising geologist and drilling contractor are responsible for tabulating all materials used such as footage of casing and screen or bags of bentonite, cement, and sand.

III. Procedure - Montioring Wells in Bedrock

The bedrock wells will be installed as open-hole wells. The bedrock monitoring wells will be installed by drilling through the overburden with hollow-stem augers, and setting a steel casing into the top of the bedrock. A plug will be installed at the base of the casing prior to installation, and the outside of the casing will be tremie grouted in place. A locking cover will be installed on the casing overnight. After the grout has set for at least 48 hours, the plug will be removed inside the casing by roller bit drilling back down to the top of the bedrock. Coring approximately 10 feet of bedrock will provide an open-hole bedrock well. A typical bedrock monitoring well detail is shown on Figure 2.

Removing the plug within the casing and coring will require washing out the cuttings with water. Wash water potentially containing source materials will be temporarily contained in a mud tub and transfeered to a central container for interim storage until properly disposed.

IV. Development

All monitoring wells will be developed or cleared of fine grain materials that may have settled in or around the screen during installation. Development will be accomplished by surging and evacuating water by slow pumping. The well will be developed until turbidity is reduced to 50 nephelometric turbidity units (NTUs) or less. In the event that the wells cannot be developed to 50 NTUs, development will proceed until the water evacuated from the well is reasonably free of visible sediment.

A. Materials for well development include:

- Appropriate Health and Safety Equipment;
- Appropriate Cleaning Equipment;
- Bottom Loading Bailer;
- Polypropylene Rope;
- Plastic Sheeting;
- pH, conductivity, and temperature meters;
- Nephelometric Turbidity Meter;
- Graduated Buckets;
- Disposable gloves;
- Pump/tubing/foot valve/surge block; and
- Generator.

B. The procedure for developing a well using the pumping method is outlined below:

When developing a well using the pumping method, new cleaned polypropylene tubin with a foot valve and surge block will be extended to the screened portion of the diameter of the surge block will be within 0.5 inches of the well diameter. The tub connected to a hydrolift-type pumping system that allows up and down movement block. The tubing will also be manually lifted and lowered within the screened ir pumping rate will be about two times the anticipated well purging rate. Surging will as many times as necessary within the well screen interval until the ground water clear. Any tubing will be disposed of between wells; clean, new tubing will be used

Detailed procedures for ground-water well development will be as follows:

1. Don appropriate safety equipment.
2. All equipment entering each monitoring well will be cleaned as specified ix D.
3. Attach appropriate pump and lower tubing into well.
4. Turn on pump. If well runs dry then shut off pump and allow to recove
5. Surging by raising and lowering the tubing in the well will be performe times to pull in fine grained materials.
6. Steps 4 and 5 will be repeated until ground water is relatively silt free
7. The developing equipment will be raised 2 feet and then Step 4 thr tep 5 will be repeated.

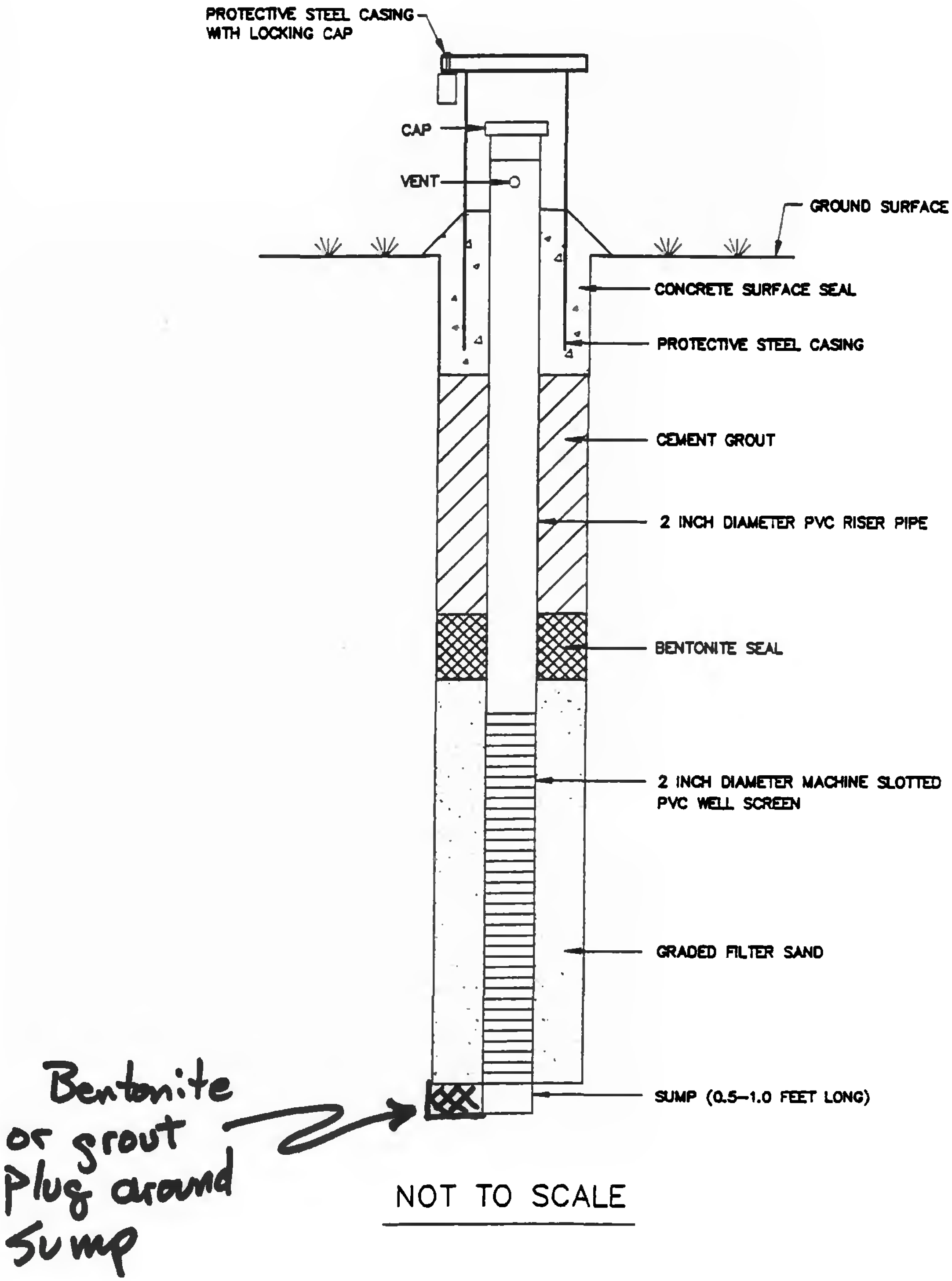
8. Step 6 will be repeated until entire well screen has been developed.

V. Survey

A field survey control program will be conducted using standard instrument survey techniques to document the well location to the State Plane Coordinate System of 1927 (or other appropriate reference) and the ground, inner casing, and outer casing elevations to the National Geodetic Vertical Datum (NGVD) of 1929.

VI. Equipment Cleaning

Drilling equipment will be cleaned using high-pressure steam cleaning equipment using a tap water source. Drilling equipment will be cleaned prior to use on the site, between each monitoring well location, and at the completion of the drilling prior to leaving the site as discussed in Appendix D.



NOT TO SCALE

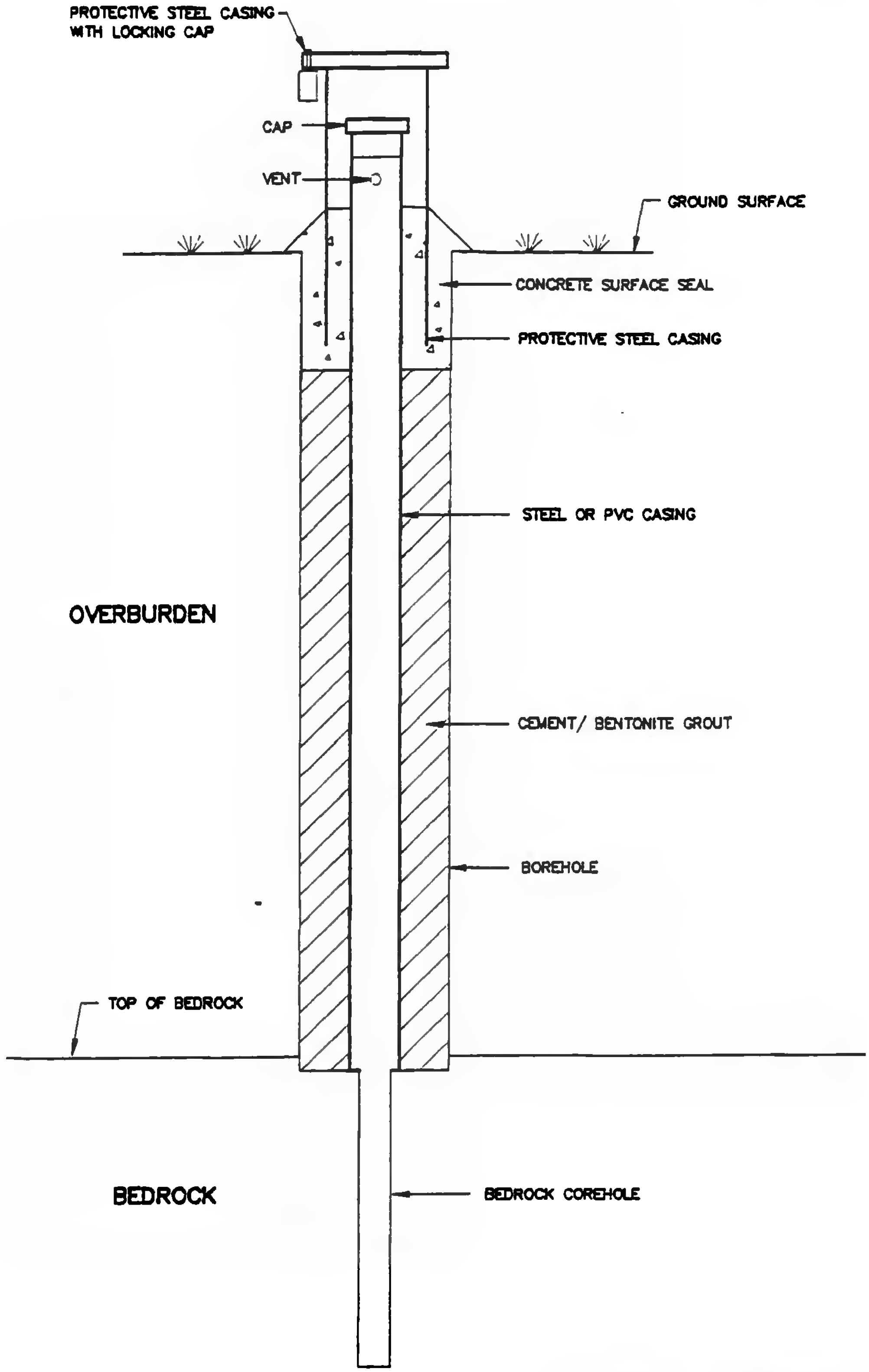
NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER
MGP/RCRA INVESTIGATION &
REMEDIAL MEASURES EVALUATION

TYPICAL SHALLOW OVERBURDEN MONITORING WELL CONSTRUCTION DETAIL

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
1

P: STD-PCP/AP
3/1/96 DIV54 RCB
36469001/36469W01.dwg



NOT TO SCALE

NIAGARA MOHAWK POWER CORPORATION
NORTH ALBANY SERVICE CENTER
MGP/RCRA INVESTIGATION &
REMEDIAL MEASURES EVALUATION

TYPICAL OPEN HOLE
MONITORING WELL CONSTRUCTION DETAIL

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
2

P: STD-PCP/AP
8/1/96 DIV54 RCB
36469001/36469W02.dwg

APPENDIX I - IN-SITU HYDRAULIC CONDUCTIVITY TEST PROCEDURES

I. Introduction

In-situ hydraulic conductivity tests will be conducted to calculate hydraulic conductivity of the geologic formation immediately surrounding the screened interval of monitoring wells. These tests consist of creating an "instantaneous" water level change in the well and monitoring the water level through time as the well is allowed to recover to static or near-static conditions.

The type of test conducted will be one or a combination of the following: 1) a falling head test accomplished by using solid cylinder ("slug") that will be submerged below the water table in a well to displace a known volume of water; 2) a rising head test accomplished by inserting a slug into the well allowing the water to equilibrate, then removing the slug and recording data immediately; 3) a rising head test utilizing a pressure system which lowers the static water level by a specified amount of displacement under positive air pressure. Falling head tests are not valid in wells whose screened intervals straddle the water table, because the elevated water level would flow out of the well into the previously unsaturated material above the water table. The field water level data will be evaluated using Hvorslev's and/or the Bouwer-Rice method.

II. Materials

- Cement weighted PVC slug;
- Polypropylene rope;
- Water level indicator and extra batteries;
- Masking or electrical tape to secure transducer cable to well standpipe;
- Waterproof marker;
- Engineer's rule;
- Cleaning supplies including non-phosphate laboratory grade detergent (Alconox or equivalent), solvents (pesticide grade methanol or hexane), brushes, buckets, tap water, aluminum foil, plastic sheeting, etc;
- Garbage bags;
- Disposable gloves;
- Flashlight;
- Stopwatch;
- Well keys;
- Extra locks;
- Hacksaw;
- Field notebook;
- Pressure system well head assembly and a hand pump or a compressed air supply with regulator and a pressure gauge;
- Data acquisition unit (Data logger) and pressure transducer; and
- Portable personal computer (PC) with extra batteries, appropriate cables, software, floppy disks and/or a field printer.

III. Procedures

1. Identify site and well number in the field notebook along with date, time, personnel and weather conditions. Include the type of test conducted and the range and pressure of the transducer in pounds per square inch (PSI). (Two persons will be required to conduct this test.)

2. Make sure all equipment that enters the well is cleaned before use (i.e., slug, pressure transducer and cable). Use new, clean materials when cleaning is not appropriate (i.e., polypropylene rope, disposable gloves). Document cleaning procedures in the field notebook.

3. Place the cleaned equipment and instruments on plastic sheeting near the well.

4. Measure the static water level of the well with a water level indicator and record the measurement in the field notebook. This measurement will aid in determining the depths for the placement of the pressure transducer and the slug.

5. If using a solid slug to conduct the test continue with step 5. If using the pressure system to conduct the test go directly to step 13. Install the precleaned pressure transducer in the well to a predetermined depth making sure it will be below the slug once the slug is fully submerged. Record this depth in the field notebook. The installation depth also depends on the amount of water displacement and the range of the pressure transducer. If the transducer is installed at a depth below its maximum range, damage may occur to the sensor and the output reading will not be correct. One PSI is equal to approximately 2.31 feet of water. If a 5 PSI pressure transducer is utilized, the range is 11.55 feet of water and the pressure transducer should not be installed at a depth below 11.55 feet. Tape the transducer cable to the well to eliminate any movement of the pressure transducer and ensure stability.

6. Connect the pressure transducer cable to the data logger, and verify that the equipment is working properly. Program the data logger accordingly using the PC and appropriate software. Monitor the water level displayed on the PC screen to ensure the pressure transducer sensor is not below its maximum range and to ascertain when the water level has reached static conditions after the insertion of the pressure transducer and cable. Record the equilibrated water level reading displayed on the PC in the field notebook.

7. Measure out a length of rope and attach it to the slug. It is important that the slug does not come in contact with the transducer sensor once it is inserted in the well.

8. Run a rising head slug test by inserting the precleaned slug and allowing the water level to equilibrate (i.e., return to static or near-static conditions). Remove the slug and begin recording the data immediately. Collect the water level data according to a predetermined schedule while water levels rise and the aquifer returns to static or near-static conditions.

   OR

   Run a falling head test by inserting the precleaned slug and immediately collecting the water level data according to a predetermined schedule while the water levels fall and the aquifer returns to static or near-static conditions. Do not disturb the slug following its introduction into the well because this will adversely affect the test results.

9. Review the data to determine if a meaningful test has been conducted and perform a duplicate test if deemed necessary (Results of duplicate test should be within a half order of magnitude). Record the start and finish time of the test.

10. Transfer the data from the data logger to the PC and create a spreadsheet compatible file. Copy recorded data to a floppy disk.

11. Remove the pressure transducer and cable from the well. Clean all test equipment that came into contact with the ground water with soapy water (Alconox or equivalent), tap water rinse, pesticide grade methanol or hexane rinse, and tap water rinse.

12. Secure the test well prior to leaving by replacing the well cap and/or cover and lock it. Place all disposable equipment (i.e., rope, plastic sheeting, and disposable gloves, etc.) in a plastic bag and dispose in an appropriate manner. Go to next well and repeat step 1 through 12.

13. The pressure system well head assembly consists of 2-inch I.D. PVC pipe with a cap at one end, with air tight fittings for the air line and pressure transducer cable. A 2-inch I.D. quick release ball valve is attached to a Y-connector (a T-connector can also be used) in-line with the well head

assembly. The well head assembly is attached to the well riser pipe by a rubber sleeve and hose clamps. A diagram of the well head assembly is shown in Exhibit 1.

14. Pass the precleaned pressure transducer through the well head assembly cap and suspend the transducer at a predetermined depth below the water table. Record this depth in the field notebook. The appropriate depth will depend on the amount of water displacement and the transducer pressure rating (refer to Step 5). Secure the well head assembly to the well riser by tightening the hose clamps. Check the seals and make sure the seals are air tight.

15. Connect the pressure transducer cable to the data logger, and verify that the equipment is working properly. Program the data logger accordingly, using the PC and appropriate software. Monitor the water level displayed on the PC screen to ensure the pressure transducer sensor is not below its maximum range and to ascertain when the water level has reached static conditions after the insertion of the pressure transducer and cable. Record the equilibrated water level reading displayed on the PC in the field notebook.

16. Close the quick release valve. A simple hand pump can be used to supply the appropriate amount of air pressure to achieve the desired change in water level. This change is monitored on a gauge connected to the well head assembly which displays air pressure in inches of water. A tank of compressed air with a regulator equipped with a pressure gauge can also be used. This is accomplished by connecting an air line from the regulator to the fitting on the top of the well head assembly.

17. Monitor the change in pressure and water level displayed on the PC until the water and air pressure equilibrates and is equal to the static total head recorded prior to pressurizing the well.

18. Begin recording data while simultaneously opening the quick release valve. Collect the water level data according to a predetermined schedule while water levels rise and the aquifer returns to static or near-static conditions.

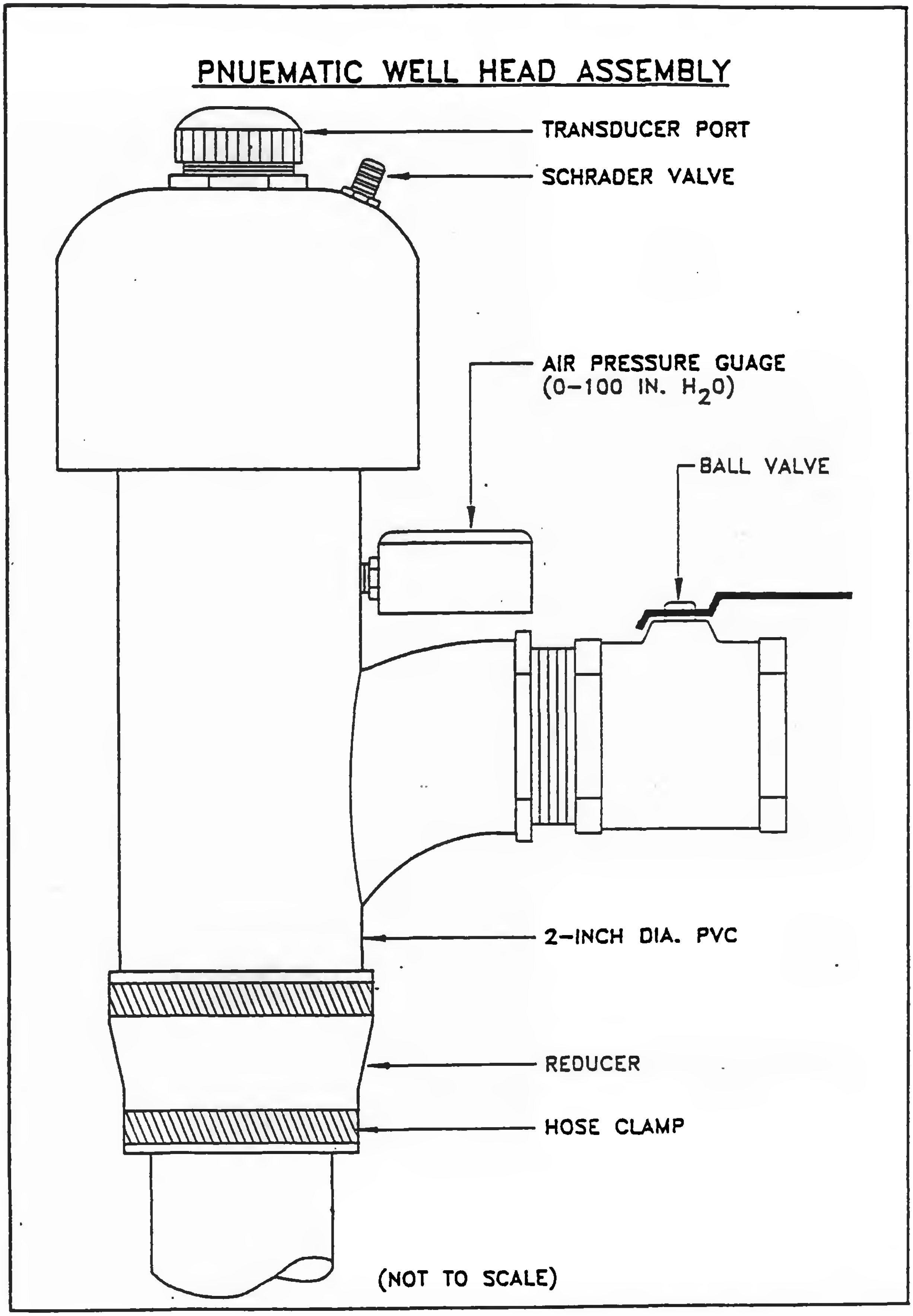
19. Review the data to determine if a meaningful test has been conducted and perform a duplicate test if deemed necessary. Record the start and finish time of the test.

20. Transfer the data from the data logger to the PC and create a spreadsheet compatible file. Copy recorded data to a floppy disk.

21. Remove the well head assembly and the pressure transducer and cable from the well. Clean all test equipment with a soapy water rinse, tap water rinse, pesticide grade methanol or hexane rinse, and tap water rinse.

22. Secure the test well prior to leaving by replacing the well cap and/or cover and lock it. Place all disposable equipment (i.e., rope, plastic sheeting, and disposable gloves, etc.) in a plastic bag and dispose in an appropriate manner. Go to next well and repeat Step 1 through Step 4 and Step 13 through Step 22.

EXHIBIT 1



PNUEMATIC WELL HEAD ASSEMBLY
TRANSDUCER PORT
SCHRADER VALVE
AIR PRESSURE GUAGE
(0-100 IN. H2O)
BALL VALVE
2-INCH DIA. PVC
REDUCER
HOSE CLAMP
(NOT TO SCALE)

APPENDIX J - STORM SEWER DRY WEATHER FLOW SAMPLING PROCEDURES

I. Introduction

This appendix presents the methods to be used for collecting dry weather flow samples from pipes that discharge to manholes/catch basins associated with the storm sewer system at the facility.

II. Materials

The following materials will be available, as required, during dry weather flow sampling:

- Tripod and harness for lowering personnel into manholes/catch basins
- Orange traffic cones
- Manhole hook for cover removal
- Health and safety equipment as required by the Health and Safety Plan
- Rope and bucket for lowering sampling equipment to personnel in manholes
- Field book
- Graduated cylinder/beaker or velocity meter
- Stopwatch
- Appropriate water sample containers (prepared with appropriate preservatives by the laboratory prior to each sampling event)
- Dedicated sample containers for transferring samples
- Appropriate blanks (trip)
- Appropriate transport containers (coolers) and appropriate packing, labeling, and shipping materials with ice
- Appropriate water sampler (i.e., grab sample containers and peristaltic pump)
- 0.45 micron in-line filter

III. Procedures

1. Up to five dry-weather flow sampling locations will be selected by the BBL project manager after the inspection of drainage stuctures and piping. The locations will be noted in the field book.

2. Place orange traffic cones around the manhole/catch basin from which dry-weather flow samples will be collected, if located in an area where traffic is expected.

3. Remove manhole/catch basin covers using proper lifting techniques.

4. Monitor the air in the manhole/catch basin for oxygen, carbon monoxide, hydrogen sulfide, combustible gas, and total organic vapors, as described in the Health and Safety Plan.

5. Use tripod and harness to lower personnel into the manhole/catch basin, if necessary, to collect dry-weather flow samples.

6. Collect whole water samples directly into the appropriate sample containers, as described below. Do not submerge any sample containers that contain preservative (i.e., containers for TAL inorganic samples). Use a dedicated sample container to transfer the sample into the appropriate laboratory sample container, if necessary.

7. Each dry-weather flow sample will be submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, TAL inorganic constituents, and TSS. At two of the five dry-weather flow sampling locations, both filtered and unfiltered flow samples will be collected for analysis for PCBs and TAL inorganic constituents. Filtration of dry-weather flow samples selected for filtered PCB analysis will be conducted in the laboratory. Filtration of dry-weather flow samples selected for filtered TAL inorganic constituent analysis will be performed in the field.

8. For samples requiring filtration in the field, pump a sufficient volume of the sample into a sample container using a peristaltic pump, dedicated or pre-cleaned tubing, and dedicated 0.45 micron in-line filter (change filter between sampling locations).

9. Unfiltered water samples to be analyzed for VOCs will be collected directly in 40 ml vials with Teflon liners. The vial is submersed with the cap on. After the vial is under the surface, remove the cap and allow the vial to fill. No air bubbles shall remain in the vial. Before removing from the water, cap the vial. As an alternate method, the vial may be filled by transferring dry-weather flow water collected in a dedicated sample container into the vial. Sample water shall also be poured onto the inside of the vial cap, so that when the cap is tightened onto the sample vial, no bubbles are present in the sample.

10. Label all bottles as appropriate, as described in Appendix B.

11. Place filled sample containers on ice in a cooler.

12. Follow procedures for preservation of samples and packing, handling, and shipping associated with chain-of-custody procedures for samples as set forth in Section 4.0 and Appendix B.

IV. Field Cleaning Procedures

A. Materials

- Health and safety equipment (as required in the Health and Safety Plan)
- Distilled water (laboratory-supplied)
- Non-phosphate soap; (Alconox^R, or equivalent)
- Tap water
- Appropriate cleaning solvent (ie., hexane, methenol, nitric acid)
- Rinse collection plastic containers
- Brushes
- Aluminum foil
- Garbage bags
- Spray bottles for solvent
- Ziploc^R type bags

B. Procedures

1. Follow health and safety procedures specified in the Health and Safety Plan.

2. Cleaning of any reusable sampling equipment (e.g., glass beakers, glass mixing containers, teflon stirring rods, teflon tubing) will follow the decontamination procedures presented in Appendix D.

3. Cleaning will be conducted in plastic containers that will be transported to each sampling location (or group of locations). These containers will also be used to collect all decontamination rinsate.

V. Disposal Methods

Materials generated during the above activities will be disposed of as described in Section 4.2.6.

APPENDIX K - STORM SEWER DEBRIS SAMPLING PROCEDURES

I. Introduction

Prior to sampling debris from manholes/catch basins and/or piping associated with the site storm sewer system, the depth of debris in the bottom of the manhole/catch basin will be determined as part of the drainage structure inspection activities by probing using a metal rod. Following the inspection activities, debris samples will be collected as described in Section III. Debris samples from the drainage structures/piping will be collected in conjunction with the dry-weather flow sampling activities. In order to collect representative samples, dry-weather flow samples will be collected at a selected location first, followed by the collection of debris samples. Sampling will start at the most downstream location in the site storm sewer system and will proceed to the upstream locations.

II. Materials

The following materials will be available, as required, during storm sewer debris sampling activities:

- Tripod and harness for lowering personnel into manholes/catch basins
- Orange traffic cones
- Manhole hook for cover removal
- Health and safety equipment as required by the Health and Safety Plan
- Rope and bucket for lowering sampling equipment to personnel in manholes
- Field book
- Stainless steel scoop
- Appropriate sediment sample containers
- Appropriate transport containers (coolers) and appropriate packing, labelling, and shipping materials with ice

III. Procedures

1. Up to ten debris sampling locations will be selected by the BBL project manager after the inspection of drainage structures and piping. The locations will be noted in the field book.

2. Place orange traffic cones around the manhole/catch basin from which debris samples will be collected, if located in an area where traffic is expected.

3. Remove manhole/catch basin covers using proper lifting techniques.

4. Monitor the air in the manhole/catch basin for oxygen, carbon monoxide, hydrogen sulfide, combustible gas, and total organic vapors, as described in the Health and Safety Plan.

5. Use the tripod and harness to lower personnel into the manhole/catch basin, if necessary, to collect debris samples.

6. Use the stainless steel scoop to fill the appropriate debris sample containers.

7. Describe and record sample descriptions in the field notebook.

8. Each debris sample will be submitted for laboratory analysis for PCBs, TCL VOCs, TCL SVOCs, and TAL inorganic constituents.

9. Label all bottles as appropriate, as described in Appendix B.

10. Place filled sample containers on ice in a cooler.

11. Follow procedures for preservation of samples and packing, handling, and shipping associated with chain-of-custody procedures for samples as set forth in Section 4.0 and Appendix B.

IV. Field Cleaning Procedures

Field cleaning procedures will follow those set forth in Appendix D.

V. Disposal Methods

Materials generated during the sampling activities and disposable equipment will be disposed appropriately as discussed in Section 4.2.6.

MGP/RCRA Investigation and Remedial Measures Evaluation Project Management Plan

Niagara Mohawk Power Corporation
North Albany Service Center
Albany, New York

August 1996

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

6723 Towpath Road, P.O. Box 66
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(315) 446-9120

Table of Contents

1. Introduction

1.1 General

This MGP/RCRA Investigation and Remedial Measures Evaluation Project Management Plan (PMP) presents the project organization, schedule, and personnel to be utilized for implementation of the MGP/RCRA Investigation and Remedial Measures Evaluation at the Niagara Mohawk Power Corporation (NMPC) North Albany Service Center located at 1125 Broadway, Albany, New York. The PMP has been prepared in accordance with the requirements outlined in Module III - Corrective Action (Permit Module III) of the 6NYCRR Part 373 Hazardous Waste Management Permit for the North Albany Service Center hazardous waste treatment, storage, and disposal facility (TSDF).

This PMP includes a description of personnel qualifications for those individuals performing or directing the MGP/RCRA Investigation and Remedial Measures Evaluation. This PMP also documents the overall management approach to the MGP/RCRA Investigation and Remedial Measures Evaluation. The PMP supports the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan, Quality Assurance Project Plan (QAPjP), Health and Safety Plan (HASP), Data Management Plan (DMP), and Community Relations Plan (CRP) for the MGP/RCRA Investigation and Remedial Measures Evaluation to be implemented at the North Albany Service Center.

This PMP covers the core aspects of the MGP/RCRA Investigation and Remedial Measures Evaluation. If additional work activities are identified which are outside the scope of the PMP or if additional Blasland, Bouck & Lee, Inc. (BBL) personnel or subcontractors (i.e., laboratories and drillers), are required for this project, an addendum to this PMP will be prepared.

2. Project Organization and Responsibilities

2.1 Project Organization

This section of the PMP presents an overview of the project management organization that will be utilized to successfully attain the objectives of the MGP/RCRA Investigation and Remedial Measures Evaluation. The MGP/RCRA Investigation and Remedial Measures Evaluation will require integration of personnel from the organizations identified below, collectively referred to as the project team. A detailed description of the responsibilities of each member of the project team is presented below. A project organization chart presenting the BBL personnel involved with this project and their respective responsibilities is included on Figure 1.

2.1.1 Overall Project Management

BBL, on behalf of NMPC, has overall responsibility for the MGP/RCRA Investigation and Remedial Measures Evaluation at the NMPC North Albany Service Center. BBL personnel will perform the soil, ground-water, and storm sewer investigations; a focused screening level risk assessment; the air emissions assessment; and the assessment of potential interim remedial measures (IRMs). In addition, BBL will be responsible for evaluating resultant investigation data and preparing MGP/RCRA Investigation and Remedial Measures Evaluation deliverables required by the Consent Order and Permit Module III. Test pits, soil borings, and monitoring wells will be installed as part of the MGP/RCRA Investigation and Remedial Measures Evaluation by BBL's subcontractor, SJB Services, Inc. (SJB).

Project direction and oversight will be provided by NMPC personnel. Oversight in the field will also be provided by NMPC personnel. A listing of key project management personnel is provided below:

Project Title	Company/Organization	Name	Phone Number
Project Manager	Niagara Mohawk Power Corp. 300 Erie Boulevard West Syracuse, NY 13202	James F. Morgan	(315) 428-3101
Project Officer	Blasland, Bouck & Lee, Inc. 6723 Towpath Road, Box 66 Syracuse, NY 13214	David J. Ulm	(315) 446-9120
Project Manager	Blasland, Bouck & Lee, Inc. 6723 Towpath Road, Box 66 Syracuse, NY 13214	Michael C. Jones	(315) 446-9120
Technical Advisor	Blasland, Bouck & Lee, Inc. 6723 Towpath Road, Box 66 Syracuse, NY 13214	Frederick J. Kirschenheiter, P.E.	(315) 446-9120
New York State Department of Environmental Conservation MGP Project Manager	New York State Dept. of Environmental Conservation Bureau of Construction Services Division of Haz. Waste Rem. 50 Wolf Road Albany, NY 12233-7010	John T. Spellman, P.E.	(518) 457-9280

Project Title	Company/Organization	Name	Phone Number
New York State Department of Environmental Conservation Corrective Action Project Manager	New York State Dept. of Environmental Conservation Bureau of Haz. Compliance and Land Management Division of Solid and Hazardous Materials 50 Wolf Road Albany, NY 12233-7010	James R. Meacham	(518) 457-9255

The qualifications of BBL personnel identified in the above table are presented in Attachment A.

2.1.2 Task Managers

BBL staff performing the investigations and engineering activities for the MGP/RCRA Investigation and Remedial Measures Evaluation will be directed by BBL's project manager. The personnel responsible for each of the MGP/RCRA Investigation and Remedial Measures Evaluation tasks are listed below:

Project Title	Name	Phone Number
MGP/RCRA Investigation Task Manager	Nancy E. Gensky	(315) 446-9120
Focused Screening Level Risk Assessment Task Manager	Michelle A. Anatra-Cordone, Ph.D.	(315) 446-9120
Remedial Measures Evaluation Task Manager	Frederick J. Kirschenheiter, P.E.	(315) 446-9120
SWMU Investigation Field Manager	John C. Brussel	(315) 446-9120
MGP Investigation Field Manager	Lynette B. Mokry	(315) 446-9120
Health and Safety Manager	Herrick L. Teeter	(315) 446-9120

The qualifications of the BBL Task Managers identified in the above table are provided in Attachment A.

2.1.3 Analytical Laboratory Services

The majority of the laboratory analytical services for samples associated with the MGP/RCRA Investigation and Remedial Measures Evaluation will be provided by Galson Laboratories (Galson), a New York State Department of Health- and USEPA Contract Laboratory Procedures-certified laboratory. Analytical services will also be provided by Doble Engineering Company (Doble), and SJB. The analyses to be performed by each laboratory are listed below:

- Galson will perform analyses of soil, ground-water, LNAPL/DNAPL, dry-weather flow, and storm sewer debris samples for PCBs; Target Compound List (TCL) volatile organic compounds (VOCs); TCL semi-volatile organic compounds (SVOCs); Target Analyte List (TAL) inorganic constituents; benzene, toluene, ethylbenzene, and xylenes (BTEX compounds); polynuclear aromatic hydrocarbons (PAHs); total petroleum hydrocarbons (TPH); nitrate/nitrite; sulfate/sulfide; total suspended solids; and BTU content;

- Doble, will perform analyses of DNAPL samples for viscosity, density, and interfacial tension; and

- SJB will perform analyses of soil samples for grain size distribution, Atterberg limits, bulk density, moisture content, and specific gravity.

The laboratory analytical data provided by Galson, Doble, and SJB will be validated by BBL. Laboratory and data validation management personnel are listed below:

Title	Company/Organization	Name	Phone Number
Laboratory Project Manager	Galson Laboratories 6601 Kirkville Road East Syracuse, NY 13057	Ian McEachren	(315) 432-0506
Laboratory Project Manager	Doble Engineering Company 85 Walnut Street Watertown, MA 02172-4037	Paul Griffin	(617) 926-4900
Laboratory Project Manager	SJB Services, Inc. 55 Oliver Street Cohoes, NY 12047	Joe Genovese	(518) 238-1145/ (716) 821-5911
Quality Assurance Manager	Blasland, Bouck & Lee, Inc. 6723 Towpath Road, Box 66 Syracuse, NY 13214	Laurie Indick	(315) 446-9120

2.1.4 Quality Assurance Staff

The Quality Assurance (QA) aspects of the MGP/RCRA Investigation and Remedial Measures Evaluation will be conducted and/or reviewed by BBL, Galson, Saybolt-Heinrici, SJB, and representatives of the NYSDEC. To date, the following personnel have been assigned to this project component:

Title	Company/Organization	Name	Phone Number
Quality Assurance Manager	Blasland, Bouck & Lee, Inc.	Laurie Indick	(315) 446-9120
Quality Assurance Officer	Galson Laboratories	Gail Sutton	(315) 432-0506
Quality Assurance Officer	Doble Engineering Company	Paul Griffin	(617) 926-4900
Quality Assurance Officer	SJB Services, Inc.	Joe Genovese	(518) 238-1145
Data Validator	Blasland, Bouck & Lee, Inc.	Anthony J. Zuccolillo	(315) 446-9120
Quality Assurance Officer	NYSDEC	Christine McGrath	(518) 457-3252

The NYSDEC Quality Assurance Officer (QAO) will be informed prior to any changes to the protocols set forth in the QAPjP. The qualifications of BBL's Quality Assurance Manager (QAM)/data validator are presented in Attachment A.

2.2 Team Member Responsibilities

This section of the QAPjP discusses the responsibilities and duties of the project team members.

2.2.1 Niagara Mohawk Power Corporation

Project Manager

Responsibilities and duties include:

1. Overall direction of the MGP/RCRA Investigation and Remedial Measures Evaluation;
2. Direction of BBL and coordination with regulatory agencies;
3. Review of BBL work products, including data, memoranda, letters, and reports and all documents transmitted to the NYSDEC; and
4. Timely submittal of reports/documents to the NYSDEC.

2.2.2 Blasland, Bouck & Lee, Inc.

Project Officer

Responsibilities and duties include:

1. Oversight during BBL preparation of MGP/RCRA Investigation and Remedial Measures Evaluation work products; and
2. Provide BBL approval for major project deliverables.

Project Manager

Responsibilities and duties include:

1. Management and coordination of all aspects of the project as defined in the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan with an emphasis on adhering to the objectives and schedule of the MGP/RCRA Investigation and Remedial Measures Evaluation;
2. Maintain communications with NMPC;
3. Review MGP/RCRA Investigation and Remedial Measures Evaluation Report and all documents prepared by BBL;
4. Prepare monthly progress reports; and
5. Assure corrective actions are taken for any deficiencies cited during audits of MGP/RCRA Investigation and Remedial Measures Evaluation activities.

Technical Advisor

Responsibilities and duties include:

1. Providing technical advice related to engineering issues; and
2. Providing technical information related to previous investigations.

Task Managers

The NMPC North Albany Service Center MGP/RCRA Investigation and Remedial Measures Evaluation will be managed by Task Managers as set forth in Section 2.1.2. Responsibilities and duties of the Task Managers include:

1. Manage day-to-day MGP/RCRA Investigation and Remedial Measures Evaluation activities;
2. Develop, establish, and maintain files on MGP/RCRA Investigation and Remedial Measures Evaluation activities;
3. Review data reductions from the MGP/RCRA Investigation and Remedial Measures Evaluation activities;
4. Perform final data review of field data reductions and reports on MGP/RCRA Investigation and Remedial Measures Evaluation activities;
5. Assure corrective actions are taken for deficiencies cited during audits of MGP/RCRA Investigation and Remedial Measures Evaluation activities;
6. Overall QA/QC of the relevant portions of the MGP/RCRA Investigation and Remedial Measures Evaluation;
7. Review all field records and logs;
8. Instruct personnel working on MGP/RCRA Investigation and Remedial Measures Evaluation activities;
9. Coordinate field and laboratory schedules pertaining to the MGP/RCRA Investigation and Remedial Measures Evaluation activities;
10. Request sample bottles from laboratory;
11. Review the field instrumentation, maintenance, and calibration to meet data quality objectives;
12. Prepare sections of MGP/RCRA Investigation and Remedial Measures Evaluation Report; and
13. Maintain field and laboratory files of notebooks and logs, data reductions, and calculations. Transmit originals to the Project Manager.

Field Personnel

Responsibilities and duties include:

1. Perform field procedures associated with the soil, ground-water, and storm sewer investigations as set forth in the QAPjP;
2. Provide oversight during completion of soil borings and monitoring wells;
3. Perform field analyses and collect QA samples;
4. Calibrate, operate, and maintain field equipment;
5. Reduce field data;
6. Maintain sample custody; and
7. Prepare field records and logs.

Quality Assurance Manager (QAM)

Responsibilities and duties include:

1. Review laboratory data packages;
2. Oversee and interface with the analytical laboratories;
3. Oversee the data validator;
4. Coordinate field QA/QC activities with task managers, including audits of MGP/RCRA Investigation and Remedial Measures Evaluation activities, concentrating on field analytical measurements and practices to meet data quality objectives;
5. Review field reports;
6. Review audit reports;
7. Prepare interim QA/QC compliance reports; and
8. Prepare QA/QC report which includes an evaluation of field and laboratory data and data validation reports.

Data Validator

Responsibilities and duties include:

1. Provide validation of analytical data; and
2. Prepare validation report for incorporation into the MGP/RCRA Investigation and Remedial Measures Evaluation Report.

2.2.3 Galson Laboratories/Doble Engineering Company

General responsibilities and duties include:

1. Perform sample analyses and associated laboratory QA/QC procedures;
2. Supply sampling containers and shipping cartons;
3. Maintain laboratory custody of sample; and
4. Strictly adhere to all protocols in the QAPjP.

Project Manager

Responsibilities and duties include:

1. Serve as primary communication link between BBL and laboratory technical staff:
2. Monitor work loads and ensure availability of resources;
3. Oversee preparation of analytical reports; and
4. Supervise in-house chain-of-custody.

Quality Assurance Officer

Responsibilities and duties include:

1. Supervise the group which reviews and inspects all project-related laboratory activities; and
2. Conduct audits of all laboratory activities.

Sample Custodian

Responsibilities and duties include:

1. Receive all samples; and
2. Maintain custody of the samples and all documentation.

Laboratory Data Reviewer

Responsibilities and duties include:

1. Verify final analytical data prior to transmittal to BBL.

2.2.4 SJB Services, Inc.

General responsibilities and duties include:

1. Excavate test pits, complete soil borings, and install monitoring wells in accordance with protocols in the MGP/RCRA Investigation and Remedial Measures Evaluation QAPjP;
2. Decontamination of drilling and excavation equipment;
3. Comply with federal, state, and local laws, ordinances, codes, rules, and regulations relating to the performance of the work;
4. Comply with established facility-wide safe work practices;
5. Collecting soil cuttings and water generated by drilling activities for disposal by NMPC; and
6. Performing sample analyses (geotechnical parameters), supplying sample containers and shipping cartons, maintaining laboratory custody of samples, and adhering to the protocols in the QAPjP.

2.2.5 NYSDEC

Project Manager(s)

Responsibilities and duties include:

1. Provide NYSDEC approval of MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan and supporting documents and future MGP/RCRA Investigation and Remedial Measures Evaluation deliverables; and
2. Provide oversight during performance of the MGP/RCRA Investigation.

Quality Assurance Officer

Responsibilities and duties include:

1. Review and approval of the QAPjP;

2. Review of the QA/QC portion of the MGP/RCRA Investigation and Remedial Measures Evaluation Report; and
3. Field and laboratory audit responsibilities, if determined necessary.

3. Project Schedule

3.1 General

The anticipated schedule for completion of the MGP/RCRA Investigation and Remedial Measures Evaluation, following NYSDEC approval of the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan, is presented on Figure 2. The schedule presents dates for submittal of the Work Plan components, dates for starting and accomplishing specific tasks, and dates for reporting to the NYSDEC. The schedule is subject to change if unforeseen problems arise during implementation of the Work Plan.

3.2 Management Approach to Assure Adherence to Project Schedule

To assure adherence to the project schedule, project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities. Copies of the project schedule will be distributed to all BBL field personnel involved with implementation of the MGP/RCRA Investigation and to personnel involved with the Remedial Measures Evaluation. Field personnel will be responsible for contacting the MGP/RCRA Investigation Task Manager if field work appears to be falling behind schedule or if unforeseen events occur that may delay the overall project schedule. In the event that situations are identified that may delay the overall project schedule, additional equipment and/or additional manpower may be utilized, as appropriate.

As described in the Work Plan and the QAPjP, if corrective actions are required when field or analytical data are not within the objectives of the MGP/RCRA Investigation and Remedial Measures Evaluation, corrective actions shall be initiated promptly in order to minimize any impacts on the overall project schedule.

Figures

Project Organization Chart

FIGURE 1

Niagara Mohawk Power Corporation
MGP/RCRA Investigation and Remedial Measures Evaluation
North Albany Service Center

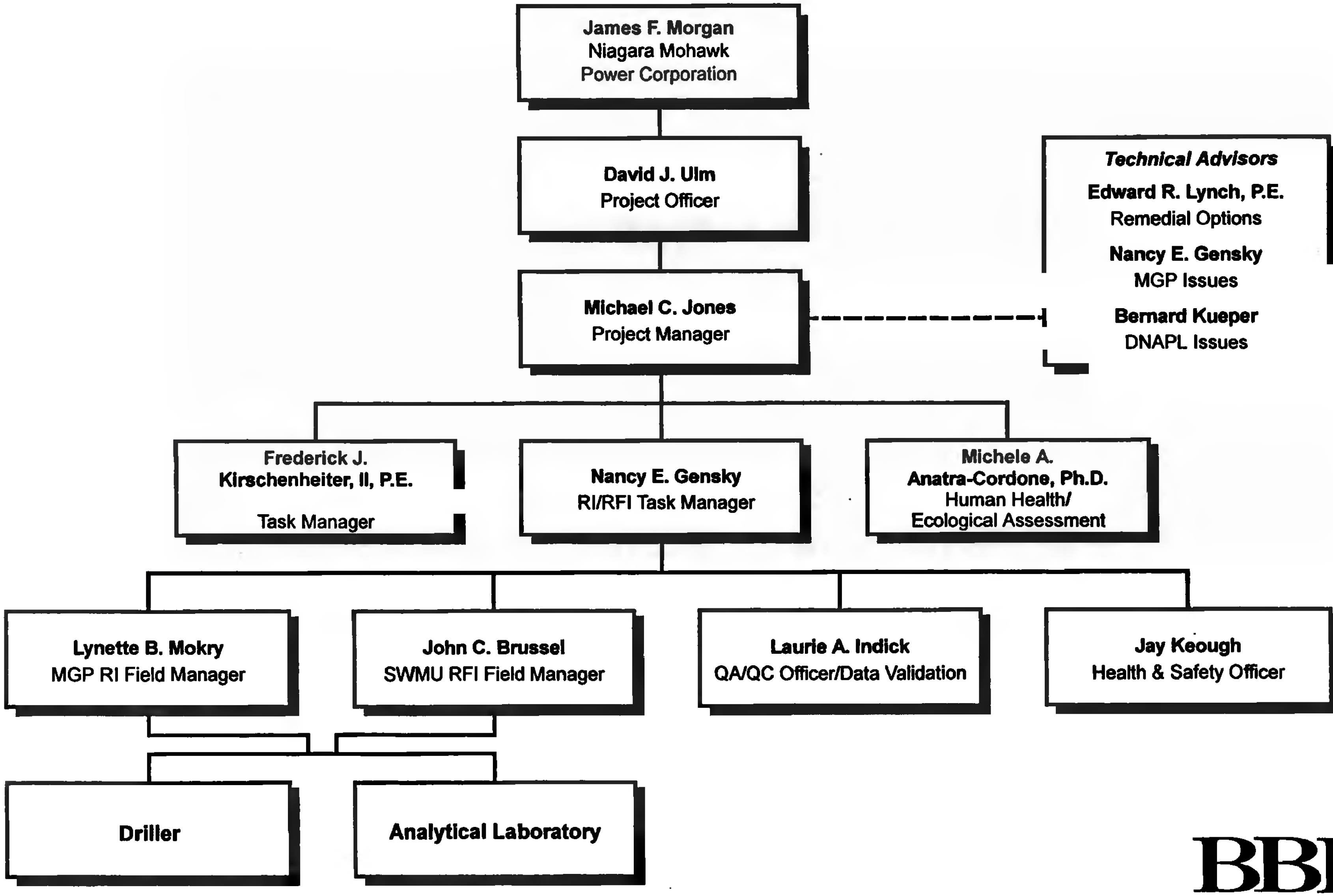

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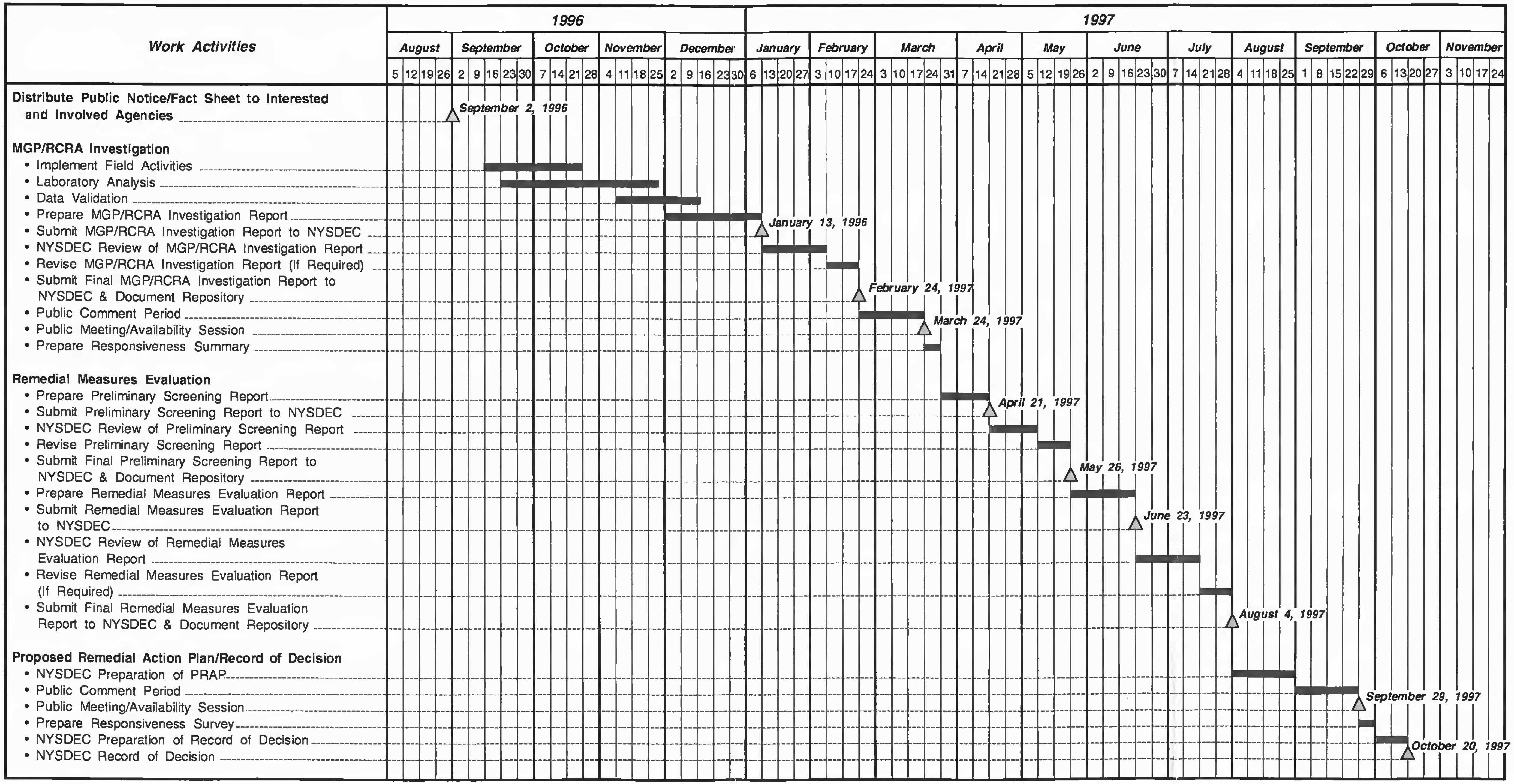
FIGURE 2

Proposed Project Schedule

Niagara Mohawk Power Corporation
MGP/RCRA Investigation and Remedial Measures Evaluation
North Albany Service Center



Notes:
1. Schedule for completion of the Remedial Measures Evaluation will be dependent upon the results of the MGP/RCRA Investigation.
2. Schedule is dependent upon NYSDEC review time frames.
3. Schedule for preparation of MGP/RCRA Investigation Report includes the evaluation of interim remedial measures and completion of the Focused Screening Level Risk Assessment.

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Attachment A

Resumes

David J. Ulm
Vice President

Professional Profile

Mr. Ulm has more than 15 years of experience in environmental consulting, and he currently heads an engineering division that specializes in hazardous waste site investigation and remediation. His project experience includes the management of remedial programs at several state and federal Superfund sites, including sites impacted by PCBs, volatile organic compounds, heavy metals, and other hazardous compounds.

Project Experience

Responsible for directing the preparation of a RCRA Corrective Measures Study for a 385-acre hazardous waste treatment, storage, and disposal facility (TSDF) in Niagara Falls, New York. The Corrective Measures Study involved evaluating and recommending corrective measures for 45 solid waste management units (SWMUs) including five hazardous waste landfills and seven solid waste landfills, in accordance with the RCRA corrective action modules of the facility's Part 373 permit.

Prepared, in response to RCRA Consent Order, an evaluation of the design and performance of three secure chemical management facilities to determine if a hydraulic connection existed between these facilities and the surrounding ground water for an industrial client in New York.

Responsible for directing several Remedial Investigation/Feasibility Study (RI/FS) programs including:

- A 5-acre active fire training school where oils containing PCBs were placed on or over training props and set on fire to simulate electrical fire fighting conditions for a utility client in New York State. Chemical of concern in soils, sediments, surface water, and ground water included PCBs, volatile, and semi-volatile organics and metals. Sediment and surface water investigations are required for an adjacent stream which discharges to a surface water body used as a public water supply source.

- An 8-acre inactive petroleum/chemical waste solvent storage and transfer facility in New York State. Chemicals of concern in soils and ground water include methylene chloride, methanol, N,N dimethyaniline, aniline and benzene. Negotiated technology-based cleanup levels for soils. Developed and implemented the first full-scale soil bioremediation pilot study (in-situ and ex-situ technologies) to be undertaken in New York State as part of NYSDEC's Inactive Hazardous Waste Sites Program.

- An active manufacturing facility with a chromeplating operation where plating rinse waters containing trivalent and hexavalent chromium were released to the environment. Chromium contamination is present in soils, stream sediments, and ground water. Negotiated risk-based cleanup levels for soils.

- A 7-acre inactive scrap yard in New York State where transformer oils containing regulated levels of PCBs were released to the environment. PCBs have been detected in the soils, ground water, and surface water and in the sediments of an on-site quarry pond. Off-site surface water and sediment investigations are focused on determining the presence and the extent of PCBs in the downstream river system. Responsible for the design and installation of a 400-gallon-per-minute PCB water treatment system used to drain a 2-acre on-site quarry pond to facilitate debris removal as part of an interim remedial measure.

Responsible for developing and administering numerous RCRA closure plans including:

- An inactive petroleum/waste solvent storage and transfer facility, conducted to satisfy the requirements of the Resource Conservation and Recovery Act (RCRA), which involved verifying decontamination of 11 aboveground storage tanks with capacities of up to 4 million gallons, and initiating removal and disposal of the aboveground tanks, underground tanks, and contaminated above and underground distribution piping. Verification procedures involved implementing a tank interior air sampling program using low volume sampling pumps with specific chemical absorbent collection tubes.

- A 65-acre inactive hazardous waste disposal site involving Consent Order negotiations with regulatory agencies. Selected alternative consisted of a synthetic membrane cap, leachate collection and storage facilities, a methane gas collection system, and an extensive on-site and off-site ground-water monitoring system.

- Hazardous waste surface impoundments at a chemical manufacturing plant in New York State, involving removal of mercury contaminated sludges and associated on site contaminated soils. Sludge was filter-pressed on site for disposal, and contaminated liquids were processed at on-site wastewater treatment plant.

Prepared, in response to RCRA Consent Order, an evaluation of the design and performance of three secure chemical management facilities to determine if a hydraulic connection existed between these facilities and the surrounding ground water for an industrial client in New York.

Responsible for directing the preparation of a RCRA Corrective Measures Study for a 385-acre hazardous waste treatment, storage, and disposal facility (TSDF). The Corrective Measures Study involved evaluating and recommending corrective measures for 45 solid waste management units (SWMUs) including five hazardous waste landfills and seven solid waste landfills.

Responsible for directing the preparation of a feasibility study to evaluate remedial alternatives for seven former waste lagoons at a federal Superfund site. The lagoons contain sludges from municipal and industrial wastewater treatment plants. Chemicals of concern in the sludges, soils, and ground water include volatile and semi-volatile organics and metals. Treatability studies to evaluate the effectiveness of solidification and low-temperature thermal desorption as potential remedial alternatives were conducted on the sludges and soils.

Project Officer for design and implementation of the first full-scale bioremediation pilot study (using in-situ and ex-situ technologies) to be undertaken in New York State as part of the New York State Department of Environmental Conservation's Inactive Hazardous Waste Sites Program, at the McKesson Site in "Oil City" Syracuse, New York. The project was awarded grand prize in the 1994 New York State Association of Consulting Engineers (NYSACE) Annual Engineering Excellence Awards competition, and this technology is currently being implemented in full scale at the site to remediate petroleum-related compounds in the soils.

Education

BS/Wood Products Engineering, 1981, SUNY College of Environmental Science and Forestry

AAS/Forestry, 1979, Paul Smith's College of Arts and Sciences

Awards/Citations

Awarded first prize in the 1994 New York State Association of Consulting Engineers (NYSACE) annual Engineering Excellence Awards Competition for development and implementation of the first full-scale soil bioremediation pilot study (in-situ and ex-situ technologies) to be undertaken in New York State as part of NYSDEC's Inactive Hazardous Waste Sites Program. Selected to represent the state organization in the national competition, the American Consulting Engineers Council (ACEC) 1994 Engineering Excellence Awards Competition.

Michael C. Jones
Senior Project Scientist II

Professional Profile

Mr. Jones has over six years of experience in environmental permitting, environmental regulatory compliance, site investigation and characterization, hazardous and industrial waste remediation, environmental audits, electronic data management, and data quality assurance/quality control.

Project Experience

Site Investigation/Remediation: Developed and directed implementation of RCRA Facility Investigation (RFI) Work Plan to characterize potential releases from solid waste management units (SWMUs) at a 120-acre hazardous waste treatment, storage, and disposal facility (TSDF). RFI activities focused on potential releases to and/or from site-wide storm sewer system. Storm sewer investigation included a detailed reconnaissance of system, sampling accumulated debris within storm sewer structures, identifying and characterizing wet and dry-weather flow sources, characterizing discharges at storm sewer outfalls, and evaluating potential on-site/off-site migration of chemical constituents of concern. Results of RFI are currently being utilized to evaluate requirements for eliminating flow sources, isolating sections of storm sewer, or implementing interim or long-term corrective measures to address releases to/from storm sewer system.

Principal author of a Remedial Investigation/Feasibility Study (RI/FS) Work Plan for a fire training facility in accordance with NYSDEC and United States Environmental Protection Agency (USEPA) RI/FS guidance. Directed field activities for Phase I RI, detailed in NYSDEC-approved RI/FS Work Plan.

Assisted a public utility company with preparation of two 6NYCRR Part 373 Hazardous Waste Management Permit Applications for Hazardous Waste Tank and Container Storage Facilities. Applications included a detailed description of operating procedures, storage facilities, waste analysis protocols, emergency procedures, proposed closure activities, and closure cost estimates.

Compiled PCB Annual Reports for a public utility company and several manufacturing facilities in accordance with reporting requirements for use, storage, and disposal of PCBs outlined in Toxic Substances Control Act (TSCA) regulations.

Prepared Annual Hazardous Waste Generator Report for a public utility company in accordance with New York State Department of Environmental Conservation (NYSDEC) guidance for electronic filing of generator reports.

Assisted a public utility company with preparation and revision of corporate-wide environmental procedures for handling, storage, transportation, and disposal of hazardous and regulated non-hazardous wastes. Also assisted with preparation of procedures for preparing annual Hazardous Waste Generator Reports, PCB Annual Reports, and spill cleanup and reporting requirements.

Assisted a public utility company with establishing an annual solid waste generation baseline, developing solid waste minimization goals, and implementing a mechanism to capture appropriate data necessary to track process toward waste minimization goals.

Prepared and directed implementation of Sampling and Analysis Plan to characterize soils at an 18.5-acre inactive petroleum storage terminal. Sampling plan included mechanisms for eliminating large areas of the site from consideration for remedial activities based on statistical comparison with soil cleanup criteria.

Directed implementation of a soil sampling program to delineate the extent of a former waste lagoon at an active manufacturing facility.

Developed sampling plan to characterize demolition debris generated by periodic production changes at an automotive manufacturing facility as either characteristic hazardous or non-hazardous wastes.

Assisted with USEPA-funded research program to assess acidic precipitation effects on upland Appalachian headwater streams. Directed field activities, maintained continuously operating in-field monitoring equipment, directed data quality assurance/quality control program for electronic data management system, maintained automated sampling equipment, and collected aquatic biota samples.

Education

MS/Environmental Pollution Control, 1989, Pennsylvania State University

BS/Wildlife Resources, 1985, West Virginia University

Frederick J. Kirschenheiter, II, P.E.

Manager

Professional Profile

Mr. Kirschenheiter has over seven years of experience in the areas of hazardous and industrial waste remediation, including preparation of remedial investigation/feasibility study work plans and reports, corrective measure studies, environmental audits, environmental permits; facility decommissioning, sanitary sewer, and chemical process designs.

Project Experience

Hazardous Waste: Prepared QAPPs and FSPs for investigation of two manufactured gas plant sites in New York (NYSEG) State. The QAPP was prepared in accordance with NYSDEC ASP requirements. Also prepared a QAPP for the remedial investigation of a NPL site in New York State.

Principal author of a feasibility study for a National Priority List (NPL) Superfund site. Chemicals of concern included volatile and semi-volatile organics. The feasibility study was completed in a short time frame due to USEPA requirements and involved the incorporation of four air dispersion models and risk assessments for soil incineration, soil thermal desorption, ground-water air stripping, and soil venting. The feasibility study was prepared in accordance with the revised National Oil and Hazardous Substances Pollution Contingency Plan criteria.

Prepared an engineering feasibility study (EFS) for mercury and lead contamination of ground water resulting from the past operation of two RCRA surface impoundments at an industrial facility. The EFS involved the analysis of various ground-water pump and treatment alternatives and in-situ ground-water treatment alternatives.

Aided a utility TSDF in NYSDEC negotiations to conducting an RFA type investigation of a SWMU in lieu of a full blown RFI. In addition, the negotiations resulted in NYSDEC agreeing to a focused corrective measures evaluation in lieu of a comprehensive corrective measures study. The SWMU in question is currently undergoing investigation.

Conducted a corrective measures study (CMS) for two solid waste management units (SWMUs) at a TSDF in accordance with the facility's RCRA permit. The CMS evaluated potential corrective measures for the SWMUs to determine the next five appropriate corrective measure. The contaminants of concern included volatile and semi-volatile organic compounds present in soil. The CMS recommendations were subsequently accepted by USEPA.

Prepared a feasibility study for chromium contamination in soils and ground water at an inactive hazardous waste site in New York.

Remedial alternatives evaluated included soil solidification, soil washing, ground-water treatment using ion exchange, precipitation/ flocculation, and various off-site alternatives.

Prepared a removal work plan for a sewage sludge SWMU at an active TSDF in New York State. The removal work plan was prepared in accordance with the facility's RCRA permit. The removal work plan consisted of requirements for site preparation, and sludge excavation, transportation, and disposal.

Prepared a RCRA post closure permit application for two closed hazardous waste surface impoundments. The post closure permit application was prepared in accordance with federal and New York State RCRA requirements and included a ground-water monitoring program to evaluate contaminant plume movement.

Prepared a Remedial Action Plan for the closure of six inactive underground fuel oil storage tanks at a municipal facility. The Remedial Action Plan included an underground storage tank tightness testing and closure program, and an evaluation of potential remedial alternatives for petroleum-contaminated soils. Remedial alternatives evaluated included slurry phase biodegradation, soil farming, and thermal desorption.

Prepared a Sampling, Analysis, Monitoring, and Investigation Plan (SAMP) for sampling and analysis of ground water and soils at a NPL site in New York State to support the remedial design of a ground-water treatment system and thermal desorption system for soil treatment. The SAMP included field sample collection protocols, a Health and Safety Plan, and a Quality Assurance Project Plan prepared in accordance with USEPA Region II requirements.

Prepared a Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) for the remedial investigation of a scrap yard. The chemicals of concern in soils and other environmental media at the site include PCBs and heavy metals. The QAPP was prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocols (ASP) methods.

Design: Prepared contractor bid specifications, reviewed and tabulated bids, and recommended a contractor for conducting interim remedial measures (IRMs) at an inactive hazardous waste disposal site in New York State. The IRMs, which entailed installing a 400-GPM water treatment system for PCBs and debris removal from a pond, were valued at approximately 2.5 million dollars.

Prepared Remedial Design Work Plans on behalf of PRP Group for implementation of a ground-water pump and treat system and soil remedy using low temperature thermal desorption at a NPL site in New York State. The Remedial Design Work Plans were prepared in accordance with USEPA Region II requirements, an Order of Consent, and applicable USEPA guidance.

Designed a PCB remediation plan for an abandoned manufacturing facility. Plan included preparation of contract documents and drawings, specifications for various cleaning methods, demolition, and utilities modifications. Also directed the bid process.

Designed on-site encapsulation vaults for PCB-contaminated debris for an industrial facility in Massachusetts. The design included a leachate collection system and utility modifications.

Designed a sanitary sewer system for buildings at an existing sanitary landfill. Design criteria included a leak-proof sewer system that was installed in an environmentally sensitive area. Construction materials included HDPE piping, low permeability backfill, and specially designed precast manholes.

Designed a low profile airstripper unit for the removal of VOCs from groundwater. Design elements included the evaluation of air emissions, process control requirements, and pump and piping design.

Education

BS/Civil Engineering, 1987, Union College

Registrations

Professional Engineer - New York

Nancy E. Gensky
Associate, Geology

Professional Profile

Ms. Gensky has over 12 years of experience in ground-water investigations. She specializes in the project management of complex site investigations and remediations that involve unique geologic settings, multiple sites, and/or multi-disciplinary tasking. Management responsibilities include client communications, regulatory negotiations, and budget and schedule control.

Project Experience

Remedial investigations at eight former manufactured gas plant (MGP) sites in New York State for Central Hudson Gas & Electric Corporation. Managed installation of soil borings, rock corings, monitoring wells; soil, sediment, waste, surface water, and ground-water sampling; and soil vapor and air sampling. Produced combined work and quality assurance project plans, health and safety plans, and work plan addenda. Evaluated MGP processes and potential source areas at the sites. Evaluated potential migration pathways and receptors from the potential identified sources. Evaluated the potential remedial alternatives using the GRI remedial cost spreadsheet for the restoration of MPG sites.

Remedial Investigations at five former MGP sites in New York State (Auburn, Granville, Binghamton, Goshen, and Border City, New York) for New York State Electric & Gas. Managing ongoing investigations, including the development of Work Plans, conceptual model, and data gaps using historic site information; and surface soil, subsurface soil, and waste sampling, monitoring well installation, ground-water sampling, surface water sampling, sediment sampling, and soil screening. Responsibilities include management of budget, invoicing, and contract issues; preparation of proposals; review of Work Plans and reports; and client liaison.

Multi-media remedial investigation at the Rosen Site, New York, a former 20-acre scrap yard. Management responsibilities included conducting a site-wide soil vapor survey, test pits, soil borings, monitoring well/ piezometer installations; ground-water, surface water, soil, waste, sediment, air sampling; and in-situ hydraulic conductivity testing. Performed a historical delineation of waste areas, past land uses via the use of aerial photographs and information from the local historical society. Primary client contact for the CPRP Group, primary regulatory agency contact, presented RI approach and answered community questions at a public meeting, primary presenter during internal status meetings with the CPRP Group, interaction with local landowners and school officials during field operations on their properties, and negotiated with regulatory agency officials.

Remedial investigation of the Wallace Site, a former scrapyard in Cobleskill, New York, for Niagara Mohawk Power Corporation. Managing the hydrogeologic investigation, which included rock coring, test borings, monitoring well installations, packer testing, ground-water sampling, residential well sampling, fracture-trend mapping, and an off-site geologic fractures reconnaissance. The unique Karst hydrogeologic setting required integration of site and regional geologic and hydrogeologic information. Responsibility includes management and oversight of hydrogeologic activities; coordination with other ongoing activities at the site; and presentations/ discussions with the NYSDEC, NYS Department of Labor, and the client.

Preparation of a remedial investigation plan (RIP) for the Indian Orchard Plant, Monsanto Chemical Company. This large chemical plant site includes eight different waste disposal areas. Preparation included meeting with regulatory agencies and the client. Implemented and supervised implementation of Phase 1 and Phase 2 activities of the RIP including geology and hydrogeology review, aerial photograph analysis, control survey, magnetometer and seismic refraction surveys, ground-water flow assessment, ground-water sampling and analysis, site-specific compound evaluation, and test boring installation including on-site soil screening with an HNU/OVA method. Prepared and supervised preparation of the Phase 1 RIP report. Currently providing management oversight for integrated investigation efforts to meet both state (Massachusetts Contingency Plan) and federal RCRA requirements.

Remedial investigations at five sites contaminated with PCBs and other organic compounds, Westinghouse Electric Company, Bloomington, Indiana. Management responsibilities included preparation of work plans, quality assurance project plans, field sampling plans, project-specific health and safety plans, data reports, investigation reports, numerous responses, and information letter to the regulatory agencies. Field efforts included: boring installations, monitoring well installations, geophysics (magnetometer, seismic refraction, earth penetrating radar, gravity) borehole geophysics (gamma ray and hole caliper logging), packer and in-situ hydraulic conductivity testing, soil and ground-water sampling, surface water sampling, high-flow and low-flow ground-water tracer tests using dyes and inorganic constituents, continuous water level measurements, geologic mapping (lithologic units and karst features). Reduced physical and chemical data, compiled over 10 years of soil and water data, evaluated purge water treatment systems for the ground water extracted during sampling events, prepared routine long-term ground-water monitoring protocols, and evaluated sampling devices. Involved in primary client contact, primary regulatory contact, participation in public meetings, interaction with local homeowners during field efforts, liaison with other client consultants, and provided expert witness testimony.

Hydrogeologic investigation and coordination of pre-RI deliverables for an off-site RI at the Loeffel Site, Nassau, New York, for General Electric Company. The purpose of the RI is to address the presence of PCBs in a drainage basin associated with remediated solvent/ oil recovery operations on site. Managed the installation of monitoring wells and piezometers. Also conducted ground-water sampling, surface water sampling during various flow conditions, sediment deposition mapping and sampling, and biota sampling including fish, frogs, and crayfish. Participated in numerous meetings over a three-year period with the client and the state to negotiate the RI. Prepared work plan, quality assurance project plan, field sampling plan, and health and safety plan.

Education

BS/Geology, 1982, University of Rochester

Masters Coursework, Syracuse University/University of Waterloo

Professional Affiliations

Association of Ground Water Scientists and Engineers

Central New York Association of Professional Geologists

Technical Training/ Seminars

OSHA 40-Hour Training

Michele Anatra-Cordone, Ph.D.

Manager

Professional Profile

Dr. Anatra-Cordone has more than ten years of experience in human health risk assessment and toxicology. She manages and reviews risk assessments for various sites throughout the United States and provides analyses of toxicity evaluations for PRPs. Dr. Anatra-Cordone has also participated in the development of risk assessment methodology and negotiations with federal and state regulatory agencies.

Project Experience

More than ten years of experience in the preparation of chemical- and site-specific risk assessments. Under contracts with the USEPA, involved in the evaluation of toxicity data and derivation of chemical-specific RFDs and carcinogenic Slope Factors. Also participated in risk assessment methodology development and involved in the preparation of test rules under TSCA.

For the past several years, responsible for preparing and reviewing site-specific risk assessments for industrial and military sites across the United States. These assessments have been conducted as part of the RI/FS process under CERCLA, as part of an RFI under RCRA, or as part of the IRP program for the U.S. Air Force Hazardous Waste Remedial Action Program (HAZWRAP). All of these assessments entail data evaluation, exposure assessment, review of toxicity data, and risk characterization. Typically, these risk assessments are conducted in accordance with state and federal guidance and are used to assess baseline (no-action) conditions, to evaluate remedial alternatives, to calculate target concentrations, and/or to support closure plans.

Manages and writes risk assessments, prepares critical reviews of risk assessments, and provides critical analyses of toxicity evaluations for Potentially Responsible Parties (PRPs), regarding sites in New York, Pennsylvania, New Jersey, Wisconsin, Michigan, Indiana, Massachusetts, and Florida.

Representative projects include:

- Preparation of risk assessments for operable units associated with the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site in Michigan.
- Preparation of a baseline risk assessment and analysis of remedial alternatives for a PCB-containing sediment deposit in the Lower Fox River system in Wisconsin. These assessments are being used by the PRPs to negotiate remedial alternatives with the Wisconsin Department of Natural Resources (WDNR).

- Critical review of a risk assessment prepared for the New Jersey Department of Environmental Protection (NJDEP). This review uncovered major flaws in the risk assessment, which enabled PRPs to contest the NJDEP's proposed remedial actions for the site.

- Preparation of baseline risk assessments for federal Superfund sites in New York State. These assessments entailed a review of potential risks to human and ecological receptors potentially exposed to organic and inorganic chemicals in soils, ground water, surface water, and sediments. Both risk assessments involved coordination with PRP groups and negotiations with USEPA Region 2.

- Critical review of PCB toxicity for clients in Michigan, Wisconsin, and Indiana. These reviews included an in depth analysis of studies on carcinogenicity, developmental effects, and other noncarcinogenic endpoints.

Prepared risk assessments under CERCLA, RCRA, and state guidance for industrial sites in Ohio, Pennsylvania, New York, Texas, Florida, and Puerto Rico. Also prepared risk assessments under HAZWRAP for numerous military installations in Florida, Missouri, California, Michigan, Ohio, Minnesota, and Wisconsin. Projects representative of this experience include:

- Preparation of a baseline risk assessment as part of an RI/FS for a large industrial client in northeastern New York State. The assessment encompassed PCB, volatile organic and inorganic contamination in ground water, soil, surface waters, sediments and biota. Dr. Anatra-Cordone worked closely with the client, the NYSDEC, and the NYSDOH to complete this project.

- Preparation of risk-based clean-up objectives to support RCRA closure at an industrial manufacturing facility in northeastern Ohio. These values were reviewed and approved following negotiation with the Ohio EPA.

- Preparation of a baseline risk assessment for a pharmaceutical manufacturer in Puerto Rico. Contaminants at this site primarily included volatile organics in ground water, volatile, semi-volatile, and inorganic contaminants in soils. The assessment was conducted under CERCLA guidelines, and was reviewed and accepted by the USEPA Region 2.

- Preparation of a baseline risk assessment for a pharmaceutical manufacturer in Puerto Rico to evaluate the potential impacts of a kerosene spill on a public water supply.

- Preparation of a baseline risk assessment for a PCB and lead-contaminated industrial site in Buffalo, New York for the NYSDEC.

- Preparation of baseline risk assessment to evaluate potential ground-water contamination at a medical supply facility in Central New York.

- Review and preparation of risk-based criteria used to drive soil remediation at a federal Superfund site in Ohio.

- For a major oil company in Pennsylvania, preparation of a baseline risk assessment to evaluate trichloroethylene contamination of public water supply wells.

- Preparation of baseline risk assessments for HAZWRAP at numerous military installations including: Eglin AFB (Florida, multiple sites); Missouri ANGB; March AFB (California, Site 1); Phelps-Collins ANGB (Michigan, multiple sites); Rickenbacker AFB (Ohio); Minneapolis ANGB (Small Arms Range Landfill); Michigan ANGB; Volk Field ANGB (Wisconsin, multiple sites).

Education

PhD/Biology, 1984, Syracuse University

BS/Biology, 1978, University of Dayton

Selected Publications/ Presentations

Kracke, George R., Michele A. Anatra, and Philip B. Dunham, 1987. "Asymmetry of Na/K/CI Cotransport in Human Erythrocytes," American Journal of Physiology, 254 (Cell Phsiol. 23), C243-C250.

Neuhauser, E.F., P.R. Durkin, M.R. Malecki, and M. Anatra, 1986. "Comparative Toxicity of Ten Organic Chemicals to Four Earthworm Species," Comparative Biochemistry and Physiology C: Comparative Pharmacology and Toxicology, 83C(1): 197-200.

Warnock, D.G., R. Greger, P.B. Dunham, M.A. Benjamin, R.A. Frizzel, M. Field, K.R. Spring, H.E. Ives, P.S. Aronson, and J. Seifter, 1984. "Ion Transport Process in Apical Membranes of Epthelia," Federation Proceedings, 43(10): 2473-2487.

Benjamin, M.A. and P.B. Dunham, 1983. "Asymmetry of Na/K Contrasport in Human Erythrocytes," Journal of General Physiology, 82: 27a (abstract).

Laurie Indick
Senior Project Scientist II

Professional Profile

Ms. Indick has over nine years of experience in the operation, management, and quality assurance/quality control of environmental analytical laboratories. Ms. Indick is responsible for the management, quality assurance, and validation of analytical data being collected at BBL client hazardous waste sites. She is also responsible for the management of the firm's subcontracts with analytical laboratories.

Project Experience

Serves as Quality Assurance Officer (QAO) for investigations of several hazardous waste sites. Sites include impacted aquatic systems, industrial facilities, landfills, and wastewater effluent discharges. As QAO, Ms. Indick serves as the primary communication link between analytical subcontractors and Blasland, Bouck & Lee and is responsible for the management of site sample analyses and coordination between Field Managers and analytical subcontractors.

Current responsibilities include the development of Quality Assurance Project Plans (QAPPs) that are consistent with project data quality objectives (DQOs) and federal and state guidelines. On a project-specific basis, also is involved with: selection of sampling and analytical approaches to solve specific project requirements and regulatory needs; development and review of contracts and bid documents for analytical services; and evaluation and audit of laboratory performance.

Oversees the validation of data from investigations of several hazardous waste sites, including data validation pursuant to EPA Functional Guidelines, and providing guidance on data usability. Manages and performs data validation efforts pursuant to New York State Department of Environmental Conservation (NYSDEC) guidelines. As such, is proficient in EPA-CLP, EPA SW-846, 40 CFR Part 136, and NYSDEC ASP procedures.

Representative NYSDEC projects include:

- Crosman Site, East Bloomfield, New York
- Rosen Brothers Superfund Site, Cortland, New York
- Oswego Fire Training School, Niagara Mohawk, Oswego, New York
- Dewey Avenue Site, Niagara Mohawk, Buffalo, New York
- Bern Metals/Universal Sites, Buffalo, New York
- Martin Marietta Site, Syracuse, New York
- Bear Street Site, McKesson Corporation, Syracuse, New York
- M. Wallace & Son Scrapyard Site, Cobleskill, New York
- Chicago Pneumatic, Syracuse, New York

Other representative projects include:

Critical review of analytical methods for determining PCB levels in industrial waste streams for the pulp and paper industry.

- In support of RCRA Corrective Action Program at GE - Pittsfield, provided assistance to GE on QAPP development; aided in laboratory coordination; and managed the validation of data following USEPA guidance using a 'tiered' approach.

For American Cyanamid's Bound Brook, New Jersey facility, responsible for data validation pursuant to NJDEP guidance. Data validation efforts supported the implementation of a RCRA Corrective Action Program being implemented by Blasland, Bouck & Lee at the site.

For Cytec - Warners Plant, also responsible for data validation pursuant to NJDEP guidance.

Was instrumental in the development of the framework for the Blasland, Bouck & Lee corporate analytical contract program and in the review and selection of potential subcontractors.

Prior responsibilities included client contact for industrial and consulting firms regarding analytical services for a major CLP laboratory. Was responsible for the daily operation of the GC/MS department for an analytical laboratory. Participated in the development of software to manage, track, and report analytical data.

Previously, served as Laboratory Project Manager for sample analysis, analytical documentation, data management, and data reporting for industrial clients. Prepared and maintained laboratory standard operating procedures and conducted internal audits to assess compliance with EPA CLP, New York State Analytical Services Program (ASP), and NYS-ELAP protocols as well as maintain laboratory certifications with the New York State Departments of Health and Environmental Conservation, New Jersey Department of Environmental Protection and Energy, Maryland Department of Health, and California Department of Health Services.

Education

BA/Environmental Science, 1984, State University of New York at Plattsburgh

Graduate Studies/Environmental Science, 1984, University of Massachusetts at Boston

Jay D. Keough, C.I.H.

Corporate Industrial Hygiene/Environmental Safety

Professional Profile

Mr. Keough is a Certified Industrial Hygienist (American Board of Industrial Hygiene #4685) with 16 years of experience in industrial hygiene, process safety, and hazardous waste site safety. He has designed and implemented industrial hygiene programs and conducted audits at locations in the United States, Brazil, Switzerland, and the Netherlands. His technical experience includes chemical processes, incineration, chemical exposure monitoring, ventilation design, and radiation protection. He has written more than 250 health and safety plans for such activities as solid waste site sampling; hazardous waste site investigation and remediation; and emergency response. He has served as Health and Safety officer for a number of large-scale projects.

Project Experience

Prepared a Health and Safety Plan and performed health and safety audits for the RI/Feasibility Study (FS) project at the Naval Air Warfare Center in Trenton, New Jersey. Conducted air sampling during deep well installation in an area of contaminated soils, and determined the proper level of protection for site activities.

Prepared a Health and Safety Plan for an RI/FS project at the Anacostia Naval Station in Washington, D.C. Developed site-specific procedures and air monitoring program for field sampling activities.

Health and Safety Officer for unexploded ordinance surveys and removal projects at the former Raritan Arsenal in New Jersey and at Ft. Meade in Maryland.

Wrote a Health and Safety Plan for a RI/FS at a BP Chemicals mixed waste site.

Managed environmental consulting company health and safety and quality assurance programs, supervising a professional staff of industrial hygienists and quality specialists. In this capacity, prepared and approved Health and Safety Work Plans and Quality Assurance Plans for various projects, and coordinated/conducted health and safety and quality assurance training.

Prepared and executed Industrial Hygiene Sampling Plans for various commercial clients. Conducted indoor air quality assessments and employee exposure assessments.

As Health and Safety Officer for the Fresh Kills Landfill Leachate Mitigation Project in New York, prepared Health and Safety Plans and conducted compliance audits/inspections and air monitoring during an investigation which involved the drilling of more than 300 wells.

Prepared a Health and Safety Plan for all Remedial Investigation (RI) site activities conducted at the Mattiace Petrochemical Superfund site in New York. Activities included air, soil, ground-water, sediment, and test pit sampling, and site characterization.

Completed a Health and Safety Plan for Edgemere Landfill Investigation work in New York. The program included procedures for well drilling, soil borings, and sediment and leachate sampling. Interacted with New York State Department of Environmental Conservation (NYSDEC) personnel and developed programs in compliance with NYSDEC regulations.

Conducted many job site and facility audits and inspections, and tracked corrective actions.

Managed the implementation of a corporate Total Quality Management program. Supported quality assurance officers in regional locations.

Conducted project and facility Quality Assurance audits, and prepared and approved Quality Assurance Plans. Wrote and implemented corporate standard quality practices.

Health and Safety Officer for the Chemical Insecticide Corporation Superfund site during the implementation of an interim remedial measure for the U.S. Army Corps of Engineers.

Designed and executed a polychlorinated biphenyl (PCB) sampling program at a chemical manufacturing facility in northern New Jersey. Air sampling was conducted as part of an Environmental Cleanup and Responsibility Act (ECRA) site investigation at the facility.

While with Union Carbide Corporation, managed Environmental Protection and Industrial Hygiene programs at the Union Carbide Bound Brook Technical Center in New Jersey. Also responsible for program development and support at five other locations. Also:

- Managed asbestos removal projects at Union Carbide facilities.
- Provided expert testimony at a USEPA hearing in Washington, D.C. regarding premanufacture notice under the Toxic Substances Control Act (TSCA).
- Designed and conducted a trial burn for permitting of a chemical waste incinerator.

- Designed and implemented programs in hearing conservation, exposure monitoring, ventilation design and evaluation, radiation protection, and chemical hazards.
- Provided Industrial Hygiene support for a 750-person research facility.
- Negotiated a U.S. Nuclear Regulatory Commission license covering the use of various isotopes.
- Participated in numerous environmental and safety audits of plants in the United States and abroad.
- Managed a chemical waste incineration program, and designed systems for waste treatment.

Education

BS/Environmental Science, Rutgers University, 1979

Edward R. Lynch, P.E.
Executive Vice President

Professional Profile

Mr. Lynch's principal experience relates to managing large and complex hazardous waste site programs, taking responsibility for overall financial and technical control of such projects, including final internal QA/QC review and approval authority for all work products. Mr. Lynch, who is responsible for the supervision of several hazardous waste divisions within the Firm, has 20 years of experience managing hazardous and industrial waste projects, including investigation, design, and construction management.

Project Experience

Former MGP Sites: Four Former MGP Site, New York State Electric and Gas Corporation: Officer in charge of the preparation and implementation of work plans for four former MGP sites in New York State. The work plans included detailed site histories, identification of potential source area evaluation of pathway migration, and identification of exposure pathways and receptors. Following RI Work Plan approval by NYSE&G, RI investigations consisting of test pit/trenching and test borings, as well as soil/waste sampling and analysis, ground-water sampling and analysis, and surface-water sediment sampling and analysis were conducted. RI reports have been completed.

Hazardous Waste: Project Officer for RCRA Corrective Measures Study for a 385-acre hazardous waste treatment, storage, and disposal facility (TSDF) in Niagara Falls, New York. The Corrective Measures Study involved evaluating and recommending corrective measures for 45 solid waste management units (SWMUs) including five hazardous waste landfills and seven solid waste landfills, in accordance with the RCRA corrective action modules of the facility's Part 373 permit.

Directed the successful closure of two hazardous waste surface impoundments regulated under New York State Interim Status Standard (6 NYCRR Subpart 373-3) and also listed as on New York State's registry of inactive hazardous waste disposal sites. The work completed included a remedial investigation, feasibility study, remedial design, and construction management services as part of a number of projects focusing on the two RCRA waste management units, as well as on a site-wide basis. As part of New York State's Inactive Hazardous Waste program, the remedy for the surface impoundments included excavation and dewatering (filter press) of contaminated sludge and soils, off-site disposal, and construction of a cap. The ground-water remedy (as part of a RCRA post-closure permit) included removal and treatment. Site contaminants of concern included mercury, lead, and chromium.

Project Officer for design of closure of an inactive petroleum/waste solvent storage and transfer facility, conducted to satisfy the requirements of the Resource Conservation and Recovery Act (RCRA), which involved verifying decontamination of 11 aboveground storage tanks with capacities of up to 4 million gallons, and initiating removal and disposal of the aboveground tanks, underground tanks, and contaminated above and underground distribution piping.

Directed the completion of a RI/FS at a Superfund site in Moira, New York, a former waste oil recycling and storage facility impacted by polynuclear aromatic hydrocarbons (PAHs), PCBs, metals, phenols, and organic compounds. One objective of the investigation was to determine the ecological impact of contamination on the surrounding wetlands. Conducted a soil and sediment contamination pathways investigation to assess the nature and extent of off-site contamination and to provide information on site geology. Designed and implemented an ecological investigation consistent with USEPA's RA guidance and with NYSDEC's draft Fish and Wildlife Impact Analysis.

Project Officer for design support of the soil remedy and groundwater Remedial Design at the Fulton Terminals Superfund Site in Fulton, New York. Responsible for the preparation of a Sampling, Analysis, Monitoring, and Investigation Plan; Quality Assurance Project Plan; and Remedial Design Work Plan in accordance with the requirements of a USEPA Consent Decree. The remedial action at this site includes withdrawal, treatment and reinjection of ground water, as well as excavation and on-site thermal desorption of contaminated soils.

Project Officer for turnkey ground-water containment and treatment system project at the Solvent Recovery Services of New England Superfund Site in Southington, Connecticut. Project includes design of a 100 gpm-capacity ground-water treatment system consisting of a metals pretreatment system, enhanced oxidation (peroxide and ultraviolet light) treatment system, and granular activated carbon treatment prior to discharge of treated water to the adjacent Quinnipiac River. The selected ground-water containment system consists of a series of 11 vertical recovery wells installed within the containment area, with submersible well pumps connected to a common header leading to the ground-water treatment system, and a 700-foot, interlocking, steel sheetpile wall installed to the top of bedrock.

Supervised remedial investigation in PCB-contaminated environs surrounding a former solvent and oil recovery facility in New York State. The RI addressed the off-site impacts of site constituents on ground water, surface water, sediments, biota, and air.

Design: Directed the completion of a design for an on-site PCB secure landfill. The facility design included a clay and synthetic liner, a passive leachate collection and removal system, a clay cap, surface water drainage considerations, and a post-closure maintenance and monitoring program.

Managed preparation of the remedial design for the closure of a federal Superfund site in eastern New York State. The chief issues of concern at the site included contamination of residential wells and a spring supply for the nearby village. The remedial program consisted of installing a soil-bentonite cutoff wall and a 4½-foot clear cap around the perimeter of the lagoon area. Also managed design and construction services for air stripper to reduce contaminants in the village's spring supply.

Designed and implemented remedial closure requirements for the Kingsbury waste disposal site, an inactive municipal landfill contaminated with PCBs, regulated under New York State's Superfund program. Design included relocation of 130,000 cubic yards of refuse, installation of a soil-bentonite ground-water cut-off wall, installation of a multi-layered clay and topsoil cap, landfill gas control measures, and extensive site grading and drainage control. Currently supervising design of a ground-water treatment system at the site.

Designed a pressure-filter sludge-dewatering system for a one mgd wastewater treatment facility. Responsible for operations and maintenance manual, cost recovery, and user charge system.

Education

Masters Program, Environmental Engineering, Syracuse University
BS/Civil Engineering, 1975, Union College

Registrations

Professional Engineer - New York, Massachusetts, Michigan, Ohio, Rhode Island

Awards/Citations

Project Officer for development and implementation of the first full-scale soil bioremediation pilot study (in-situ and ex-situ technologies) to be undertaken in New York State as part of NYSDEC's Inactive Hazardous Waste Sites Program. Project awarded grand prize in the Consulting Engineers Council of New York State (CEC/NYS) 1994 Engineering Excellence Awards Competition.

John C. Brussel
Project Engineer

Professional Profile

Mr. Brussel has over three years of experience in hazardous and industrial waste investigation and remediation. He is also experienced in regulatory compliance and permitting work.

Project Experience

Hazardous Waste: Prepared Work Plans and supporting documents, including Field Sampling Plan (FSPs), Quality Assurance Project Plan (QAPPs), and Health and Safety Plan (HASPs) for conducting focused remedial investigations (FRIs) at electrical substations located in Falconer, New York and Hudson, New York. The Work Plans described activities required to investigate soil, ground water, and catch basin debris. Was the field task manager for the soil and catch basin debris investigations. Was the health and safety supervisor at both sites for the field investigation activities. Prepared FRI reports for each site upon completion of the field investigations.

Prepared a RCRA Facility Investigation (RFI) Work Plan to address past releases of hazardous constituents and hazardous waste from solid waste management units (SWMUs) at a TSDF facility located near Syracuse, New York. Also prepared supporting documents, including a QAPP, Project Management Plan (PMP), Data Management Plan (DMP), HASP, and Community Relations Plan (CRP). Also prepared a Task I Report, which included a summary of previous investigation efforts, and a Corrective Measures Study Plan, outlining the evaluation process for selecting potential corrective measures.

Prepared a Work Plan and supporting documents, including a FSP, QAPP, and HASP for conducting preliminary site assessments (PSAs) at an active electrical substation located in Deerfield, New York. The Work Plan described activities required to investigate soil, surface water, sediment, ground water, and catch basin debris.

Prepared a Remedial Investigation/Feasibility Study (RI/FS) Work Plan and supporting documents to determine the presence and extent of VOCs, metals, and petroleum hydrocarbons in soils and ground water resulting from past documented hazardous waste disposal activities at a site located in Farmingdale, New York. Also prepared Phase I RI FSPs and HASPs for performing investigation work to determine the presence and extent of PCBs, VOCs, SVOCs, and metals in soil, surface water, sediment, and ground water at a former scrapyard and at a former fire fighting training school. Participated in the soil and surface water investigations at the former fire fighting training school.

Prepared a HASP to address worker health and safety during implementation of in-situ soil bioremediation using a Mitsui-Miike twin header soil mixing device attached to an excavator, demolition of on-site buildings, and scarification of concrete debris. The HASP addressed risks presented by heavy equipment and chemical constituents present in site soils.

Prepared a Work Plan and HASP for an aboveground tank investigation for a site located in Newark, New Jersey. Required inspection of 78 aboveground tanks, collection of PCB wipe samples, collection of debris characterization samples, and level B protection for confined space entry into the tanks, in accordance with 29 CFR 1910.146. Was the on-site engineer during implementation of the Work Plan and participated as the site Health and Safety Supervisor.

Prepared a HASP to collect PCB wipe samples and oil samples from inside transformers using confined space entry procedures in Level B protection. Also prepared HASPs requiring Level B protection for conducting storm sewer investigations at a site in Utica, New York and St. Thomas, USVI.

Prepared a Work Plan to describe the activities to be conducted at a former electric motors manufacturing facility to determine sources of environmental contamination at the facility, through dye-testing and sampling of sanitary and storm sewer manholes.

Prepared a Preliminary Screening report to address alternative technologies for treatment of soils impacted by volatile organic compounds and semi-volatile organic compounds from past manufacturing activities at a former industrial facility in Ohio.

Wastewater/Stormwater: Conducted a conduit investigation at an electrical substation located near Poughkeepsie, New York. Investigation consisted of site mapping, visual inspection of all storm sewer manholes and catch basins associated with the site storm sewer system, visual inspection of all electrical manholes, and collection of water and debris samples to determine if storm sewer piping and/or electrical conduits were acting as pathways for migration of chemical constituents previously detected in ground-water at the site. Also collected core samples from concrete transformer pads to determine the disposal requirements of the pads.

Participated in an investigation of a storm sewer system associated with a shopping plaza and two gasoline service stations located in the U.S. Virgin Islands. Coordinated the shipment of equipment required for the investigation, including Level B protective equipment for personnel (i.e. supplied air breathing system). Processed dry-weather flow water samples and sediment samples from the storm sewer system for shipment out of the USVI for laboratory analysis.

Identified the appropriate procedures, including completion of soil quarantine forms, commercial invoices, and chain of custody documentation for shipment of samples outside of the United States. Prepared a Storm Sewer Investigation Report which identified discharge sources of chemical constituents into the storm sewer system.

Conducted a storm sewer investigation at an active tool manufacturing facility in Utica, New York. Investigation consisted of inspecting storm sewer manholes, catch basins, and outfalls; reviewing historical facility mapping, and inspecting facility interior. Purpose of the investigation was to identify potential continuing sources of PCBs and metals to the storm sewer system, and provide information to be used in preparing plans and specifications to remove PCB and metals-impacted sediments from the storm sewer system.

Performed storm and sanitary sewer manhole inspections at an electronics and radar manufacturing company. Collected and processed water samples for analysis of VOCs to trace the path of contaminant migration through the sewer system and ground water. Also conducted a wastewater survey at the facility to determine the nature and extent of waste materials being introduced into the storm and sanitary sewer systems.

Environmental Assessment/Permitting: Performed detailed background information searches and data reviews for three electrical substations located in New York State. As part of the review, the following information was obtained and evaluated: information on site topography, geology, and hydrogeology (based on topographic maps, soil survey information, aerial photographs, wetlands mapping, and floodplain mapping); NYSDEC spill records and petroleum bulk storage records; the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) listing; facility information including PCB equipment records, corporate spill records, Spill Prevention Control and Countermeasure Plan (SPCC) plans, and waste generator records; and inactive hazardous waste disposal sites listed in the NYSDEC Inactive Hazardous Waste Disposal Sites Listing. Also reviewed water quality information for an adjacent river as presented in the NYSDEC Rotating Intensive Basin Study (RIBS) and NYSDEC Storet Database.

Conducted a Phase I Environmental Assessment of an inactive warehouse located in Brooklyn, New York. The facility consisted of 5 interconnected buildings and approximately 130,000 square feet of interior floor space.

Determined the disposal requirements for concrete grade rings based on the results of full-core concrete samples and one-centimeter core concrete samples which indicated that the grade rings were impacted by F-listed hazardous wastes. Based on review of the debris rule contained in 40 CFR 268, recommended scarification of 0.6 centimeters of the outer surface of concrete such that the remaining concrete could be disposed of off-site as non-hazardous waste.

Performed file reviews for several large industrial aerospace manufacturing facilities to determine their compliance with regulations enacted pursuant to the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA), consisting of preparing Freedom of Information Act Requests (FOIA) and visiting NYSDEC Regional Offices to meet with NYSDEC personnel and review Part A and Part B Hazardous Waste permit applications, annual generator reports, and other information required under the Acts.

Prepared PCB Annual Reports in accordance with 40 CFR 761.180 for a former electronic manufacturing facility located in Indiana and for a utility company in New York State.

Participated in an industrial storm sewer sampling program to meet NYSDEC stormwater discharge permitting requirements. Assisted with the completion of the NYSDEC stormwater discharge permit application.

Used USEPA software to compute a Preliminary Assessment Score for a former pulp and paper manufacturing facility for potential site listing on the National Priorities List.

Construction Oversight: Provided contractor oversight during construction of a new propane line and associated appurtenances at a NYSDEC inactive hazardous waste disposal site located in Oswego, New York. Responsibilities included directing the excavation of PCB-impacted site soils for containerization and disposal off-site. Collected characterization soil sample to determine the disposal requirements of the excavated soil.

Provided oversight during the removal of four concrete-encased underground storage tanks at a site in Brooklyn, New York. Responsible for reporting to the NYSDEC a former spill observed during excavation of the tanks. Directed the removal of petroleum-impacted soils for disposal off-site. Collected soil samples for laboratory analysis in accordance with the NYSDEC Spill Technology and Remediation Series (STARS) Memo #1 Petroleum-Contaminated Soil Guidance Policy.

Provided oversight during the repair of deteriorated expansion joints, deteriorated control joints, and concrete floor cracks in a hazardous waste management located in Liverpool, New York. Ensured that work was performed using suitable materials in accordance with plans and specifications.

Provided oversight during contractor inspection of a storm sewer pipe using a remote operated television video camera. Purpose of the inspection was to determine potential sources of PCBs previously detected in dry-weather flow discharge into a downstream manhole and to determine the origin of the pipe.

Remedial Design: Prepared the design for a ground-water Interim Remedial Measure at an electronics manufacturing facility. Prepared design drawings and technical specifications for the modification of an existing pumping well and construction of a leak-proof, dual-containment treatment pipeline and installation of a submersible well pump, shallow tray-type air stripper, specially designed precast manholes, and associated appurtenances.

Prepared the design for a soil vapor extraction system for a former fuel oil facility in Brooklyn, New York. Prepared design drawings for horizontal vapor extraction pipes to be installed by microtunneling below an existing office building and garage. Major treatment system components included a blower to remove VOCs from soil below the building, a knockout pot to reduce moisture in the influent air, filters to trap particulates, and a pipe gallery to control the flow to two vapor phase carbon units connected in series. Changeout of carbon was facilitated by specifying flexible hose and kamlock fittings between the underground HDPE piping and the carbon units.

Prepared an aboveground tank investigation report and contractor scope of work and specifications for the closure of 78 aboveground tanks up to 225,000 gallons located at a former solvent recycling facility in Newark, New Jersey.

Participated in the design and implementation of an on-site water treatment pilot test. Purpose was to determine the treatability of PCB-contaminated surface water using a filtration and granular-activated carbon treatment system. Project included constructing the on-site treatment system, monitoring the operation of the treatment system, collecting and processing samples, and maintaining the system components during the test.

Determined the physical and chemical testing to be performed as part of a solidification treatability study of lagoon sludges composed of municipal and industrial waste containing high levels of VOCs and SVOCs at a Superfund site in New York State.

Performed volumetric calculations to determine the extent of PCB contamination in sediments in a 6-mile stretch of an Upstate New York river.

Determined the size and operational requirements of pumps and prepared piping layout for tie-in of additional sumps to an existing packed-tower-type air stripper to protect a large industrial facility's discharge through the storm sewer system from exceeding discharge limits established in the facility's Storm Water Discharge Permit with the New York State Department of Environmental Conservation (NYSDEC).

Prepared plans and specifications for repairing cracks and sealing flooring and containment walls in a secondary containment area of a TSDF facility located in Albany, New York. Specified the equipment and materials to use, provided step-by-step instructions for facility personnel to complete the work, and a detailed cost estimate to complete the work.

Education

BS/Civil and Environmental Engineering, 1992, Clarkson University

Technical Training/ Seminars

E.I.T. Certificate

40 Hour OSHA Training/Supervisory Training

Confined Space Entry Training

Lynette B. Mokry
Project Hydrogeologist

Professional Profile

Ms. Mokry, in her six years of experience, has been project hydrogeologist on various mixed-media sampling and hydrogeologic investigations. She has been responsible for management and supervision of drilling and trenching operations, soil characterization, soil and ground-water sample collection, database design and implementation, subsurface geophysical investigations, interpretation of field data, aquifer testing, in-situ hydraulic conductivity testing, and monitoring well installation.

Project Experience

Field Coordinator/Health and Safety Supervisor for a RCRA Facility Investigation (RFI) completed in conjunction with a Massachusetts Contingency Plan (MCP) Phase II Comprehensive Site Assessment at an active chemical plant in Massachusetts. Several Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) were investigated during this integrated field program through the drilling and sampling of 37 soil borings and 10 new wells. A site-wide ground-water sampling event was also conducted as part of this investigation.

Managed ground-water sampling events at a CERCLA site in central New York State, including coordination of field and office activities and reporting of results. Also coordinated, implemented, and reported the results of an aquifer test conducted at this site to aid a feasibility study evaluation of remedial alternatives. This aquifer test consisted of pre-test water-level monitoring, containing water removed from the pumping well at 80 gallons per minute (gpm) for eight hours, followed by recovery monitoring for 12 hours, and on-site carbon treatment of the discharged water.

Coordinated, implemented, and reported the results of interactive drilling programs at current and former gasoline stations and fuel terminals in Pennsylvania and Michigan.

Performed Phase I Environmental Site Assessments (ESAs) at light industrial sites in New York, Delaware, and Ontario, Canada. This included historical background and aerial photograph summaries, site walkovers, interviews with key site personnel and regulatory officials, documentation, and reporting of results. As warranted, limited field programs were conducted as part of the ESAs.

Reviewed ESAs completed by consultants at two sites in Florida and two sites in California, to evaluate completeness, appropriateness, and compliance of the reports with the ASTM standard.

Conducted a drilling program to evaluate the nature and extent of Non-Aqueous Phase Liquids (NAPLs) in the subsurface at a former industrial facility in central New York State. Data reduction included calculations to evaluate the migration potential of the NAPL.

Conducted a CERCLA Remedial Investigation (RI) at a chemical plant in New Jersey. Field responsibilities included the oversight of USEPA contractors, supervision of drilling and trenching activities, soil and ground-water sampling, monitoring well installation, and in-situ hydraulic conductivity testing. Supervised extensive electromagnetic, ground-penetrating radar, and magnetometry surveys that were used primarily to locate and define the limits of drums and/or other ferro-magnetic objects prior to trenching activities. Also responsible for well and boring log generation and standardization, geologic mapping, database management, and analytical data interpretation.

Implementation of a Sampling, Analysis, and Monitoring Plan (SAMP) at a CERCLA site in New Jersey. Installed 32 monitoring wells using both mud rotary and hollow-stem auger drilling methods to determine the downgradient extent of ground-water contamination. Performed down-hole geophysical logging using gamma, resistivity, and specific conductivity probes.

Primary field investigator for a hydrogeologic investigation at a Superfund site in New Jersey. Identified potential on-site locations to receive recharge of over 2 million gallons per day (mgd) of treated ground water. Field activities included field reconnaissance, collection of ground-water samples using Hydropunch II sampling devices, installation of monitoring wells, in-situ hydraulic conductivity testing, and estimation of unsaturated soil permeabilities.

Coordinated and performed ground-water sampling for several monitoring programs, including sites in New Jersey, New York, Pennsylvania, Massachusetts, and Michigan.

Instructed introductory college geology laboratory sessions, with emphasis on rock, mineral, and fossil identification, and surface and internal earth processes. Also served as teaching assistant for an introductory hydrogeology class.

Education

MS/Geology, 1989, Rensselaer Polytechnic Institute

BS/Geology, 1988, Saint Lawrence University

Technical Training/ Seminars

OSHA 40-hour Hazardous Site Training

OSHA Hazardous Site Supervisor Training

TECHNICAL REPORT

MGP/RCRA Investigation and Remedial Measures Evaluation Data Management Plan

Niagara Mohawk Power Corporation
North Albany Service Center
Albany, New York

August 1996

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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Syracuse, New York, 13214-0066
(315) 446-9120

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1. Introduction

1.1 General

This MGP/RCRA Investigation and Remedial Measures Evaluation Data Management Plan (DMP) presents the methods to be used to document and track field data and laboratory analytical results generated during implementation of the MGP/RCRA Investigation at the Niagara Mohawk Power Corporation (NMPC) North Albany Service Center at 1125 Broadway in Albany, New York. The MGP/RCRA Investigation will be conducted to address the presence of chemical constituents associated with the former MGP facility and hazardous wastes or hazardous constituents released from solid waste management units (SWMUs) at the site. The DMP has been prepared in accordance with the requirements of Module III - Corrective Action (Permit Module III) of the 6 NYCRR Part 373 Hazardous Waste Management Permit for the North Albany Service Center hazardous waste, treatment, storage, and disposal facility (TSDF). The DMP supports the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan, Quality Assurance Project Plan (QAPjP), Health and Safety Plan (HASP), Project Management Plan (PMP), and Community Relations Plan (CRP) for the MGP/RCRA Investigation and Remedial Measures Evaluation at the North Albany Service Center.

Sections 2.0 through 5.0 of this DMP present a detailed description of the following:

- Field documentation materials and procedures which will be used for the MGP/RCRA Investigation field activities;
- The report format to be used to present field data and laboratory analytical results at the conclusion of the MGP/RCRA Investigation;
- Project file requirements; and
- Progress reports to be completed during the MGP/RCRA Investigation.

2. Field Documentation Materials and Procedures

2.1 General

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and chain-of-custody. This documentation constitutes a record that allows reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the field work will be retained in the project file (discussed below). Documentation to be maintained for field activities conducted throughout the MGP/RCRA Investigation will include the project field notebook, sampling field logs, sample chain-of-custody forms, field equipment calibration and maintenance logs, and daily field reports. Detailed laboratory documentation procedures are provided in the QAPjP. Field documentation for the MGP/RCRA Investigation activities is discussed below.

2.2 Project Field Notebook

The project field notebook consists of a waterproof, bound notebook that will be used on a daily basis to record all activities at the site. The field notebook will include the date, personnel on-site, weather, and detailed sampling information, including notes regarding sampling locations, physical observations, sample and field measurement codes, sample depths, sample times, and PID screening results.

2.3 Sampling Field Logs

To facilitate recording of sampling information, field logs have been prepared for the ground-water investigation. Ground-water sampling field logs will be filled out during each sampling event and will contain the sample location, ground-water and LNAPL/DNAPL elevation, well depth, physical observations of the water, and field measurements (temperature, pH, dissolved oxygen, turbidity, conductivity, and oxidation-reduction potential). Water level readings will be measured to surveyed reference points, and will be documented in the field notebook or on copies of the field log forms included in the QAPjP.

2.4 Sample Chain-of-Custody

Chain-of-custody forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. Chain-of-custody forms will be filled out at each sampling site, at a group of sampling sites, or at the end of each day of sampling by one of the field personnel designated to be responsible for sample custody. In the event that the samples are relinquished by the designated sampling person to other sampling or field personnel, the chain-of-custody form will be signed and dated by the appropriate personnel to document the sample transfer. The original chain-of-custody form will accompany the samples to the laboratory and copies will be forwarded to the project files. A copy of a sample chain-of-custody form is included in the QAPjP.

Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

2.5 Field Equipment Calibration and Maintenance Logs

Calibration and maintenance logs will be maintained to document the calibration and maintenance of each piece of field equipment (which is not factory calibrated) used during implementation of the MGP/RCRA investigation activities. Calibration procedures and calibration and maintenance logs are provided in the QAPjP. Field equipment calibration will occur daily prior to the start of field activities and at regular intervals during the day as required for each piece of equipment. Calibration procedures for equipment used for health and safety monitoring are presented in the HASP.

2.6 Daily Field Report

In addition to the above-mentioned documentation, a daily field report will be completed for each day of field activities which provides a brief summary of activities conducted, the personnel performing the field activities, personnel visiting the site, and a listing of equipment present on-site.

The daily field report and each of the above-mentioned notebooks, logs, and custody forms will be maintained by the field personnel during the investigation and will be placed in the project file at the conclusion of the MGP/RCRA Investigation field activities. An example daily field report form is included in the HASP.

3. Presentation of MGP/RCRA Investigation and Remedial Measures Evaluation Results

3.1 General

During the MGP/RCRA Investigation and Remedial Measures Evaluation, progress reports, and special reports (if necessary) will be submitted to the NYSDEC. Following completion of the MGP/RCRA Investigation and Remedial Measures Evaluation field activities, a MGP/RCRA Investigation Report will be submitted to the NYSDEC. Following NYSDEC approval of the MGP/RCRA Investigation Report, a Remedial Measures Evaluation Report will be submitted to the NYSDEC. The schedule for completion of the MGP/RCRA Investigation Report and the Remedial Measures Evaluation Report is presented in the PMP. The components of the progress reports, special reports, MGP/RCRA Investigation Report, and the Remedial Measures Evaluation Report are presented below.

3.2 Progress Reports

Progress reports signed by NMPC's project manager, Mr. James F. Morgan, will be submitted to the NYSDEC as required by Condition B.8(a) of Permit Module III and Subparagraph VIII.A of the Order on Consent (Index # D0-0001-92101) between the NYSDEC and NMPC. The first progress report shall be submitted no later than 30 calendar days following the required implementation of MGP/RCRA Investigation and Remedial Measures Evaluation as required by Condition B.8(a) of Permit Module III. Subsequent progress reports shall be submitted on a monthly basis as required by the Order on Consent between the NYSDEC and NMPC. The progress report shall contain the following information:

- Summary of all work plans, reports, and other deliverables that were completed and submitted during the previous month;
- A description of the work performed;
- Summary of all findings and summaries of laboratory data;
- Summaries of any changes made;
- Summaries of contacts made with representatives of the local community and public interest groups;
- Summaries of all problems or potential problems encountered and actions taken to correct problems;
- Changes in personnel conducting or managing the corrective action activities;
- Copies of daily reports, inspection reports, and laboratory/monitoring data (Note: Field documentation and laboratory data to be included in the MGP/RCRA Investigation Report will not be included in the monthly reports);
- Description of the work to be performed during the next month; and
- Information regarding any delays encountered or anticipated that may affect the schedule for completion of the MGP/RCRA Investigation and Remedial Measures Evaluation.

3.3 Special Reports

As required by Condition B.8(b) of Permit Module III, NMPC will submit special reports to NYSDEC upon discovery of any release(s) from newly-identified SWMUs, from SWMUs which had previously been categorized as no further action by the NYSDEC, or from SWMUs investigated as part of the MGP/RCRA Investigation and Remedial Measures Evaluation. If impacted ground water or releases of hazardous constituents to air in excess of action levels at NMPC's property boundary are discovered, NMPC will prepare a special report to indicate what actions are necessary to notify individuals who have or may have been potentially exposed to the hazardous constituents.

3.4 MGP/RCRA Investigation Report

Following completion of the MGP/RCRA Investigation field activities, Blasland, Bouck & Lee, Inc. (BBL) will prepare the MGP/RCRA Investigation Report, which will describe the procedures, methods, and results of the MGP/RCRA Investigation, including information on the presence and extent of chemical constituents in on-site and/or off-site environmental media, sources and migration pathways, and actual or potential receptors, as required by Section E.7 of Permit Module III. The MGP/RCRA Investigation Report will also summarize the quality of the data collected and/or used based on project data quality objectives, which are discussed in the QAPjP.

The MGP/RCRA Investigation Report will be organized into the sections listed below:

Section 1.0 - Introduction
- 1.1 General
- 1.2 Background Information
  - 1.2.1 Facility Location and Regional Setting
    - 1.2.1.1 Location
    - 1.2.1.2 Topography and Drainage
    - 1.2.1.3 Geology and Hydrogeology
  - 1.2.2 Site History
    - 1.2.2.1 Summary of MGP-Related Activities
    - 1.2.2.2 Summary of RCRA-Related Activities
    - 1.2.2.3 Summary of Previous Investigations
- 1.3 MGP/RCRA Investigation Objectives
- 1.4 Report Organization

Section 2.0 - Interpretation of Analytical Results

(Note: This section will present a general discussion regarding the presentation and interpretation of analytical data to be included in the MGP/RCRA Investigation Report).

Section 3.0 - Soil Investigation
- 3.1 General
- 3.2 Soil Investigation Activities
- 3.3 Soil Investigation Results

Section 4.0 - Ground-Water Investigation
- 4.1 General
- 4.2 Ground-Water Investigation Activities
- 4.3 Ground-Water Investigation Results

Section 5.0 - Storm Sewer Investigation
- 5.1 General
- 5.2 Storm Sewer Investigation Activities
- 5.3 Storm Sewer Investigation Results

Section 6.0 - Focused Screening Level Risk Assessment

Section 7.0 - Assessment of Air Emissions

Section 8.0 - Conclusions and Recommendations
8.1 General
8.2 Conclusions
8.3 Recommendations

The MGP/RCRA Investigation Report will also include tables, figures, and appendices, as described below.

3.4.1 Tables

To optimize data useability, laboratory analytical results and relevant field data will be presented in tabular format. The laboratory analytical results will be presented in tables, as described below:

1. Separate tables will be prepared to present the analytical results for soil, ground-water, dry-weather flow, drainage structure debris, and air samples collected during the MGP/RCRA Investigation.

2. Separate tables, if appropriate, will be prepared to present the analytical results for the different parameters analyzed [i.e., polychlorinated biphenyls; volatile organic compounds; semi-volatile organic compounds; inorganics; polynuclear aromatic hydrocarbons; total petroleum hydrocarbons; benzene, toluene, ethylbenzene, xylenes (BTEX compounds); total suspended solids; sulfate/sulfide; and nitrate/nitrate].

Relevant raw field data or summary data will also be presented in tables in a useable format. Data reduced for statistical analyses will also be tabulated using an appropriate data sorting method or summary.

As required by Permit Module III Condition E.7, the MGP/RCRA Investigation final report will include a comparison of media-specific hazardous constituents with corresponding action levels. This comparison will be presented in tabular format and will be discussed in the MGP/RCRA Investigation Report.

3.4.2 Figures

Laboratory analytical results will be displayed on figures (i.e., site plan or partial site plan) that will identify the locations where chemical constituents were detected and show the extent of chemical constituents at the site. Laboratory analytical results will be shown in boxes adjacent to the corresponding sample locations. Separate figures will be prepared as necessary to present the results from the investigations of soil, ground water, and the storm sewer system. Separate figures will also be prepared as necessary to present the analytical results for the different parameters analyzed.

The figures presented with the MGP/RCRA Investigation Report may also include the following:

- sampling grids;
- sampling area boundaries;
- locations where more data is required;
- maximum and average concentrations;
- changes in concentration relative to distance from the source or time;
- features affecting transport of chemical constituents; and
- other information, as appropriate.

As part of the MGP/RCRA Investigation Report, a figure will be prepared showing both ground-water contours and storm sewer invert elevations. In addition, one or more geologic cross sections will be prepared to support discussion of subsurface conditions at the site.

3.4.3 Appendices

Investigation data to be presented in appendices to the MGP/RCRA Investigation Report will include copies of test pit logs, soil boring logs, field screening results, monitoring well construction logs, ground-water field parameter measurements, hydraulic conductivity test data, manhole inspection forms, and copies of the validated analytical laboratory data.

3.5 Remedial Measures Evaluation Report

Prior to preparation of the Remedial Measures Evaluation Report, a Preliminary Screening Report will be prepared. The Preliminary Screening Report will present the results of the identification and preliminary screening of potential remedial measure technologies. The Preliminary Screening Report will be submitted to the NYSDEC for review and approval. Upon NYSDEC approval of the Preliminary Screening Report, the Remedial Measures Evaluation Report will be prepared. The Remedial Measures Evaluation Report will present the following:

- A summary of relevant issues identified by the MGP/RCRA investigation;
- A detailed discussion of the evaluation of remedial measure alternatives based on the criteria of technical feasibility, environmental and human health assessment, costs, and compliance with institutional requirements (as outlined in the Work Plan). The discussion will include performance expectations, preliminary design criteria, general operation and maintenance requirements, and long-term monitoring requirements;
- Tables presenting capital costs and operation and maintenance costs for each remedial measure alternative;
- A summary table presenting a clear comparison of the positive and negative aspects of each remedial measure alternative;
- A recommendation and justification of the preferred remedial measure alternative(s);
- A summary of any field, bench-scale laboratory, or pilot-scale laboratory studies (if conducted);
- A preliminary discussion of the preferred remedial measure(s) design and implementation precautions, including special technical issues (i.e., additional engineering data required, permits and regulatory requirements, access, easements, rights-of-way, health and safety requirements, and community relations activities); and
- A project schedule that covers preparation of a Remedial Measures Design, Construction QA/QC Plan, Health and Safety Plan, and Remedial Measure Construction for the preferred remedial measure alternative(s).

The Remedial Measures Evaluation Report will be signed by a licensed New York State Professional Engineer as required by the MGP Consent Order. The Remedial Measures Evaluation Report will be submitted to the NYSDEC for review and approval. Upon approval by the NYSDEC, the Remedial Measures Evaluation Report will be provided to the public as described in the Community Relations Plan.

4. Project File

4.1 General

Documentation generated during the MGP/RCRA Investigation and Remedial Measures Evaluation will be placed in a single project file at the BBL office in Syracuse, New York. This file will consist of the following components:

- Agreements (filed chronologically);
- Correspondence (filed chronologically);
- Memos (filed chronologically); and
- Notes and Data (filed by topic).

Reports will be filed with correspondence. Analytical laboratory documentation (when received) and field data will be filed with notes and data. Materials contained within project files may only be removed, on a temporary basis, by authorized personnel.

MGP/RCRA Investigation and Remedial Evaluation Health and Safety Plan

Niagara Mohawk Power Corporation
North Albany Service Center
Albany, New York

August 1996

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

6723 Towpath Road, P.O. Box 66
Syracuse, New York, 13214-0066
(315) 446-9120

Approvals and Acknowledgments

Approvals

I have read and approved this HASP with respect to project hazards, regulatory requirements, and BBL procedures.

Project Name: Niagara Mohawk Power Corporation North Albany Service Center
Project Number: 364.69.01

Project Manager/Date

Regional HS Coordinator/Date

Project/Site HS Staff/Date

Corporate HS Associate/Date

Acknowledgments

The final approved version of this HASP has been provided to the Site Supervisor. I acknowledge my responsibility to provide the Site Supervisor with the equipment, materials and qualified personnel to implement fully all safety requirements in this HASP. I will formally review this plan with the HS Staff every three months until project completion.

Project Manager

Date

I acknowledge receipt of this HASP from the Project Manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the Project Manager and/or the Health and Safety Representative.

Site Supervisor

Date

Health and Safety Plan Acknowledgment

I have read this Site-Specific Health and Safety Plan, or its contents have been presented to me, and I understand the contents, and I agree to abide by its requirements.

Name (Print)	**Signature**	**Representing**	**Date**

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Appendices.

1. Introduction

1.1 Objective

The objective of site activities is to implement the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan activities at the Niagara Mohawk Power Corporation (Niagara Mohawk) North Albany Service Center which are anticipated to include the following activities:

- Soil investigation;
- Ground-water investigation;
- Storm sewer investigation;
- Focused Screening Level Risk Assessment;
- Assessment of air emissions; and
- Assessment of interim remedial measures.

Relevant background information and the objectives the health and safety plan (HASP) for the MGP/RCRA Investigation and Remedial Measures Evaluation are summarized below.

The objective of this plan is to provide a mechanism for establishing safe working conditions at the site. The safety organization, procedures, and protective equipment have been established based upon an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of accident or injury.

1.2 Site and Facility Description

The North Albany Service Center is located at 1125 Broadway in Albany, New York. A facility location map is presented as Figure 1 of the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan (BBL; March 1996). The approximately 25-acre facility is bordered by Broadway to the west; Interstate I-90 to the North; a Delaware and Hudson Railroad right-of-way to the east; and Bridge Street to the south. Land use in the surrounding area is primarily commercial/industrial, with residential areas located to the west of the facility. Interstate I-787 and the Hudson River are located east of the railroad right-of-way that forms the eastern property boundary of the facility.

The North Albany Service Center is located on land gently sloping to the south. The average ground elevation at the North Albany Service Center is approximately 20 feet above mean sea level. Surface water runoff from the site is collected by catch basins which discharge to the south and east of the facility. The ultimate discharge location for surface water drainage from the facility will be determined as part of the MGP/RCRA Investigation activities.

The North Albany Service Center is located in the Hudson-Champlain Lowland physiographic province. Bedrock beneath the site is reportedly the Black Snake Hill Shale. The depth to bedrock generally varies from 16 to 24 feet in the western/northwestern part of the site, and is generally greater than 25 feet in the eastern/southeastern part of the site. Overburden soils in the vicinity of the site consist of fill, glacial-fluvial deposits, and till. Surface soil and shallow subsurface soil at the site consists of a mixture of imported fill and native materials that have been disturbed by excavation and grading activities. Based on subsurface conditions encountered during previous investigations at the site, the ground-water table occurs within the overburden at depths ranging from 5 to 16 feet below ground surface. The extent of seasonal fluctuations of ground-water elevations and/or daily fluctuations associated with the tidal conditions of the Hudson River will be evaluated as part of the MGP/RCRA Investigation activities.

The North Albany Service Center is a maintenance/supply and office facility that supports Niagara Mohawk's eastern operating division. The facility consists of several buildings, parking lots, and storage areas. As shown on the facility site plan presented on Figure 2 of the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan (BBL; March 1996), primary buildings and support facilities currently located at the service center include the following:

- The Versaire Building (Building #1) is a warehouse and crew headquarters building. A storage shed, which is part of the North Albany TSDF (the PCB storage shed), is located along the western side of the Versaire Building;

- Building 2 is a three-story structure which contains offices, meeting rooms, and maintenance shops. A transformer shop located on the first floor of Building 2 is used to service various electrical equipment (including oil-filled units containing PCBs);

- Building 2-1, an office building located at the southwestern corner of the property, is used to support Niagara Mohawk customer service and billing operations;

- Buildings 2-3 and 2-4 are storage sheds that were constructed as part of a lumber planning business formerly located in the southeastern section of the property;

- A vehicle maintenance building is located in the northeastern section of the property;

- An electrical equipment and non-RCRA-regulated waste storage building is located to the south of Building 2;

- An aboveground storage tank facility consisting of a PCB-contaminated waste oil tank, two non-hazardous waste oil storage tanks, and a virgin oil storage tank, is located south of Building 2 in the area immediately outside the transformer shop;

- A large portion of the southern section of the site consists of a gravel-covered storage yard, which is used to store various electrical equipment, cable spools, steel framing, and wood poles.
- An electrical substation (the Genesee Street Substation) is located at the northwestern corner of the property;
- Two guard houses are located at the facility (one at an entrance off Bridge Street and one at the main facility near the northeastern corner of Building 2); and
- A diesel fuel pump island is located east of Building 2, and a gasoline pump island is located to the north of Building 2.

A detailed site history and regulatory history for the site is provided in the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan (BBL; March 1996).

1.3 Policy Statement

The policy of Blasland, Bouck & Lee, Inc. (BBL) is to provide a safe and healthful work environment for all employees. No aspect of operations is of greater importance than injury and illness prevention. A fundamental principle of safety is the belief that all accidents and injuries are preventable. BBL will take every reasonable step to eliminate or control hazards in order to minimize the possibility of injury, illness, or accident.

This Health and Safety Plan (HASP) prescribes the procedures that must be followed during referenced site activities. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager, and the Regional Health and Safety Coordinator. This document will be periodically reviewed to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will involve a review and modification to the HASP. Such changes will be completed in the form of an addendum.

The provisions of this plan are mandatory for all BBL personnel and BBL's subcontractors assigned to the project. All visitors to the work site must abide by the requirements of the plan. It should be acknowledged that the employees of other consulting and/or contracted companies may work in accordance with their own independent HASPs. Subcontractor HASPs must meet the requirements of this HASP.

This HASP is not intended or represented to be suitable for use by other organizations, reuse by Niagara Mohawk or others on extensions of this or any other project. Any reuse without prior written approval or adaptation by BBL will be at the user's sole risk and without liability and legal exposure to BBL.

1.4 References

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, United States Environmental Protection Agency (USEPA) regulations, and BBL Health and Safety policies and procedures. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guides*, EPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH, OSHA, USCG, EPA (86-116, October 1985).
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.120.
- Title 29 of the Code of Federal Regulations (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, DHHS, PHS, CDC, NIOSH, (1994).
- *Threshold Limit Values*, ACGIH, (1995)
- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed., (1993).
- *Health and Safety Policies and Procedures Manual*, BBL.

1.5 Definitions

The following definitions are applicable to this HASP:

- *Site* - The area where the work is to be performed. The site may not include areas of the facility that have been fully characterized, are not subject to remedial action, and not potentially affected by activities conducted under this health and safety plan.

- *Project* - All on-site work performed under the scope of work for the MGP/RCRA Investigation and Remedial Measures Evaluation.

- *Subcontractor* - Includes subcontractor personnel hired on-site by BBL.

- *On-Site Personnel* - All Niagara Mohawk, BBL, and BBL subcontractor personnel involved with the project.

- *Visitor* - All other personnel, except the on-site personnel. All visitors must receive approval to enter the site.

- *Exclusion Zone* - Any portion of the site where hazardous substances are, or are reasonably suspected to be present in the air, water or soil.

- *Contamination Reduction Zone* - Area between the Exclusion Zone and Clean Zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.

- *Clean/Support Zone* - The rest of the site. Support equipment is located in this zone.

2. Roles and Responsibilities

2.1 All Personnel

All BBL and subcontractor personnel must adhere to these procedures during the performance of their work. Each person is responsible for completing tasks safely, and reporting any unsafe acts or conditions to his or her immediate supervisor or to the Site Supervisor. No person may work in a manner that conflicts with the safety and environmental precautions expressed in these procedures. After due warnings, the Project Manager will dismiss from the site any person who violates safety procedures.

All on-site personnel will receive training in accordance with 29 CFR 1910.120 and be familiar with the requirements and procedures contained in this document prior to the beginning of project operations.

The roles of key BBL personnel are outlined in the following sections. Key personnel and contacts are summarized in Table 2-1.

2.2 Corporate Health and Safety Associate (CSA)

The CSA administers all corporate health and safety policies, procedures and activities. The CSA in association with divisional and regional health and safety personnel implement, maintain, and enforce the corporate health and safety program.

2.3 Regional Health and Safety Coordinator

The Regional Health and Safety Coordinator (RHSC) or other Division 61 representative is responsible for technical health and safety aspects of the project, including review and approval of this HASP. Inquiries regarding BBL procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. Any changes or addenda to this HASP must be approved by the RHSC or other member of Division 61.

2.4 Health and Safety Supervisor

The site/project Health and Safety Supervisor (HSS) is responsible for coordinating site health and safety issues. The HSS will advise the Project Manager on health and safety issues, and will establish and oversee the project air monitoring program. The HSS is the primary site contact on occupational health and safety.

It is the responsibility of the HSS or designated alternate to:

- Verify that all on-site personnel are made aware of the provisions of the HASP and have been informed of the nature of any physical and/or chemical hazards associated with the site activities;
- Maintain a daily logbook for recording all significant health and safety activities and incidents;
- Verify that on-site personnel and visitors have received the required training, including instructions for safety equipment and personal protective equipment use;

- Suspend work if health and/or safety-related concerns arise;
- Provide on-site technical assistance;
- Conduct site and personal air monitoring, including equipment maintenance and calibration. Where necessary, submit samples to an American Industrial Hygiene Association (AIHA) accredited laboratory;
- Issue/obtain required work permits;
- Conduct site safety orientation training and daily safety meetings;
- Verify that on-site personnel have received the required physical examinations and medical certifications;
- Review site activities with respect to the adequacy of the HASP; and
- Maintain required health and safety documents and records on-site.

2.5 Project Manager

The Project Manager (PM) is ultimately responsible for ensuring that all project activities are completed in accordance with the requirements and procedures in this plan. The PM is responsible to provide the Site Supervisor with the equipment, materials and qualified personnel to implement fully all safety requirements in this HASP.

It is the responsibility of the PM to:

- Report all accidents and incidents to the RHSC, and thoroughly investigate all such occurrences on the project;
- Approve, in writing, any addenda or modifications of this HASP;
- Suspend work if health and/or safety-related concerns arise; and
- Formally review this plan with the RHSC or HSM every *three* months until the project is completed.

2.6 Site Supervisor

The Site Supervisor (SS) is responsible for implementation of the HASP, including communication of site requirements to all on-site project personnel (including subcontractors) and consultation with the HSS. The SS will be responsible for informing the RHSC and the PM of any changes in the work plan or procedures so that those changes may be addressed in the HASP. Other responsibilities include:

- Stopping work, as required, to ensure personal safety and protection of property, or in cases of life or property-threatening safety noncompliance;

- Obtaining a site map and determining and posting routes to medical facilities and emergency telephone numbers, and arranging emergency transportation to medical facilities;

- Notifying local public emergency officers of the nature of the site operations, and posting of their telephone numbers in an appropriate location;

- Observing on-site project personnel for signs of chemical or physical trauma;

- Verifying that all site personnel have the proper medical clearance, have met applicable training requirements, and have training documentation available in the office;

2.7 Subcontractors

On-site subcontractors and their personnel must understand and comply with the site requirements established in this HASP. Subcontractors may prepare their own task-specific HASPs, which must be consistent with the requirements of this HASP. Subcontractor personnel must attend and participate in the daily safety meetings and all other site safety meetings.

2.8 On-Site Personnel and Visitors

All personnel must read and acknowledge their understanding of this HASP, abide by the requirements of the plan, and cooperate with site supervision in ensuring a safe work site. Site personnel will immediately report any of the following to the SS or HSS:

- Accidents and injuries, no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Symptoms of chemical exposure;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;
- Damage to equipment or property;
- Conditions or activities for which they are not properly trained;

TABLE 2-1
KEY PERSONNEL

Name/Title	Address	Telephone Number
Niagara Mohawk Power Corporation		
James F. Morgan Environmental Analyst IV	300 Erie Boulevard West Syracuse, NY 13202	(315) 428-3101
Blasland, Bouck & Lee, Inc.		
David J. Ulm Project Supervisor	6723 Towpath Road, P.O. Box 66 Syracuse, NY 13214	(315) 446-9120
Michael C. Jones Project Manager	6723 Towpath Road, P.O. Box 66 Syracuse, NY 13214	(315) 446-9120
John C. Brussel Health & Safety Supervisor (HSS)/BBL Site Supervisor	6723 Towpath Road, P.O. Box 66 Syracuse, NY 13214	(315) 446-9120
Richard J. Price Divisional Health and Safety Coordinator (DHSC)	6723 Towpath Road, P.O. Box 66 Syracuse, NY 13214	(315) 446-9120
Herrick L. Teeter Jr., IHIT Regional Health and Safety Coordinator (RSHC)	6723 Towpath Road, P.O. Box 66 Syracuse, NY 13214	(315) 446-9120
Jay D. Keough, CIH Corporate Health and Safety Associate	8 South River Rd. Cranbury, NJ 08512	(609) 860-0590
SJB Services, Inc.		
Joseph L. Genovese Drilling Services Coordinator	55 Oliver Street Cohoes, NY 12047	(518)238-1145

3. Project Hazards and Control Measures

3.1 Scope of Work

3.1.1 Job Hazard Assessment

Activities covered by this HASP include tasks outlined in the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan. The activities outlined below are organized slightly different from the tasks in the work plan to address common hazards of the activities rather than the scope of the activity (i.e., soil boring installation and monitoring well installation are grouped together due to drilling hazards, etc.). The activities covered by this HASP include the following:

Activity No.	Activity Description
1	Mobilization/Area Reconnaissance
2	Surface Soil Sampling and Test Pit Excavation
3	Soil Boring and Ground-Water Monitoring Well Installation
4	Ground-Water Sampling
5	Storm Sewer Investigation, Inspection, Flow Sampling, and Debris Sampling
6	Decontamination
7	Demobilization

A job hazard assessment is necessary to identify potential safety, health, and environmental hazards associated with each type of field activity. Because of the complex and changing nature of field projects, supervisors must continually inspect the work site to identify hazards that may harm site personnel, the community, or the environment. The SS must be aware of these changing conditions and discuss them with the HSS, RHSC, and the PM whenever these changes impact employee health, safety, the environment, or performance of the project. The SS will keep BBL personnel and subcontractors informed of the changing conditions and the RHSC will write or approve addenda to this HASP as necessary.

3.2 Field Activities, Hazards, Control Procedures

3.2.1 Mobilization/Area Reconnaissance

Site Mobilization/Area Reconnaissance will include establishing excavation locations, sample locations, determining location of utilities and other installations, and establishing work, contamination control and support zones.

A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the support and contamination reduction zones. During this initial phase, project personnel will walk the site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

The hazards of this phase of activity are associated with heavy equipment movement, manual materials handling, installation of temporary on-site facilities, and manual site preparation.

Manual materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion and laceration hazards. The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitos, wasps, spiders and snakes. The work area presents slip, trip and fall hazards from scattered debris and irregular walking surfaces. Freezing-weather hazards include frozen, slick and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil.

Exposure to contaminated soil is possible. Airborne particulate and organic vapors will be monitored according to Section 8, Air Monitoring. In accordance with Section 5, decisions on personal protective equipment (PPE) for the chemical hazards will be based on measurements made before and during work activities. Control procedures for environmental and general hazards are discussed in Section 4.0.

Installation of temporary field office or support facilities may expose personnel to electrical hazards, underground and overhead utilities, and physical injury due to manual lifting and moving of materials.

3.2.2 Surface Soil Sampling and Test Pit Excavation Activities

This task will consist of collecting surface soil samples. This task will also consist of excavating tests pit at each specified location to allow for visual assessment of subsurface soils and to facilitate collection of subsurface samples. Subsurface soil samples will be collected and screened for VOCs using a photoionization detector (PID). Field sampling operations consist of the collection of soil samples for subsequent analysis and evaluation of potential site contamination. The physical hazards of this operation are primarily associated with the sample collection methods and procedures utilized.

During the course of this project, several different sampling methodologies may be utilized based on equipment accessibility and the types of materials to be sampled. These sampling methods may include the use of hand-auger/sampling probes, sampling spoons, or trowels. The primary hazards associated with these specific sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present chemical and physical hazards. The hazards associated with these sampling procedures are generally limited to strains/sprains resulting from hand augering and potential eye hazards.

In addition to the safety hazards specific to sampling operations, hazards associated with the operation of vehicles, particularly large vehicles, in a small area will be a concern. Of particular concern will be the backing up of trucks, excavation equipment, and other support vehicles.

Additionally, personnel will collect samples remotely from outside of confined spaces and excavations when feasible. If entry into a confined space is required then BBL personnel will follow BBL's Confined Space Entry Policy and Procedure Memo.(Appendix A)

The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitos, wasps, spiders and snakes. The work area presents slip, trip and fall hazards from scattered debris and irregular walking surfaces. Freezing-weather hazards include frozen, slick and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil.

Exposure to contaminated soil is possible. Airborne particulate and organic vapors will be monitored according to Section 8, Air Monitoring. In accordance with Section 5, decisions on personal protective equipment (PPE) for the chemical hazards will be based on measurements made before and during work activities. Control procedures for environmental and general hazards are discussed in Section 4.0.

3.2.2.1 Excavation Safety

This task involves removing earthen materials from a designated area, thereby creating a man-made cut, trench, or depression in the earth's surface.

Physical Hazards: The physical hazards involved in the excavation of soils are related to the excavation itself and the operation of heavy equipment. The presence of overhead utilities such as power lines requires careful positioning of the excavating equipment in order to maintain a safe distance between the lines and the closest part of the equipment. The presence of underground utilities such as gas lines, power lines, water lines and sewer pipes must be determined prior to beginning the excavation.

Excavations pose significant hazards to employees if they are not carefully controlled. There exists a chance for the excavation to collapse if it is not dug properly, sloped, benched or shored as required by 29 CFR 1926 Subpart P. Protective systems, as required by 29 CFR 1926 Subpart P, must be utilized if the potential for hazardous cave-ins exist. The excavation also is a fall hazard, and employees must pay careful attention to what they are doing or they risk a fall into the excavation. Fall protection, as required by 29 CFR 1926 Subpart M, will be required.

Some activities may require personnel to enter an excavation. Whenever feasible, equipment placement and other activities shall be done remotely, without entering the excavation. If entry is absolutely unavoidable, the safety procedures for excavation entry and employee protective systems consistent with 29 CFR 1926 Subpart P shall be followed for each such activity. Air monitoring in accordance with Section 8 is required for all excavation entry activities.

Noise also may present a hazard. Heavy equipment operation frequently results in noise levels exceeding 85 dBA, requiring the use of hearing protection.

Chemical Hazards: Airborne concentrations of soil contaminants and the dust from the procedure pose the potential for exposure at this stage.

Control: Before any digging can be done, all underground utilities must be located and identified. The Underground/Overhead Utilities Checklist in Attachment B will be used to document this process. PPE for this phase is described in Section 5.0. All excavation activities shall be conducted in accordance with 29 CFR 1926 Subpart P. As indicated above, any personnel entry into an excavation will be in accordance with 29 CFR 1926 Subpart P. If excavation operations are located near underground installations, the exact location of the installations must be determined by safe and acceptable means. While the excavation is open, underground installations must be protected, supported or removed as necessary to safeguard employees.

3.2.2.2 Excavation Access, Egress, and General Requirements

Structural ramps that are used solely by employees as a means of access or egress from excavations must be designed by a competent person. Structural ramps used for access or egress of equipment must be designed by a competent person qualified in structural design, and must be constructed in accordance with the design. Ramps and runways constructed of two or more structural members must have the structural members connected together to prevent displacement. Structural members used for ramps and runways must be of uniform thickness. Cleats or other appropriate means used to connect runway structural members must be attached to the bottom of the runway or must be attached in a manner to prevent tripping. Structural ramps used in lieu of steps must be provided with cleats or other surface treatments to the top surface to prevent slipping.

A stairway, ladder, ramp or other safe means of egress must be located in trench excavations that are 4 feet (1.22 m) or more in depth, so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

No person shall be permitted underneath loads handled by lifting or digging equipment. Site personnel must be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with 1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system must be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

In addition to the requirements set forth in 29 CFR 1926.50 - 1926.107 to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements must apply:

Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation must be tested before employees enter excavations.

Adequate precautions must be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with 29 CFR 1926.50 - 1926.107.

Adequate precaution must be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 10 percent of the lower flammable limit of the gas.

When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing must be conducted as often as necessary to ensure that the atmosphere remains safe.

Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, must be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment must be attended by support personnel when in use.

Employees must not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline. If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations must be monitored by a competent person to ensure proper operation.

If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person.

Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning must be provided to ensure the stability of such structures for the protection of employees. Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees is not permitted except when:

- A support system designed by a competent person, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
- The excavation is in stable rock; or
- A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or

  A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

Sidewalks, pavements and appurtenant structures must not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures. Adequate protection must be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection must consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

Employees must be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection must be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

3.2.2.3 Inspections by Competent Person

Daily inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection must be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections also must be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees must be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Walkways must be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with 1926.502(b) must be provided where walkways are 6 feet (1.8 m) or more above lower levels. Adequate barrier protection must be provided at all remotely located excavations. All wells, pits, shafts, etc., must be barricaded or covered. Upon completion of exploration and other similar operations, temporary wells, pits, shafts, etc., must be backfilled.

3.2.2.4 Soil Classification

29 CFR 1926 Subpart P, Appendix A describes methods of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils. This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in 1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with Appendix C to Subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with 29 CFR Subpart P Appendix D. This Appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data are predicated on the use of the soil classification system set forth in the Appendix A.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V). Short term exposure means a period of time less than or equal to 24 hours that an excavation is open. Soil and rock deposits must be classified in accordance with Appendix A to Subpart P of part 1926. The maximum allowable slope for a soil or rock deposit must be determined from Table B-1. The actual slope must not be steeper than the maximum allowable slope. The actual slope must be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope which is at least ½ horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope. When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person must determine the degree to which the actual slope must be reduced below the maximum allowable slope, and must assure that such reduction is achieved. Surcharge loads from adjacent structures must be evaluated in accordance with 1926.651(I). Configurations of sloping and benching systems must be in accordance with 29 CFR 1926 Subpart P Appendix B.

TABLE B-1
29 CFR 1926 Subpart P Appendix B
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP(3)
STABLE ROCK	VERTICAL (90 Deg.)
TYPE A (2)	3/4:1 (53 Deg.)
TYPE B	1:1 (45 Deg.)
TYPE C	1 1/2:1 (34 Deg.)

Footnote(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

Footnote(2) A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth must be 3/4H:1V (53 degrees).

Footnote(3) Sloping or benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.

3.2.2.5 Overhead Electrical Clearances

If excavation is conducted in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned such that no part, including excavation boom can come within the minimum clearances as follows:

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

When the equipment is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

Dust Control - Airborne particulate generation will be controlled during site excavations. Dry, dusty soil will be wetted with a water spray from a potable water source to control the generation of dust. Soil will not be wetted to a degree which will cause runoff or soil erosion.

3.2.3 Soil Boring and Groundwater Monitoring Well Installation

This task includes the installation of soil borings and ground-water monitoring wells at specified locations. Prior to monitoring well installation, soil borings will be drilled using the hollow-stem auger drilling technique. After the wells are completed, the wells will be developed using the standard operating procedures.

3.2.3.1 Drilling Hazards

The primary physical hazards for this project are associated with the use of the drilling rig and supporting vehicles. Rig accidents can occur as a result of improperly placing the rig on uneven or unstable terrain, or failing to adequately secure the rig prior to the start of operations. Underground and overhead utility lines can create hazardous conditions if contacted by drilling equipment. Rotating augers, tools, and equipment such as elevators, cat lines, and wire rope have the potential for striking, pinning, or cutting personnel.

Wire Rope: Worn or frayed wire rope presents a laceration hazard if loose wires protrude from the main bundle.

Cat Lines: Cat lines are used on drilling rigs to hoist material. Accidents that occur during cat line operations may injure the employee doing the rigging as well as injure the operator. Minimal hoisting control causes sudden and erratic load movements, which may result in hand and foot injuries.

Working Surfaces: Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

Derrick Operations: The derrick man on a well drilling operation performs his tasks from various elevated work platforms in the mast. He is exposed to falls when not utilizing fall protection equipment while climbing the derrick ladder, while working with the pipe stands, and while moving from the ladder to his platform station.

Materials Handling: The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Rolling stock can shift and/or fall from a pipe rack or truck bed.

3.2.3.2 Drilling Safety Procedures

Drill Crews: All drillers performing work must possess required state or local licenses to perform such work. All members of the drill crew shall receive site specific training prior to beginning work.

The driller shall be responsible for the safe operation of the drill rig as well as the crew's adherence to the requirements of this HASP. The driller must ensure that all safety equipment is in proper condition and is properly used. The members of the crew shall follow all instructions of the driller, wear all personal protective equipment, and be aware of all hazards and control procedures. The drill crews shall participate in the Daily Safety Meetings and be aware of all emergency procedures.

Rig Inspection: Each day, prior to the start of work, the drill rig and associated equipment shall be inspected by the driller and/or drill crew. The following items shall be inspected:

- Vehicle condition;
- Proper storage of equipment;
- Condition of all wire rope;
- Fire extinguisher; and
- First Aid Kit.

Drill Rig Set Up: The drill rig shall be properly blocked and leveled prior to raising the derrick. The wheels which remain on the ground must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

Site Drilling Rules: Before drilling, the existence and location of underground pipe, electrical equipment and gas lines will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer will be used to locate the line.

Documentation that nearby utilities have been marked on the ground, and that the drill site has been cleared shall be in the possession of the Field Operations Manager prior to commencement of the intrusive investigation at that point of the site (See Appendix B).

No ignition sources are permitted if the ambient airborne concentration of flammable vapors exceeds 10% of the lower explosive limit (LEL) when drilling. A combustible gas indicator will be used to make this determination (see Section 8).

Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10 percent of LEL in the immediate area (a one-foot radius) of the point of drilling.

Combustible gas readings of the general work area will be made regularly (see Section 8).

Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the catline be used as a personnel carrier.

Overhead Electrical Clearances: If drilling is conducted in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables can come within the minimum clearances as follows:

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

Rig Set Up: All well sites will be inspected by the driller prior to the location of the rig to ensure a stable surface exists. This is especially important in areas where soft, unstable terrain is common.

All rigs will be properly blocked and levelled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur.

When the ground surface is soft or otherwise unstable, wooden blocks, at least 24" by 24" and 4" to 8" thick shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

Hoisting Operations: Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

Drill pipe, auger strings or casing should be picked up slowly.

Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrick man has signaled that he may safely hoist the pipe.

During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor, and no one should be on the rig or derrick.

The brakes on the drawworks of every drilling rig should be tested by each driller each day. The brakes should be thoroughly inspected by a competent individual each week.

A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

Workers should never stand near the borehole whenever any wire line device is being run.

Hoisting control stations should be kept clean and controls labeled as to their functions.

Catline Operations: Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline.

The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

Personnel should not stand near, step over, or go under a cable or catline which is under tension.

Employees rigging loads on catlines shall:

- Keep out from under the load,
- Keep fingers and feet where they will not be crushed,
- Be sure to signal clearly when the load is being picked,
- Use standard visual signals only and not depend on shouting to coworkers,
- Make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

Wire Rope: When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or resocketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

An eye splice made in any wire rope shall have not less that five full tucks.

Wire rope shall not be secured by knots except on haul back lines on scrapers.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

Wire rope clips shall not be used to splice rope.

Pipe/Auger Handling: Pipe and auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger or pipe sections without assistance.

Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

Slip handles should be used to lift and move slips. Employees should not be permitted to kick slips into position.

When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

Pipe and augers stored in racks, catwalks or on flatbed trucks should be chocked or otherwise secured to prevent rolling.

3.2.4 Ground Water Sampling Activities

The ground-water sampling program will involve uncapping, purging (pumping water out of the well), and sampling existing and newly-installed monitoring wells. A mechanical pump may be utilized to purge the wells and can be hand-, gas-, or electric-operated. Water samples taken from the wells are then placed in containers and shipped to an analytical laboratory for analysis.

During the course of this project, several different sampling methodologies may be utilized based on equipment accessibility and the types of materials to be sampled. These sampling methods may include hand or mechanical bailing. The primary hazards associated with these specific sampling methods are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present chemical and physical hazards. The hazards of these types of sampling methods are generally limited to strains/sprains resulting from hand bailing and potential eye hazards resulting from water sampling activities.

In addition to the safety hazards specific to sampling operations, hazards associated with the operation of vehicles, particularly large vehicles, in a small area will be a concern. Of particular concern will be the backing up of trucks, excavation equipment, and other support vehicles.

The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitos, wasps, spiders and snakes. The work area presents slip, trip and fall hazards from scattered debris and irregular walking surfaces. Freezing-weather hazards include frozen, slick and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil.

Exposure to contaminated soil is possible. Airborne particulate and organic vapors will be monitored according to Section 8, Air Monitoring. In accordance with Section 5, decisions on personal protective equipment (PPE) for the chemical hazards will be based on measurements made before and during work activities. Control procedures for environmental and general hazards are discussed in Section 4.0.

3.2.5 Storm Sewer Inspection, Flow Sampling, and Debris Sampling

This task will consist of visually inspecting each manhole and catch basin associated with the facility storm sewer system. Following inspection of manholes and catch basins, samples of accumulated debris (if present) will be remotely collected from each catch basin.

Prior to inspecting each manhole and catch basin, the cover will be removed and the air inside the catch basin will be monitored for oxygen, combustible gases, carbon monoxide, and hydrogen sulfide levels using a Bacharach Sentinel 4 gas detector (or equivalent) and for total organic vapors using a PID. Personnel will not break the plane of the opening to the catch basin with any part of their body. If personnel are required to break the plane of the opening to the catch basin with any part of their body, then the activity will be conducted according to BBL's Confined Space Entry Procedures (Appendix A).. Each catch basin and manhole will be inspected from the ground surface without entering the structure, to determine the information listed. The debris samples will also be collected from the ground surface using a stainless-steel scoop attached to a non-conductive extension handle (i.e., plastic or fiberglass).

3.2.5.1 Confined Space Entry

This section contains general requirements and procedures for working in confined spaces. A confined space is defined as a space large enough and so configured that an employee can bodily enter and perform assigned work, has limited means for entry or exit, and is not designed for continuous employee occupancy. Potentially contaminated soil excavations and other confined space work may pose additional hazards such as air contamination, flammable or explosive atmosphere, and oxygen deficiency. Excavation entry may pose the possibility of engulfment. Personnel must be properly trained in order to supervise and participate in confined space entry procedures or serve as standby attendants.

All confined spaces are initially considered permit-required.

3.2.5.2 Confined Space Identification and Designation

Identification: The BBL HSS is responsible to identify all confined spaces into which BBL employees or subcontractors will enter. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space. The client is responsible to identify and provide information as to contents, expected atmosphere, and rescue procedures for all confined spaces on his/her property. If a space is not considered permit-required by the client but meets the criteria of this procedure, it shall be considered permit-required for BBL entry. If a space does not meet the criteria in this procedure but is considered permit required by the client, the confined space entry PPM shall apply

Isolation Requirements: The confined space must be isolated to prevent the introduction of contaminants during entry. Isolation must include disconnecting or installing slip blanks into all lines leading to the space.

To prevent injury from physical hazards within the space, lockout, tagout, tryout and return to service procedures must be implemented for potential sources of hazardous energy.

When isolation is not practical or possible (as in sewer entry) entry conditions must be continuously monitored.

Atmospheric Hazard Control: Atmospheric hazards must be eliminated or controlled to meet the requirements specified in section 5.0. If necessary the space shall be purged or inerted, then ventilated to the extent necessary to meet the criteria in section 5.0. Ventilation equipment may be needed to maintain these conditions.

Communications: Provisions for continuous communication between entrants and attendants may consist of the standard system of lifeline "tugs" below, so long as the attendants continuously hold the lifelines in their hands. If this is not practical or possible, portable air horns must be provided to all entrants and attendants. The same code for rope tugs will be used for air horn blasts:

Lifeline "Tug" Signals or Air Horn Signals

1 Tug/Horn Blast = Are you OK?
2 Tugs/Horn Blast = Yes, I am OK.
3 Tugs/Horn Blast = Exit the confined space immediately.

If the lifeline tug system or the air horn system are not feasible, powered communication equipment with the appropriate NEC rating shall be provided.

Personal Protective Equipment (see Section 5 for PPE requirements).

- A chest or parachute harness with approved lifelines at least ½-inch in diameter and 2,000 pounds test shall be utilized. (NOTE: Wristlets may be used only when a harness presents a greater hazard to the employee and wristlets are the safest, most effective alternative). All lifelines shall be secured to a mechanical device or fixed point outside the confined space. Mechanical devices shall be used for all vertical entry permit spaces greater than five (5) feet deep.

Other Required Equipment: Lighting and electrical shall be of the appropriate National Electrical Code (NEC) rating. Rating should be Class I, Division I unless the space specifically meets other rating requirements.

Ingress and Egress Equipment: Protective barriers to be used to protect entrants from external pedestrian, vehicle or equipment hazards.

Rescue Equipment: All lifelines must be attached to a mechanical device or a fixed point outside the space such that a rescue can begin as soon as the rescuer becomes aware that a rescue is necessary. A mechanical device must be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

3.2.6 Decontamination Activities

All vehicles and equipment will be decontaminated before leaving the site. Personnel conducting decontamination activities may be exposed to skin contact with contaminated soil, volatile emissions from heavily contaminated vehicles and equipment, high pressure water spray, noise, and cold stress from the water spray. Personnel involved in decontamination activities wear personal protective equipment, typically one level below the level worn by personnel working in the exclusion zone.

3.2.7 Demobilization

Demobilization will involve the removal of all tools, equipment, supplies, and vehicles brought to the site. The physical hazards of this phase of activity are associated with heavy equipment operation, manual materials handling and manually working with soils. Heavy equipment operation presents noise and vibration hazards and hot surfaces. Manual materials handling and manually working with soils may cause blisters, sore muscles joint and skeletal injuries. The work area presents slip, trip and fall hazards from scattered debris and irregular walking surfaces. Freezing weather hazards include frozen, slick and irregular walking surfaces. Wet weather may cause wet, muddy, slick walking surfaces.

Exposure to contaminated soil is possible. Decisions on personal protective equipment (PPE) for the chemical hazards will be based on measurements made before and during work activities in accordance with Section 5 of this HASP.

Environmental hazards include plants, such as poison ivy, poison oak:

aggressive fauna, such as ticks, fleas, mosquitos, wasps, spiders and snakes; weather, such as sunburn, lightning, rain, heat and cold-related illnesses; pathogens, such as rabies, lyme disease and blood borne pathogens.

3.3 Chemical Hazards

The chemical hazards associated with site operations are related to inhalation of, ingestion of, and skin or eye contact with site constituents of concern. Constituents potentially present in environmental media at the site are PCBs, VOCs, SVOCs, and metals. Based on previous investigation activities on the site, it is anticipated that primary constituents of concern may potentially include PCBs, benzene, ethylbenzene, toluene, xylene, methylene chloride, 1,1-dichloroethane, tetrachloroethene, 1,1,2,2-tetrachloroethane, polynuclear aromatic hydrocarbons, phenolics, antimony, barium, iron, and lead. Based on chemical constituents in environmental media at the site, levels of PPE associated with each work task were selected by BBL and are discussed in Section 5.0. As analytical data becomes available this HASP will be amended to address the specific constituents detected and Material Safety Data Sheets (MSDSs) for the specific chemicals will be attached to this HASP.

Airborne concentrations of constituents of concern during certain site tasks may be significant, and will require air monitoring of potentially toxic and flammable atmospheres during such operations. Air monitoring requirements for site tasks are outlined in Section 8.1.

The potential for inhalation of contaminants during Tasks 2,3,4,5, and 6 is moderate. The potential for inhalation of contaminants during Tasks 1 and 7 is low. The potential for dermal contact with contaminated soils, water, and debris during Tasks 2,3,4,5, and 6 is moderate. The potential for dermal contact with contaminated soils, water, and debris during Tasks 1 and 7 is low

Table 3-1 lists the chemical, physical, and toxicological properties of the site constituents of concern and materials used during field activities.

The Material Safety Data Sheets (MSDSs) for constituents of concern and materials used on site are included in Appendix C.

4. General Safety Practices

4.1 General Practices

- At least one copy of this plan must be at the project site, in a location readily available to all personnel, and reviewed by all project personnel prior to starting work.

- All site personnel must use the buddy system (working in pairs or teams).

- Contaminated protective equipment, such as respirators, hoses, boots, etc., must not be removed from the regulated area before being cleaned or properly packaged and labeled.

- Contaminated waste, debris, and clothing must be properly contained, and legible and understandable precautionary labels must be affixed to the containers.

  Removing contaminated soil from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited.

- Food, beverages, or tobacco products must not be present or consumed in the exclusion and contamination reduction zones. Cosmetics must not be applied within these zones.

- Containers must be moved only with the proper equipment, and must be secured to prevent dropping or loss of control during transport.

- Emergency equipment such as eyewash, fire extinguishers, portable shower, etc. must be removed from storage areas and staged in readily- accessible locations.

- Employees must inform their partners or fellow team members of nonvisible effects of exposure to toxic materials. The symptoms of such exposure may include:

  - Headaches
  - Dizziness
  - Nausea
  - Blurred vision
  - Cramps
  - Irritation of eyes, skin, or respiratory tract.

- Visitors to the site must abide by the following:

  - All visitors must be instructed to stay outside the exclusion and contamination reduction zones, and remain within the support zone during the extent of their stay. Visitors must be cautioned to avoid skin contact with surfaces which are contaminated or suspected to be contaminated.

- Visitors requesting to observe work in the exclusion zone must don all appropriate PPE prior to entry into that zone, and must be cleared for hazardous waste work as evidenced by a complete physical examination; have 40-hours of hazardous waste operations training; and have 8-hours of refresher training within the past 12 months. If respiratory protective devices are necessary, visitors who wish to enter the contaminated zone must have been respirator-trained and fit tested for a respirator within the past 12 months;

- Visitor inspection of the contaminated area is at the discretion of the SS.

4.1.1 Buddy System

All on-site personnel must use the buddy system. Visual contact must be maintained between crew members at all times, and crew members must observe each other for signs of chemical exposure, heat or cold stress. Indication of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Team members must also be aware of potential exposure to possible safety hazards, unsafe acts, or noncompliance with safety procedures.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

4.2 Heat/Cold Stress

Heat and cold are two physical agents which can adversely affect workers if not dealt with properly. Stress caused by heat or cold can result in lower productivity, lower morale, and greater risk of employee injury. Also, severe heat or cold stress can directly endanger workers' health. Through proper training, recognition of symptoms, work breaks, monitoring, and proper use of protective equipment, many heat and cold-related stresses on workers can be prevented and controlled.

4.2.1 Heat Stress

One of the most frequently encountered problems during field investigations is heat stress. Heat stress manifests itself in two forms: heat stroke and heat exhaustion. Depending on ambient conditions, the worker, and the work being performed, heat stress can adversely affect a worker in as little as 15 minutes. This is especially important as ambient temperatures exceed approximately 70°F at high humidities. For this reason, all workers will be observed for heat stress using the following indicators: worker appearance and responses. The field staff will take care to monitor ambient conditions, the type of protective equipment, and personnel fitness. Work loads will be adjusted to account for potentially unsafe conditions.

Early symptoms of heat stress can include rashes, cramps, discomfort, irritability and drowsiness. These symptoms can cause impaired functional ability which may threaten the safety of operations. Advanced symptoms of heat exhaustion include pale, clammy skin, profuse perspiration, and extreme tiredness or weakness.

Heat stroke is a much more dangerous form of heat stress. Symptoms of heat stroke include high body temperatures and red or flushed, hot, dry skin. Other symptoms may include dizziness, nausea, headache, rapid pulse, and unconsciousness. First aid for all forms of heat stress includes cooling the body by removing PPE, moving to a safe zone, and allowing the worker to rest in a cooler environment.

4.2.2 Cold Stress

Persons working outdoors in temperatures at, or below, freezing may be frostbitten. Frostbite may be categorized into three types:

- Frostbite or incipient frostbite characterized by sudden blanching or whitening of the skin.
- Superficial frostbite - skin has a waxy or white appearance, is firm to the touch, but tissue beneath is resilient.
- Deep frostbite - tissues are cold and hard, indicating an extremely serious injury.

Sign and symptoms of frostbite include:

- The skin changes to white or grayish-yellow in appearance.
- Pain is sometimes felt early but subsides later (often there is no pain.)
- Blisters may appear later.
- The affected part feels intensely cold and numb.
- The person frequently is not aware of frostbite until someone tells him or he observes the pale, glossy skin.

As time passes, the affected worker may become confused, stagger, experience eyesight impairment, lose consciousness, and/or stop breathing.

First-aid for frostbite includes protecting the affected area from further injury, bringing the victim indoors, warming the affected areas quickly with warm water, and maintaining respiration according to first-aid procedures. Medical help should be called immediately.

Frostbite may be prevented by the use of insulated gloves, socks and other protective clothing capable of keeping moisture away from the skin. All clothing should be chosen so that it is compatible with the PPE required for certain activities.

4.3 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, and other pests.

4.3.1 Tick-Borne Diseases

Lyme Disease and Rocky Mountain Spotted Fever (RMSF) are diseases transmitted by ticks and occurs throughout the United States during spring, summer, and fall.

Lyme Disease. The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota and Wisconsin. Few cases have been identified in other states (less than 1 in 100,000).

Erlichiosis. The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota and Wisconsin. Few cases have been identified in other states.

These diseases are transmitted primarily by the Deer Tick, which is smaller and redder than the common Wood Tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, swelling and pain in the joints, and eventually, arthritis. Symptoms of Erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever. This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (*Rickettsia rickettsii*) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death if untreated, but if identified and treated promptly, death is uncommon.

Control. Tick repellant containing diethyltoluamide (DEET) should be used in tick infested areas, and pants legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the rickettsia into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

4.3.2 Poisonous Plants

Poison ivy may be present in the work area. Personnel should be alerted to its presence, and instructed on methods to prevent exposure.

Control. The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water, and observed for signs of reddening.

4.3.3 Snakes

The possibility of encountering snakes exists, specifically for personnel working in heavily wooded/ vegetated areas. Rocky hillsides are favorite habitats of poisonous snakes. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation, and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snake bites include swelling, edema and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control. To minimize the threat of snake bites and insect hazards, all personnel walking through vegetated areas must be made aware (during training) of the potential for encountering snakes and will avoid actions potentiating encounters, such as turning over logs, etc. Additional caution will be exercised around preferred snake habitat. If a snake bite occurs, an attempt should be made to kill the snake for identification. The victim must be transported to the nearest hospital within 30-minutes; first aid consists of applying a constriction band, and washing the area around the wound to remove any unabsorbed venom.

4.4 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on site.

Control. All personnel must wear hearing protection - with a Noise Reduction Rating (NRR) of at least 20 - when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 8.0.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, wherever possible barriers or increased distance will be used to minimize worker exposure to noise.

4.5 Spill Control Plan

All personnel must take every necessary precaution to minimize the potential for spills during site operations. All on-site personnel are obligated to report immediately any discharge, no matter how small, to the SS.

Spill control apparatus will be located on site at any locations that the SS foresees the potential for discharge to the ground. All sorbent materials used for the clean up will be containerized and labeled separately from other wastes, unless otherwise directed by the contracting officer. In the event of a spill, the SS will follow the provisions outlined in Section 12 to contain and control released materials and to prevent spread to off-site areas.

4.6 Lockout/Tagout Procedures

Maintenance procedures will only be performed by fully qualified and trained individuals. Before maintenance begins, lockout/tagout procedures per OSHA 29CFR 1910.147 will be followed.

Lockout is the placement of a device that uses a positive means such as a lock to hold an energy or material isolating device or system ensuring that the equipment can not be operated until the lockout device is removed. If a device cannot be locked out, a tagout system will be used. Tagout is the placement of a warning tag on an energy or material isolating device indicating that the equipment controlled may not be operated until the tag is removed.

4.7 Sanitation

Site sanitation will be maintained according to OSHA and Department of Health requirements.

4.7.1 Break Area

Breaks will be taken in the support zone, away from the active work area after site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in the work area.

4.7.2 Potable Water

The following rules apply for all project field operations:

- An adequate supply of potable water will be provided at each work site. Potable water must be kept away from hazardous materials, contaminated clothing, and contaminated equipment.
- Portable containers used to dispense drinking water must be capable of being tightly closed, and must be equipped with a tap dispenser. Water must not be drunk directly from the container, nor dipped from the container.
- Containers used for drinking water must be clearly marked and not used for any other purpose.
- Disposable cups will be supplied; both a sanitary container for unused cups and a receptacle for disposing of used cups must be provided.

4.7.3 Sanitary Facilities

Access to facilities for washing before eating, drinking, or smoking will be provided.

4.7.4 Lavatory

If permanent toilet facilities are not available, an appropriate number of portable chemical toilets will be provided.

4.7.5 Trash Collection

Trash collected from the contamination reduction zone (CRZ) will be separated as routine hazardous waste. Trash collected in the support and break areas will be disposed of as nonhazardous waste. Labeled trash receptacles will be set up in the CRZ and in the support zone.

4.8 Electrical Hazards

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, it must be performed by a qualified electrician. General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by UL, Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.

- All installations must comply with the National Electrical Safety Code (NEC), the National Electrical Code (NEC), or United States Coast Guard regulations.

- Portable and semi portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multicontact polarized plug-in receptacle.

- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM.

- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.

- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.

- All circuits must be protected from overload.

- Temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.

- Plugs and receptacles must be kept out of water unless of an approved submersible construction.

- All extension outlets must be equipped with ground fault circuit interrupters (GFCI).

- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.

- Extension cords or cables must be inspected prior to each use, and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.

- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

High Voltage Hazards: Employees may be required to work around sources of high voltage at the site. Caution should be exercised to minimize contact with high voltage equipment, including contact between sampling equipment and potentially charged items. In accordance with OSHA regulations contained in 29 CFR 1926.950, the minimum working distances from power transmission and distribution lines and equipment that will be allowed at the site are presented in the table below:

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

To minimize the dangers presented by underground high voltage electric lines, BBL will review existing underground utility maps and will show each proposed test pit location to Niagara Mohawk personnel prior to excavation to determine if underground utilities are present at the proposed test pit, soil boring, and monitoring well locations. Niagara Mohawk personnel will provide grounding cables that will be attached to equipment and a grounding source (i.e., ground grid cable) during subsurface excavation. Use of the grounding cables will reduce the potential for worker injury in the event that underground utilities are encountered during intrusive activities. To minimize the dangers presented by backhoe contact with aboveground high voltage electric lines, BBL will locate test pits to maintain an adequate working distance from power transmission and distribution lines.

4.9 Lifting Hazards

Back strain or injury may be prevented by using proper lifting techniques. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces.
- Fingers must be kept away from points which could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

5. Personal Protective Equipment

5.1 Respiratory Protection

Personal protective equipment is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the level of contaminants and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level.

Respiratory protection is an integral part of employee health and safety at sites with potential airborne contamination.

5.1.1 Site Respiratory Protection Program

The site respiratory protection program will consist of the following:

- All site personnel who may use respiratory protection will have an assigned respirator.
- All site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-face air purifying respirator within the past 12 months.
- All site personnel who may use respiratory protection must within the past year have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the HSS, prior to commencement of site work.
- Only cleaned, maintained, NIOSH/MSHA-approved respirators are to be used on this site.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All site personnel who may use respiratory protection must be clean shaven. Mustaches and side burns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a positive, negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the facepiece.

5.2 Levels of Protection

Protection levels are determined based upon contaminants present in the work area. A summary of the levels is presented in this section.

5.2.1 Level D Protection

The minimum level of protection that will be required of BBL personnel and subcontractors at the site will be Level D, which will be worn as the initial protection level for site operations. The following equipment will be used:

- Work clothing as prescribed by weather;
- Steel toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
  Hard hat, meeting ANSI Z89;
- Hearing protection (If noise levels exceed 85 dBA, then hearing protection with a U.S. EPA NRR of at least 20 dBA must be used);

5.2.2 Modified Level D Protection

Modified Level D will be used when airborne contaminants are not present at levels of concern, but site activities are causing an increased potential for skin contact with subsurface liquids and solids. Modified Level D consists of:

- Polyethylene-(PE-) coated Tyvek® coveralls;
- Safety toe work boots;
- Vinyl or latex booties, or PVC overboots;
- Safety glasses or goggles;
- Hard hat;
- Face shield in addition to safety glasses or goggles when projectiles pose a hazard;
- Nitrile outer gloves with surgical (N-Dex) inner gloves; and
- Hearing protection (if necessary).

5.2.3 Level C Protection

Level C protection will be required when the airborne concentration of a suspected contaminant is known to be one half the ACGIH TLV or the OSHA PEL. Level C protection will be used for operations when air monitoring instruments indicate an upgrade is necessary.

The following equipment will be used for Level C protection:

- Full face, air purifying respirator with organic vapor /acid gas cartridges in combination with high efficiency particulate filters (HEPA) which are NIOSH/MSHA approved;

- Polyethylene coated Tyvek® suit, ankles and cuffs taped to boots and gloves;

- Nitrile gloves over nitrile (N-Dex) surgical gloves;

- Safety toe work boots, ANSI approved;

- Chemical resistant Neoprene boots with steel toes; or latex booties PVC boots over safety toe shoes;

- Hard hat, ANSI approved; and

- Hearing protection (if necessary).

5.2.4 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of supervising site personnel and HS professionals. The PPE used will be chosen to be effective against the compound(s) present on the site.

5.3 Using PPE

Depending upon the level of protection selected for this project, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Level C PPE is used.

All people entering the exclusion zone (EZ) must put on the required PPE in accordance with the requirements of this plan. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of contamination.

5.3.1 Donning Procedures

These procedures are mandatory if Level C PPE is used on the project:

- Remove bulky outerwear. Remove street clothes and store in clean location;
- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls or rain gear;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;
- Don the required respirator and perform appropriate fit check;
- Put hood or head covering over head and respirator straps and tape hood to facepiece; and
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

5.3.2 Doffing Procedures

The following procedures are only mandatory if Level C PPE is required for this project. Whenever a person leaves a Level C or higher work site, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;

- Remove protective garments, equipment, and respirator. All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels;
- Wash hands, face and neck or shower (if necessary);

  Proceed to clean area and dress in clean clothing; and

- Clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags, labeled for disposal. See Section 7.0 for detailed information on decontamination stations.

5.4 Selection Matrix

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the SS of the potential for skin contact with contaminated materials. The PPE selection matrix is given in Table 5-1. This matrix is based upon information available at the time this plan was written. The Airborne Contaminant Action Levels in Table 8-1 should be used to verify that the PPE prescribed in this matrix is appropriate.

Table 5-1
PPE Selection Matrix

Task	Level of Protection
Mobilization/Area Reconnaissance	Level D/Modified Level D
Surface Soil Sampling and Test Pit Excavation	Modified Level D/Level C
Soil Boring and Ground-Water Monitoring Well Installation	Modified Level D/Level C
Ground-Water Sampling	Modified Level D/Level C
Storm Sewer Inspection, Flow Sampling, and Debris Sampling	Modified Level D/Level C
Decontamination	Modified Level D/Level C
Demobilization	Level D/Modified Level D

6. Site Control

6.1 Authorization to Enter

Only personnel who have completed hazardous waste operations initial training as defined under OSHA Regulation 29 CFR 1910.120; have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations will be allowed within a site area designated as an EZ or CRZ. Personnel without such training or medical certification may enter the designated support zone only. The SS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed within the EZ or CRZ.

6.2 Site Orientation and Hazard Briefing

No person will be allowed in the general work area during site operations without first being given a site orientation and hazard briefing. This orientation will be presented by the HSS, and will consist of a review of this HASP. In addition to this meeting, Daily Safety Meetings will be held each day before work begins.

All people on the site, including visitors, must document their attendance to this briefing as well as the Daily Safety Meetings on the forms included with this plan.

6.3 Certification Documents

A training and medical file may be established for the project and kept on site during all site operations. The 24 or 40-hour training, update, and specialty training (first-aid/cardiopulmonary resuscitation [CPR]) certificates, as well as the current annual medical clearance for all project field personnel, will be maintained within that file. All BBL and subcontractor personnel must provide their training and medical documentation to the HSS prior to the start of field work.

6.4 Entry Log

A log-in/log-out sheet must be maintained at the site by the SS. Personnel may sign in and out on a log sheet as they enter and leave the CRZ, or the SS may document entry in the field notebook.

6.5 Entry Requirements

In addition to the authorization, hazard briefing and certification requirements listed above, no person will be allowed on any BBL field site unless he or she is wearing the minimum support zone PPE as described in Section 5.0. Personnel entering the EZ or CRZ must wear the required PPE for those locations.

6.6 Emergency Entry and Exit

People who must enter the site on an emergency basis will be briefed of the hazards by the SS. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

People exiting the site because of an emergency will gather in a safe area for a head count. The SS is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

7. Decontamination

7.1 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

7.1.1 Exclusion Zone

The exclusion zone (EZ) consists of the specific work area, or can be the entire area of suspected contamination. All employees entering the EZ must use the required personal protective equipment and will have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. The location of each exclusion zone will be identified by cones, caution tape, or other appropriate means.

7.1.2 Contamination Reduction Zone

The contamination reduction zone (CRZ) or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the exclusion zone will pass through this area to prevent any cross-contamination and for reasons of accountability. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the exclusion zone. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the SZ.

7.1.3 Support Zone

The support zone (SZ) is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the support zone, subject to site requirements.

7.2 Posting

The EZ, CRZ and SZ will be prominently marked and delineated using cones or caution tape.

7.3 Personnel Decontamination

All personnel working in the contaminated zone must undergo personal decontamination prior to entering the support zone. The personnel decontamination area will consist of the following stations.

Station 1: Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.

Station 2: Personnel will remove their outer garment and gloves and deposit them in the lined waste receptacles. Personnel will then decontaminate their hard hats, and boots with an aqueous solution of Alconox or other appropriate cleaning solution. These items are then hand carried to the next station.

Station 3: Personnel will thoroughly wash their hands and face before leaving the decontamination zone. Respirators will be sanitized and then placed in a clean plastic ziplock bag.

7.4 Equipment Decontamination

All vehicles that have entered the contaminated zone will be decontaminated prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to rinsing of tires and wheel wells with water.

If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

7.5 Personal Protective Equipment Decontamination

Where and whenever possible, single use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of improperly labeled containers.

Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

When removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves and covers must be thoroughly cleaned at the end of each work shift, and ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water, or by using a spray disinfectant.

8. Site Monitoring

8.1 Air Monitoring

Air monitoring will be conducted to determine employee exposure to airborne contaminants. Personal exposure monitoring may be necessary to evaluate employee exposures if direct reading instruments indicate general readings in excess of site action levels. The monitoring results will dictate work procedures and the selection of PPE. The monitoring devices to be used, at a minimum, are a photoionization detector (PID) and a MiniRAM portable dust monitor (or equivalent). A combustible gas/oxygen/hydrogen sulfide/carbon monoxide meter will be used in the event of suspected flammable or explosive vapors. Benzene-specific Drager tubes will be used for monitoring the potential benzene component of total organic vapors if concentration levels exceed 1 ppm (as stated in Table 8.1).

Air monitoring will be conducted continuously with the LEL/O_2 meter if flammable/explosive vapors are suspected, confined space, or excavation entry is required. Prior to any subsurface investigation activities, air monitoring will be conducted to establish background levels for total organic vapors (using a PID) and for dust particulates (using a mini-RAM) will be done. PID and mini-RAM measurements will be taken at the upwind property boundaries and on the first floor of Building #2. Continuous real-time monitoring for organic vapors for the purpose of estimating worker exposure level will be conducted in the breathing zone with the PID during field activities conducted during tasks 2,3,4, and 5. The PID will be equipped with an alarm set at 1 part per million (ppm). If a reading above 1 ppm in the work zone persists for more than one minute, the air monitoring activities outlined in Table 8-1 will be implemented. During operations which may cause airborne particulate (Tasks 2 and 3), a MIE MiniRAM portable dust monitor will be used to measure airborne concentrations of total particulate material. The MiniRAM portable dust monitor will be equipped with an alarm that activates when the15 minute, time-weighted average exceeds 150 micrograms per cubic meter. At a minimum, all readings will be manually recorded on an hourly basis on air monitoring logs or field notebooks.

All work activity must stop where tests indicate the concentration of flammable vapors exceeds 10% of the Lower Explosive Limit (LEL) at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

8.2 Noise Monitoring

Noise monitoring will be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

8.3 Monitoring Equipment Maintenance and Calibration

All direct reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. Instruments must be calibrated before and after use, noting the reading(s) and any adjustments which are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented on a calibration log or in the field notebook. All completed HS documentation/forms must be reviewed and maintained by BBL's HSS.

All air monitoring equipment will be maintained and calibrated in accordance with the specific manufacturers' procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturers' procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the HSS must be responsible for immediately removing the instrument from service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The HSS will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

8.3.1 Action Levels

Table 8-1 presents airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

8.4 On-Site/Off-Site Monitoring Plan and Response Activities

As indicated in the MGP/RCRA Investigation Work Plan, test pits will be excavated at on-site locations and soil borings will be completed at both on-site and off-site locations as part of the MGP/RCRA investigation field activities. These activities have the potential to generate organic vapors and particulates. As mentioned above, air monitoring will be conducted in the worker breathing zone to determine the level of protection required for personnel excavating test pits and completing soil borings. If action levels in the worker breathing zone are exceeded, air monitoring will be required at various on-site/off-site locations to determine appropriate response activities that are protective of personnel on-site who are not directly involved with the investigation, personnel at adjacent commercial sites, and the surrounding community. Additional monitoring (and appropriate response activities) to be implemented if the total organic vapor and particulate levels in the worker breathing zone exceed action levels (for both on-site and off-site investigation activities) are discussed below.

8.4.1 Monitoring and Response Activities for On-Site Investigation Activities

Activities that will be implemented if on-site investigation activities generate concentrations of VOCs or particulates that exceed action levels in the worker breathing zone are described below.

Total Organic Vapors

If the sustained level of total organic vapors in the worker breathing zone exceeds 1 ppm above background, then the level of total organic vapors will be manually recorded at the downwind perimeter of the work area (i.e., exclusion zone) at 15 minute intervals. If the level of total organic vapors at the downwind perimeter of the work area exceeds 5 ppm above background, then work activities will be halted and additional downwind monitoring will be performed. Efforts will be undertaken to mitigate the source of organic vapors. The work area will be enlarged, if necessary, to keep NMPC personnel who are not involved with the investigation from being exposed to organic vapor levels exceeding 5 ppm above background.

During the investigation, it is possible that the downwind perimeter of the work area will coincide with the exterior of an on-site building. If, at any time, the level of total organic vapors adjacent to a downwind on-site building reaches 5 ppm above background, continuous monitoring will be conducted adjacent to the building and efforts will be taken abate the source of organic vapors. If after 30 minutes, the total organic vapor level adjacent to the building has not subsided below 5 ppm above background, then the HSS will contact the NMPC on-site coordinator to request that NMPC personnel be evacuated from the building. NMPC personnel will not be allowed to return to the building until after the level of total organic vapors adjacent to the building subsides to below 5 ppm above background and monitoring inside the building indicates that total organic vapors inside the building are below 5 ppm above background.

During the investigation, it is also possible that the downwind perimeter of the work area will coincide with the fenced site perimeter. If, at any time, the level of total organic vapors adjacent to the downwind site perimeter reaches 5 ppm above background, then the level of total organic vapors adjacent to the nearest downwind residential or commercial property from the work zone will be monitored. If after 30 minutes, the total organic vapor level adjacent to the residential or commercial property has not subsided below 5 ppm above background, then the HSS will inform the local emergency response contacts (in addition to project managers from NMPC, the NYSDEC, the NYSDOH, and BBL) listed in Section 11.5 and persons who may be exposed at the residential or commercial properties will be notified to evacuate. These persons will not be permitted to return to the residential or commercial properties until after the level of total organic vapors on the properties subsides to below 5 ppm above background.

Particulate

If the level of particulates in the worker breathing zone exceeds 100 ug/m^3 above background, then the level of particulates will be manually recorded at the downwind perimeter of the work area at 15 minute intervals. If the level of particulates at the downwind perimeter of the work area is 150 ug/m^3 or greater, then work activities will cease and dust suppression techniques must be employed to maintain particulate levels below 150 ug/m^3. In addition, the work area will be enlarged if necessary to keep NMPC personnel who are not involved with the investigation (and the public) from being exposed to particulate levels greater than 150 ug/m^3.

8.4.2 Monitoring and Response Activities for Off-Site Investigation Activities

Activities that will be implemented if off-site investigation activities generate concentrations of VOCs or particulates that exceed action levels in the worker breathing zone are described below.

Total Organic Vapors

If the level of total organic vapors in the worker breathing zone exceeds 1 ppm above background, then the level of total organic vapors will be manually recorded at the downwind perimeter of the work area at 15 minute intervals. If the level of total organic vapors at the downwind perimeter of the work area exceeds 5 ppm above background, then work activities will be halted and additional downwind monitoring will be performed adjacent to downwind residential or commercial properties. Efforts will be undertaken to mitigate the source of organic vapors. After 30 minutes, if the total organic vapor level adjacent to the downwind residential or commercial properties has not subsided below 5 ppm above background, then the HSS will inform the local emergency response contacts listed in Section 11.5 (in addition to project managers from NMPC, the NYSDEC, and BBL) and persons who may be exposed at the residential or commercial properties will be notified to evacuate. These persons will not be permitted to return to the residential or commercial properties until after the level of total organic vapors on the properties subsides to below 5 ppm above background.

Particulates

If the level of particulates in the worker breathing zone exceeds 100 ug/m^3 above background, then the level of particulates will be manually recorded at the downwind perimeter of the work area at 15 minute intervals. If the level of particulates at the downwind perimeter of the work area is 150 ug/m^3 or greater, then work activities will cease and dust suppression techniques must be employed to maintain particulate levels below 150 ug/m^3.

8.5 Odor Control

If any odor complaints are received from on-site NMPC employees or from members of the surrounding community, then the test pit and soil boring activity will be suspended, subsurface openings will be covered, and on-site personnel (in consultation with NMPC and BBL project managers) will evaluate an alternative course of action.

TABLE 8-1
AIRBORNE CONTAMINANT ACTION LEVELS

Parameter	Reading	Action
Total Organic Vapors	0 ppm to ≤ 1 ppm	Normal operations; manually record breathing zone monitoring measurements every hour
	> 1 ppm to 5 ppm	Increase recording frequency to at least every 15 minutes, and use benzene drager tube to screen for the presence of benzene
	≥ 5 ppm to ≤ 50 ppm	Upgrade to level C PPE, continue screening for benzene
	> 50 ppm	Stop work; evacuate confined spaces/work area. investigate cause of reading; contact RHSC
Benzene	≥ 1 ppm to 10ppm	Upgrade to Level C PPE
	>10 ppm	Stop work; evacuate confined spaces/work area. investigate cause of reading; contact RHSC
Total Particulate	0 to 0.100 mg/m^3 above background	Normal operations
	> 0.100 mg/m^3 above background	Initiate wetting of work area to control dust; upgrade to Level C if dust control measures do not control dust within 15 minutes, Monitor downwind impacts.
	> .15 mg/m^3 in breathing zone or at downwind perimeter of work area	Stop work; investigate cause of reading; contact BBL project manager and RHSC
Oxygen	≤ 19.5 %	Stop work; evacuate confined spaces/work area. investigate cause of reading; ventilate area; contact RHSC
	> 19.5% to < 23.5 %	Normal operations
	≥ 23.5 %	Stop work; evacuate confined spaces/work area. investigate cause of reading; ventilate area; contact RHSC
Carbon Monoxide	0 ppm to ≤ 20 ppm	Normal operations
	> 20 ppm	Stop work; evacuate confined spaces/work area. investigate cause of reading; ventilate area; contact RHSC
Hydrogen Sulfide	0 ppm to ≤ 5 ppm	Normal operations
	> 5 ppm	Stop work; evacuate confined spaces/work area. investigate cause of reading; ventilate area; contact RHSC

Parameter	Reading	Action
Flammable Vapors (LEL)	< 10% LEL ≥ 10% LEL	Normal operations Stop work; ventilate area; investigate source of vapors

9. Employee Training

9.1 General

All on-site project personnel must have completed hazardous waste operations-related training, as required by OSHA Regulation 29 CFR 1910.120. All field employees receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. The BBL SS must have completed an additional 8 hours of training for supervisors and must have a current first-aid/CPR certificate.

9.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour training course:

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site HS;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application and limitations of PPE;
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment on site;
- Medical surveillance requirements;
- Recognition of symptoms and signs which might indicate overexposure to hazards;
- Worker right-to-know (Hazard Communication OSHA 1910.1200);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a site HS program and HASP;
- Decontamination practices for personnel and equipment;
- Confined-space entry procedures; and
- General emergency response procedures.

9.3 Supervisor Course

Management and supervisors receive an additional eight hours of training which typically includes:

- General site safety and health procedures;
- PPE programs; and
- Air monitoring techniques.

9.4 Site-Specific Training

Site-specific training will be accomplished through a site briefing and review of this HASP before work begins. In addition, Daily Safety Meetings (DSMs) will cover the work to be accomplished, the hazards anticipated, the protective clothing and procedures required to minimize site hazards, and emergency procedures. No work will be performed before the DSM has been held. The DSM must also be held prior to new tasks and repeated if new hazards are encountered.

9.5 First Aid and CPR

At least two employees current in first aid/CPR will be assigned to the work crew and will be on the site during operations. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood borne pathogens.

10. Medical Surveillance

10.1 Medical Examination

All personnel on site must have successfully completed a pre-placement or annual physical examination, which is provided free-of-charge to the employee. This medical surveillance program must comply with OSHA 29 CFR 1910.120 (F).

10.1.1 Preplacement Medical Examination

All on-site project personnel must have completed a comprehensive medical examination within the past 12 months that meets the requirements of applicable OSHA Regulations. The annual medical examination typically includes the following elements:

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;
- Chest X-ray, once every three years, for nonasbestos workers;
- Pulmonary function test;
- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations, confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project site work. Each employee also has the right to inspect and copy his medical records.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

10.1.2 Other Medical Examination

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials;
- At the discretion of the client, HS professional, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the occupational physician.

10.1.3 Periodic Exam

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less that thirty days per year, the frequency for periodic examinations will be eighteen months.

10.2 First Aid and Medical Treatment

All persons on site must report any near-miss incident, accident, injury, or illness to their immediate supervisor or the SS. First aid will be provided by the designated site first aider. Injuries and illnesses requiring medical treatment must be documented. The SS must conduct an accident investigation as soon as emergency conditions no longer exist and first-aid and/or medical treatment has been ensured. These two reports must be completed and submitted to the RHSC within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured should be transported to the medical facility. If the injured is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

10.3 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee, the RHSC, and the HSS. The terms of the restriction will be discussed with the employee and this supervisor. Every attempt should be made to keep the employee working, while not violating the terms of the medical restriction.

11. Emergency Procedures

11.1 General

The SS and HSS will establish evacuation routes and assembly areas for each site. All personnel entering the site will be informed of these routes and assembly areas. If necessary, a site plan will be made marking the evacuation routes and will be posted at conspicuous locations.

Each site will be evaluated for the potential for fire, explosion, chemical release, or other catastrophic events. For active facilities, site emergency procedures must be communicated to all project personnel. Unusual events, activities, chemicals, and conditions will be reported to the SS immediately.

11.2 Emergency Response

If an incident occurs, the following steps will be taken:

- The SS will evaluate the incident and assess the need for assistance and/or evacuation;
- The SS will call for outside assistance as needed;
- The SS will act as liaison between outside agencies and on-site personnel;
- The SS will ensure the PM and Regional HS Coordinator are notified promptly of the incident; and
- The SS will take appropriate measures to stabilize the incident scene.

11.2.1 Fire

In the case of a fire on the site, the SS will assess the situation and direct fire-fighting activities. The SS will ensure that the client site representative (as appropriate) is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that site personnel are unable to safely extinguish, the local fire department will be summoned via 911 or other number.

11.2.2 Spill

If a spill occurs, the following steps will be taken:

- Notify SS immediately.
- Evacuate immediate area of spill.
- Conduct air monitoring to determine needed level of PPE.
- Don required level of PPE and prepare to make entry to apply spill containment and control procedures.
- No entry will made until atmosphere is less than 10% LEL.
- Absorb or otherwise clean up the spill and containerize the material, sorbent, and affected soils.

The SS has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-site areas.

11.3 Medical Emergency

All employee injuries must be promptly reported to the SS. The SS will:

- Ensure that the injured employee receives prompt first aid and medical attention;

- In emergency situations, the worker is to be transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room); and

- EMR is to be notified by site personnel as soon as possible after the worker has left the site. The caller should dial 1-800-229-3674 and follow the instructions for reaching the Injury Management office. When the Case Manager answers, the caller should provide the information requested by the Case Manager.

11.3.1 First Aid - General

- Survey the scene. Determine if it is safe to proceed. Try to determine if the conditions which caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.
- Do a primary survey of the victim. Check for **airway** obstruction, **breathing**, and **pulse**. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victims' condition, and help being given.
- Maintain airway and perform rescue breathing as necessary.
- Perform cardiopulmonary resuscitation (CPR) as necessary.
- Do a secondary survey of the victim. Check **vital signs** and do a **head-to-toe exam.**
- Treat other conditions as necessary. If the victim can be moved, take him to a location away from the work area where EMS can gain access.

11.3.2 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Section 3.0 will be removed from the work area and transported to the designated medical facility for examination and treatment.

11.3.3 First Aid - Ingestion

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for treatment information, if recommended. If unconscious, keep the victim on his side and clear the airway if vomiting occurs.

11.3.4 First Aid - Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the decontamination zone, to the wash-up area. Personnel will remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The worker should be transported to the medical facility if they show any sign of skin reddening, irritation, or if they request a medical examination.

11.3.5 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the contaminated zone, must immediately proceed to the eyewash station, set up in the decontamination zone. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

11.4 Reporting Injuries and Illnesses

All injuries and illnesses, however minor, will be reported to the SS immediately. The SS will complete an injury report and submit it to the PM and RHSC within 24 hours.

11.5 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the Daily Safety Meeting.

Contingency Contact Telephone List

Contact	Phone Number	Location
Local Emergency		
Albany Fire Department - Information - Emergency	 (518) 463-1234 911	Albany, New York
Albany Police - Information - Emergency	 (518) 462-8000 911	Albany, New York
Medical Emergency		
Albany Memorial Hospital - Information - Emergency	 (518) 471-3221 Call 911	 600 Northern Blvd. Albany, New York
Ambulance	911	Albany, New York
Agency Contacts		
NYSDEC Division of Regulatory Affairs	(518) 457-7424	50 Wolf Road Albany, New York
NYSDEC Division of Hazardous Waste Remediation	(518) 457-0638	50 Wolf Road Albany, New York
NYSDEC 24-Hour Spill Hotline	(800) 457-7362	Albany, New York
NYSDOH Contact - Claudine Jones Rafferty	(518) 458-6306	Albany, New York
Emergency Response		
Niagara Mohawk Power Corporation - Mr. James F. Morgan	 (315) 428-3101	300 Erie Boulevard West Buffalo, New York
Blasland, Bouck & Lee, Inc. - Mr. Michael C. Jones	 (315) 446-9120	6723 Towpath Road Syracuse, New York
National Organizations		
USEPA, Emergency Response Team	(201) 321-6660	New Jersey
US Coast Guard, National Response Team	(800) 424-8802 or (202) 267-2675	Washington, D.C.
CHEMTREC, Chemical Emergencies	(800) 424-9300	
National Foam Center, Emergency Response	(215) 363-1400	Pennsylvania

Table 3-1 Chemical Hazard Information

Substance [CAS]	IP[a] (eV)	Odor Threshold (ppm)	Route[b]	Symptoms of Exposure	Treatment	TWA[c]	STEL[d]	Source[e]	IDLH (NIOSH)[f]
Benzene [71-43-2]	9.24	34–119	Inh Abs Ing Con	Irritates eyes, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, anorexia, lassitude; dermatitis; bone-marrow depression. Carcinogenic.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	1 ppm (10 ppm) NIC–0.1 skin 0.1 ppm	5 ppm C1 ppm (Ca)	PEL TLV REL	Ca [1,000 ppm]* *OSHA
Chlorodiphenyl (42% chlorine) [53469-21-9]	?	?	Inh Abs Ing Con	Irritated eyes; chloracne; liver damage. Carcinogenic.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	1 mg/m³ (skin) 1 mg/m³ (skin) 0.001 mg/m³ Ca		PEL TLV REL	Ca [10 mg/m³]
Chlorodiphenyl (54% chlorine), [11097-69-1]	?	?	Inh Abs Ing Con	Irritated eyes and skin; acne-form dermatitis; (carcinogenic); in animals: causes liver damage.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	0.5 mg/m³ (skin) 0.5 mg/m³ (skin) 0.001 mg/m³ Ca		PEL TLV REL	Ca [5 mg/m³]
Coal-tar-pitch volatiles (benzene-soluble fraction) (polynuclear aromatic hydrocarbons [PAH]) [65996-93-2]	?	?	Inh Con	Eye sensitivity to light, eye and skin irritation; dermatitis, bronchitis. Carcinogenic.	Eye: Irrigate immediately (15 mins) Skin: Soap wash Breath: Respiratory support Swallow: Immediate medical attention	0.2 mg/m³ 0.2 mg/m³ 0.2 mg/m³ (cyclohexane extractable) Ca		PEL TLV REL	Ca [700 mg/m³]
Ethyl benzene [100-41-4]	8.76	0.09–0.6	Inh Ing Con	Irritates eyes, mucous membranes; headache; dermatitis; narcosis, coma.	Eye: Irrigate immediately Skin: Water flush promptly Breath: Respiratory support Swallow: Immediate medical attention	100 ppm 100 ppm 100 ppm	125 ppm 125 ppm 125 ppm	PEL TLV REL	2,000 ppm

Refer to footnotes at end of table.

Chemical Exposure Information

Substance [CAS]	IP[a] (eV)	Odor Threshold (ppm)	Route[b]	Symptoms of Exposure	Treatment	TWA[c]	STEL[d]	Source[e]	IDLH (NIOSH)[f]
Lead inorganic dusts & fumes (as Pb) [7439-92-1]	NA	NA	Inh Ing Con	Weakness, lassitude, insomnia; facial pallor; eye pallor, anorexia, low body weight, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremors; wrist and ankle paralysis; brain damage; kidney damage; irritated eyes; hypotension.	Eye: Irrigate immediately Skin: Soap flush promptly Breath: Respiratory support Swallow: Immediate medical attention	0.05 mg/m^3 0.15 mg/m^3 <0.1 mg/m^3 See 29 CFR 1910.1025 Blood lead <0.060 mg/ 100 g whole blood		PEL TLV REL	700 mg/m^3
Methylene chloride (dichloromethane) [75-09-2]	11.32	?	Inh Ing Con	Fatigue, weakness, sleepiness, lightheadedness; numbness and tingling in limbs; nausea; irritated eyes and skin.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	500 ppm 50 ppm	C1,000 ppm; C2,000 mg/m^3 (5 min in 2 hrs)	PEL TLV REL	Ca (5,000 ppm)
Phenol [108-95 2]	8.5	0.040–3.0	Inh Abs Ing Con	Irritated eyes, nose, and throat; anorexia, low weight; weakness, muscular aches and pains; dark urine; cyanosis; liver and kidney damage; skin burns; dermatitis; ochronosis; tremors, convulsions, twitching.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	5 ppm (skin) 5 ppm (skin) 5 ppm (skin)	C15.6 ppm	PEL TLV REL	250 ppm

Refer to footnotes at end of table.

Chemical Exposure Information

Substance [CAS]	IP[a] (eV)	Odor Threshold (ppm)	Route[b]	Symptoms of Exposure	Treatment	TWA[c]	STEL[d]	Source[e]	IDLH (NIOSH)[f]
Tetrachloroethylene (perchloroethylene) [127-18-4]	9.32	47	Inh Ing Con	Irritates eyes, nose, throat; nausea; flushed face, neck; vertigo, dizziness, incoordination; headache, sleepiness; skin redness; liver damage, suspected human carcinogen.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	25 ppm 50 ppm	 200 ppm minimize exposure (LOQ 0.4 ppm)	PEL TLV REL	Ca [500 ppm]
Xylene (o-, m-, and p-isomers) [1330-20-7;95-47-6; 108-38-3;106-42-3]	8.56/ 8.56/ 8.44	1.1–20	Inh Abs Ing Con	Dizziness, excitement, drowsiness, incoordination, staggering gait; irritated eyes, nose, throat; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediate medical attention	100 ppm 100 ppm 100 ppm	150 ppm 150 ppm 150 ppm	PEL TLV REL	1,000 ppm

[a]IP = Ionization potential (electron volts).
[b]Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; Con, Skin and/or eye contact.
[c]TWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.
[d]STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.
[e]PEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).
TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value—TWA.
REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.
[f]IDLH (NIOSH)—Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
NE = No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. No. 90-117, 1990).
C = Ceiling limit value which should not be exceeded at any time.
Ca = Carcinogen.
NA = Not applicable.
? = Unknown.
LEL = Lower explosive limits.

Refer to footnotes at end of table.

Chemical Exposure Information

LC_{50} = Lethal concentration for 50 percent of population tested.
LD_{50} = Lethal dose for 50 percent of population tested.
NIC = Notice of intended change (ACGIH).

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Odor Threshold for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989.
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Refer to footnotes at end of table.

APPENDIX A
BBL Confined Space Entry PPM

STATEMENT OF POLICY:

This procedure sets forth the accepted practice for entry into a confined space and establishes the requirement for administering a Confined Space Entry Permit protocol. This procedure, protocol, and Confined Space Entry Permit and Checklist applies only to employees of the Firm.

DESCRIPTION OF PROCEDURE:

1. DEFINITIONS

A. Attendant means an individual stationed outside the confined space who is trained and who monitors the entrants inside the confined space.

B. Confined space means any enclosed space which is large enough and so configured that an employee can bodily enter and perform work, has limited or restricted means for entry or exit, is not intended for continuous employee occupancy, has or may have insufficient ventilation, or contain materials that could be harmful to health and/or safety. Confined spaces include, <u>but are not limited to</u>, storage tanks, vessels, pits, boilers, flues, manholes, ventilation system duct work, sewers, vaults, pipelines, silos, storage hoppers, and diked areas six feet or more in height.

1) Permit-required confined space (permit space) means a confined space that has one or more of the following characteristics:

a) Contains or has a known potential to contain a hazardous atmosphere;

b) Contains a material with the potential for engulfment of an entrant;

c) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section; and/or

d) Contains any recognized serious safety or health hazard.

2) Non-permit confined space means a confined space that does not contain or have the potential to contain any hazards capable of causing death or serious physical harm.

C. Entry means the act by which a employee intentionally passes through an opening into a permit required confined space. An employee is considered to have entered the confined space as soon as any part of the employee's body breaks the plane of the opening into the space.

D. Entry Permit means the document which defines the conditions of confined space entry, the reasons for entering the confined space, the anticipated hazards of the entry, a listing of atmospheric monitoring equipment and acceptable atmospheric conditions, identifies the rescue and other contacts which must be summoned in the case of an emergency, provides a listing of authorized attendants and entrants, the date of entry to the confined space, and the expiration of the entry permit. For the purposes of this PPM, the Confined Space Entry Permit consists of <u>both</u> the Confined Space Entry Permit and the Confined Space Entry Checklist and/or the Confined Space Entry Permit and the Sewer System Manhole Entry Checklist **[a Confined Space Entry Permit and Checklist follow this procedure].**

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

E. Entry supervisor means the employee responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry. The entry supervisor may also serve as an attendant or entrant.

F. Entrant means an employee who is trained and authorized to enter a confined space.

G. Hazardous atmosphere means an atmosphere which exposes employees to a risk of death, incapacitation, injury or acute illness from one or more of the following:

1) A flammable gas, vapor, or mist in excess of 10 percent (%) of its lower explosive limit (LEL);

2) An airborne combustible dust at a concentration that obscures vision at a distance of 5 feet or less;

3) An atmospheric oxygen concentration below 19.5% (oxygen deficient atmosphere) or above 23.5% (oxygen enriched atmosphere);

4) An atmospheric concentration of any substance in excess of 50% of its established permissible exposure limit (PEL), or in absence of a PEL, its assigned threshold limit value (TLV), or other value listed on the Material Safety Data Sheet (MSDS) for the chemical constituent; and/or

5) An atmosphere which is immediately dangerous to life and health.

H. Immediately dangerous to life and health (IDLH) means any condition which poses an immediate threat to loss of life; may result in irreversible or immediate-severe health effects; may result in eye damage, irritation or other conditions which could impair escape from the confined space.

2. RESPONSIBILITIES

A. Officers/Division Heads have the following responsibilities:

1) Assure that all confined spaces and entry protocols are properly identified and addressed within the project work plan, specific health & safety plan, and/or other project related documents.

2) Assure that their Divisional employees have received the proper confined space training provided by Corporate Health & Safety; and

3) Assure that the proper confined space entry equipment, including personal protective equipment, atmospheric testing equipment, and safety equipment, is available for use by their Divisional employees.

B. Corporate Health & Safety has the following responsibilities:

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

1) Provide the initial confined space entry training to all entry supervisors, entrants and attendants;

2) Function as a resource for providing technical assistance regarding confined space entry protocol, atmospheric testing equipment, personal protective equipment, hazard assessment, and research information on unusual hazards;

3) Audit project specific confined space entry for compliance with this PPM; and

4) Retain a file of canceled Confined Space Entry Permits as a measure of quality control.

C. The Divisional Health & Safety Coordinators (HSC) have the following responsibilities:

1) Review this PPM with all trained entrants and attendants on a project specific basis;

2) Ensure that all entrants and attendants have received the training offered by Corporate Health & Safety;

3) Ensure that the project specific entry supervisor fulfills his/her responsibilities (listed in D below) and completes the Entry Permit as defined in this PPM; and

4) Ensure that copies of the completed and canceled Confined Space Entry Permit are properly disseminated and retained with the project files as specified in Section 11- Posting and Recordkeeping.

D. Entry supervisors (also see Training and Duties of Entry Supervisor) have the following responsibilities:

1) Interface with the host employer to identify the hazards associated with the host employer's confined space;

2) Review existing confined space data (if any) recorded by the host employer;

3) Review the host employer's confined space procedure;

4) Review the lock-out/tag-out and isolation efforts taken by the host employer;

5) Immediately report any unusual or unforeseen confined space entry hazard to both the Divisional HSC and Corporate Manager, Health & Safety prior to authorizing entry;

6) Issue, authorize, and post the Entry Permit prior to any confined space entry; and

7) Upon completion of the entry covered by the permit, and after all entrants have exited the permit space, cancel the Entry Permit.

E. Employees of the Firm have the following responsibilities:

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

1) Receive the initial training provided by Corporate Health & Safety;

2) Never enter a confined space without provision for the Entry Permit; and

3) Never attempt rescue within a confined space.

3. CONFINED SPACE ENTRY PERMIT

A. Prior to entry into any identified confined space, the entry supervisor must complete and sign the Entry Permit as defined above.

B. A separate Entry Permit must be generated for each dissimilar confined space, and/or for similar confined spaces having dissimilar confined space hazards.

C. A single Entry Permit may be generated for entry into multiple confined spaces when:

1) Each identified confined space for the project has identical confined space hazards; and/or

2) When entering multiple sewer system manholes.

The Confined Space Checklist and/or the Sewer System Manhole Entry Checklist must, however, be completed and signed as a supplement to the entry permit. As example, for entry into several separate manholes for the purpose of collecting effluent samples, recording water depth, flow, etc., one Entry Permit may be generated for entry into all project specific manholes. The permit must, however, be accompanied by the Sewer System Manhole Entry Checklist which will facilitate entry into as many as 20 manholes per checklist.

D. The completed and signed Entry Permit and Checklist is valid for one shift only. A new completed and signed Entry Permit must be issued for each new crew of entrants and attendants.

E. The Entry Permit must be revoked and all entrants evacuated whenever the direct reading instruments being used to monitor atmospheric conditions in the confined space or some other circumstance either within or outside the confined space indicates that the conditions in the space are no longer acceptable for entry.

4. ENTRY PERMIT PROGRAM

A. Prior to authorizing the Entry Permit, the entry supervisor must assure that the Confined Space Checklist or Sewer System Manhole Entry Checklist is completed and that the confined space has been properly secured, ventilated, and tested. In completing the appropriate Checklist, the following items are required:

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

1) All mechanical apparatus, such as agitators, within or connected to the confined space must be de-energized, locked-out, and tagged. Inasmuch as this specific activity may be performed by the host employer, the entry supervisor must review the lock-out procedure with the host employer and place a separate lock(s) on all multiple lock-out devices. The entry supervisor must retain possession of the key(s) during the entire confined space entry;

2) All pipelines connected to the confined space where the nature of the service could present a hazard, such as nitrogen, steam, solvent, acid, or hot water, must be isolated from the confined space. Acceptable isolation methods include removing a valve, spool piece, or expansion joint, and blanking or capping the opened end; inserting a suitable full-pressure blank in the piping between connecting flanges; and/or closing and locking at least two valves in the pipeline and locking open to atmosphere a chain valve between the two closed and locked valves. As in #1 above, this activity may be performed by the host employer. The entry supervisor must review the isolation/blanking and lock-out procedure with the host employer. The entry supervisor must attach separate lock(s) to any lock-out device installed. The entry supervisor must retain possession of the key(s) during the entire confined space entry;

3) For confined spaces which have contained a known hazardous chemical, eg., vessels, storage tanks, etc., the host employer must ensure that the vessel has been thoroughly cleaned by appropriate means, eg., overflowing with water, steaming, etc;

4) For confined spaces containing known atmospheric hazards, mechanical ventilation may be utilized to maintain atmospheric hazards within permit parameters. Section II - Mechanical Ventilation lists the procedure for confined space ventilation.

5) The atmosphere of the confined space must be initially checked to ensure that it contains a breathable level of oxygen (19.5 to 23.5%) and is free of combustible or toxic gases or vapors. Section 7- Atmospheric Testing of this procedure lists the air quality specifications which must be met. These specifications are also listed on the Entry Permit. Depending on the nature of the confined space as well as the activity(ies) to be conducted within the confined space, continuous air monitoring may be required;

6) Ensure that all necessary entry equipment, eg., retrieval lines, personal protective equipment, respiratory protective equipment, etc., are available, in good condition, and functional;

7) Ensure that all entrants and attendants have received the appropriate confined space entry training; and

8) Ensure that all rescue arrangements are in-place as per Section 6-Outside Rescue Assistance, and that an adequate means of communicating with outside assistance is immediately available to the attendant.

B. The Entry Permit must be canceled and all entrants ordered to evacuate the confined space when any one of the following conditions exists:

[Cont'd]

DESCRIPTION OF PROCEDURE:
[Cont'd]

1) A change in initial atmospheric conditions which may jeopardize the continued safety and health of entrants is detected;

2) The attendant must leave the work station;

3) The attendant is monitoring entry in more than one permit space (See Section 5-Training and Duties of Attendants) and must focus attention on rescue of entrants from one of those spaces;

4) Whenever ordered by the attendant due to factors external to the confined space which may jeopardize the continued safety and health of entrants;

5) At the end of the work shift and/or whenever a different group of entrants and attendants will take charge of the confined space;

6) Whenever entrants self-perceive danger and self-initiate evacuation; and

7) At the termination of confined space entry.

5. TRAINING AND DUTIES OF ENTRY SUPERVISOR

A. 29 CFR 1910.146-Permit Required Confined Spaces assigns specific responsibilities to the host employer (client or owner of the confined space). These responsibilities include communicating pertinent information regarding the hazards associated with their identified confined space(s) to contractor employees who will enter those spaces. In order to assure that the required information regarding the confined space is properly communicated to employees' of the Firm, the entry supervisor must:

1) Investigate the host employers' permit entry protocol, ensuring that any identified hazards and previous experience with the confined space(s) is properly communicated;

2) Coordinate rescue assistance with either the host employer's in-house rescue team and/or the off-site rescue assistance specified by the host employer. The off-site rescue assistance specified by the host employer must have direct experience in rescue in the host employers' identified confined space(s);

3) Assure that the host employer takes the necessary precautions in notifying their employees that our employees will be entering the confined space;

4) Coordinate entry operations with the employees of the host employer when both host employer and employees of the Firm will be working in or near a permit space; and,

5) Inform the host employer of this permit space program and any additional precautions that will be taken by employees of the Firm during the entry procedure.

B. In addition to acting as the liaison with the host employer, the entry supervisor has the following assigned duties:

1) Recognize the hazards involved with the entry as well as the signs and symptoms of exposure to the hazards;

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

2) Verify the that both the entry permit and checklist are completed prior to entry; and,

3) Ensure that entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained.

C. The entry supervisor may also function as either the attendant and/or as an entrant. In those circumstances, the entry supervisor must have the training specified for an attendant and/or an entrant, and will assume the duties listed below for either the attendant and/or the entrant.

6. TRAINING AND DUTIES OF AUTHORIZED ENTRANTS

A. Entrants must have training and instruction in their duties and responsibilities regarding confined space entry. The following are assigned duties:

1) Recognize the hazards which may be faced during entry, as well as the signs and symptoms of exposure to the hazard(s);

2) Maintain visual contact and/or verbal communications with the attendant at all times;

3) Use the personal protective equipment (PPE) provided;

4) Maintain an awareness of all external barriers required to protect from external hazards, eg., blanking, blocking, lockout, etc., and the proper use of those barriers; and

5) Obey evacuation orders given by either the attendant, entry supervisor, automatic alarm activation, or when self-perceived.

7. TRAINING AND DUTIES OF ATTENDANTS

A. An attendant must be stationed and remain stationed outside the permit space at all times during entry operations.

B. All attendants must have training and instruction in their duties and responsibilities regarding confined space entry. The following are assigned duties:

1) Maintain an accurate count of all entrants in the confined space;

2) Monitor activities both inside and outside the confined space to ensure the continued safety of entrants;

3) Maintain visual contact or verbal communications with all entrants in the confined space at all times;

4) Order evacuation of the confined space if an uncontrolled hazard develops, either within or outside the confined space, or upon observing a behavioral effect of hazard exposure among entrants;

5) Warn unauthorized persons away from the confined space; and

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

6) Summon rescue and other emergency services.

D. Attendants must maintain current certification in basic first aid and cardiopulmonary resuscitation (CPR).

E. **Under no circumstances should the attendant attempt rescue of entrants by entering the confined space.**

8. TRAINING CERTIFICATION

A. Training provided to the entry supervisor, attendant, and entrant must be certified by the Firm. Such training certification will be provided by Corporate Health & Safety.

B. Documentation of training certification received by attendance at an outside training course must be provided to Corporate Health & Safety.

9. OUTSIDE RESCUE ASSISTANCE

A. For any project involving a confined space entry, the entry supervisor must address rescue coordination efforts. Such rescue assistance must be coordinated with either the host employer's designated confined space rescue team and/or with a local emergency response team.

B. No confined space entry should progress without proper notification of outside rescue assistance prior to the actual entry activity.

C. An adequate means of communication., eg., cellular telephone for contacting off-site emergency assistance, air horn or two-way radio for summoning a host employer's rescue team, etc., must be immediately available to the attendant.

10. ATMOSPHERIC TESTING

A. All confined spaces will be tested for atmospheric hazards as follows:

1) Each confined space will initially be tested prior to the entry supervisor authorizing entry.

2) Each confined space will also be tested continuously or at intervals as specified by the entry supervisor.

B. The Entry Supervisor will select continuous or interval monitoring, and specify length of the interval to be implemented during entry. Selection of continuous or interval monitoring will be based on the nature of the confined space hazards present in the permit space, activity during entry, and potential for hazards developing in the confined space.

C. All confined spaces must be tested for atmospheric hazards prior to each entry, and as entry proceeds. **The following is the sequence and acceptable air quality criteria that testing must follow:**

1) Oxygen content for all confined space entry must be 19.5 to 23.5%;

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

2) Combustible gas or vapor must not exceed 10% of its lower explosive limit (LEL);

3) Toxic gas or vapor must not exceed 50% of the permissible exposure limit;

4) Carbon monoxide must not exceed 20 ppm; and

5) Hydrogen sulfide must not exceed 5 ppm.

D. If it is necessary to enter a confined space where any of the following atmospheric conditions exists, all entrants must wear either a self-contained breathing apparatus (SCBA) of at least 60-minute duration or an air supplied respirator with emergency SCBA:

1) Initial atmospheric testing indicates conditions outside the parameters listed on the Entry Permit;

2) Initial atmospheric testing indicates conditions within permit parameters but where the quality of the atmosphere remains questionable; and/or

3) Despite initial atmospheric testing results, activities to be performed while in the confined space would endanger entrants by a creating a sudden change in atmospheric conditions within the space.

4) Mechanical ventilation will not maintain atmospheric hazards within permit limits.

E. Under no circumstances is entry into a confined space having an IDLH condition permitted by any employee of the Firm.

F. Results of all atmospheric testing must be recorded on the Confined Space Entry Permit.

11. MECHANICAL VENTILATION

A. Mechanical ventilation may be utilized to maintain confined space atmospheric hazards within entry limits.

B. Ventilation can be used to force clean air into a confined space or to remove contaminated air from the confined space.

C. Ventilation systems must be set up to adequately ventilate all areas of the confined space.

D. Ventilation systems must be locked in the "on" position and the confined space evacuated if the system fails.

E. Continuous air monitoring must be implemented when ventilation is utilized to maintain atmospheric hazards within entry permit limits.

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

12. WORK PRACTICES

A. All entrants must wear a retrieval line secured on one end to the entrant by a full-body harness, or parachute harness, and with the other end secured to a lifting or other mechanical retrieval device. **Reliance on manually lifting an entrant from a vertical confined space is prohibited.**

B. Where mechanical ventilation will be relied upon for eliminating an actual or potential hazardous atmosphere, the atmosphere of the space must be continually monitored to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.

C. Whenever a ladder is required for confined space entry, the ladder must be secured and not withdrawn while anyone remains within the confined space.

D. Adequate illumination must be provided for all confined space entry. An approved type (explosion-proof) lighting device must be employed.

E. All electrical equipment used within a confined space must be inspected prior to use to ensure good working condition. The equipment must utilize a ground fault interrupt and/or be properly grounded.

F. Whenever the confined space is structured such that visual contact can not be maintained between entrants and the attendant, intrinsically-safe two-way radios must be utilized to maintain continuous contact between entrants and attendants.

G. When mechanical ventilation is used to maintain a potentially hazardous atmosphere, continuous air monitoring must be utilized.

H. Prior to opening or removing lids, covers, access doors, or hatches of a confined space, precautions must be taken to determine if it is safe to do so.

I. Whenever entering manholes or other confined spaces with permanent ladders, all rungs must be inspected to ensure they are in safe and useable condition.

J. When working in a vertical confined space, precautions must be taken to prevent equipment and personnel from falling into the confined space opening. Tools should be lowered and removed from the space using a basket or sling to prevent falls and falling objects.

13. POSTING AND RECORDKEEPING

A. The Entry Permit(s), must be initially posted at the confined space, and remain posted for the duration of the entry. **All permits must be weather protected to maintain integrity.**

B. The original, canceled Entry Permit(s) must be retained within the project file.

[Cont'd]

DESCRIPTION OF PROCEDURE: [Cont'd]

C. Copies of the canceled Confined Space Entry Permit(s) must be forwarded to the Divisional HSC and Corporate Manager Health & Safety for quality assurance checks and record retention.

- END OF PROCEDURE -

Executive Authorization: ____________ Date: 11/10/93

CONFINED SPACE ENTRY PERMIT

Permit # ____________________

All Copies of Permit Must Remain at Job Site Until the Entry is Completed

Project ____________________ Date ______________ Time ______________

Location and Description of Confined Space: ____

____

This Entry Permit is for: ☐ single space ☐ multi-spaces ____________________(number of multi-spaces)

A Confined Space Entry Checklist must be completed for each space

Rescue Contact and Phone Number: ____

Entry Objectives: ____

____

Time of Entry: ________ a.m. ________ p.m. Expiration of Entry: ________ a.m. ________ p.m.

Required Respiratory for Entry: ____

Required Protective Clothing for Entry: ____

Air Monitoring Requirements			
Monitor For	Monitoring Equipment	Calibrated	
		Date	By
$\%O_2$			
% of LEL			
Toxic Vapor			
CO			
H_2S			

Monitoring Interval: ☐ Continuous ☐ 5 min. ☐ 10 min. ☐ 15 min. ☐ 30 min.

Number of Entry Personnel:		Number of Attendants:	
Name of Entrants		Name of Attendants	

Entry Supervisor Authorizing Confined Space Entry Permit: ____________________

Print

____

Signature Date Time

Entry Supervisor Cancelling Confined Space Entry Permit: ____________________

Print

____

Signature Date Time

CONFINED SPACE ENTRY CHECKLIST

Corresponding Permit # ____________________

All Copies of Permit Must Remain at Job Site Until the Entry is Completed

Project ____________________ Date ____________________ Time ____________________

Location and Description of Confined Space: ____________________

Checklist	Yes	No	Does Not Apply
All lines to and from confined space blanked, capped, or isolated	☐	☐	☐
Electrical service locked out (attendant with key)	☐	☐	☐
Explosion-proof electrical equipment in use	☐	☐	☐
Ladders secured at top	☐	☐	☐
Ground fault circuit interrupter checked and functioning	☐	☐	☐
All ignition sources identified and isolated	☐	☐	☐
Respirators and air supply equipment in proper condition	☐	☐	☐
Safety harnesses and lifelines in proper condition	☐	☐	☐
Required personal protective equipment being utilized	☐	☐	☐
Monitoring equipment calibrated and functioning properly	☐	☐	☐
Atmospheric testing completed	☐	☐	☐
Trained attendant on standby	☐	☐	☐
Emergency equipment ready for use	☐	☐	☐
Rescue provisions in place	☐	☐	☐
Warning signs posted	☐	☐	☐
Ventilation equipment functioning properly	☐	☐	☐
Retrieval system functioning properly (tripod with life lines)	☐	☐	☐
Devices for maintaining communication between entrants and attendants	☐	☐	☐
Area secured to eliminate unauthorized entry	☐	☐	☐
Entry personnel trained for confined space entry	☐	☐	☐
Confined space entry permit completed and posted	☐	☐	☐
Permanent ladder rungs in safe condition	☐	☐	☐

Entry Supervisor ____________________

Signature ____________________ Date ____________________

CONFINED SPACE ENTRY CHECKLIST

Corresponding Permit # ____________________

All Copies of Permit Must Remain at Job Site Until the Entry is Completed

Project ____________________ Date ____________________ Time ____________________

Location ____

Monitoring Interval: ☐ Continuous ☐ 5 min. ☐ 10 min. ☐ 15 min. ☐ 30 min.

Time	Confined Space Air Monitoring Parameters				
	% Oxygen	% LEL	H_2S	CO	Toxic Vapor ______
	>19.5% <23.5%	<10%	<5 ppm	<20 ppm	<50% of PEL
Pre-entry					

Comments: ____

____

Air Monitor:

____
Print

____
Signature Date

SEWER SYSTEM MANHOLE ENTRY CHECKLIST

Corresponding Permit Number ________________

All Copies of Permit Must Remain at Job Site Until the Entry is Completed

Manhole Number	Confined Space Entry Parameter																Initial Air Monitoring				Air Levels Exceeded (Specify)[1]	Authorized By[2]
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	$\%O_2$ 19.5-23.5	%LEL <10%	H_2S <5 ppm	Other		

[1] If air levels are exceeded, note level and time of permit space evacuation.
[2] Entry Supervisor must initial and give time.
Entry Supervisor must check ( ) all parameters that apply prior to authorizing entry. If a parameter is not applicable, it must be noted by placing N/A in box.

Confined Space Entry Parameter Key

- A Explosion-proof electrical equipment in use
- B Manhole ladder rungs in good condition
- C Temporary ladders secured at top
- D Required personal protective equipment being utilized
- E Monitoring equipment calibrated and functioning properly
- F Atmospheric testing completed
- G Trained attendant on standby
- H Rescue provisions in place
- I Safety harnesses and lifelines in proper condition
- J Ventilation equipment functioning properly
- K Retrieval system functioning properly (tripod with life lines)
- L Devices for maintaining communication between entrants and attendants
- M Area secured to eliminate unauthorized entry
- N Warning signs posted
- O Entry personnel trained for confined space entry
- P Confined space entry permit completed and posted

APPENDIX B
UNDERGROUND/OVERHEAD UTILITIES CHECKLIST

BBL UNDERGROUND/OVERHEAD UTILITY CHECKLIST

Project Name/Number____ **Date**______________

Location____

Prepared By_____________________________ **Project Manager**____________________________

This checklist must be completed for any intrusive subsurface work such as excavation or drilling. It documents that overhead and underground utilities in the work are identified and located. The Project Manager shall request utility markouts before the start of field operations to allow the client and utility companies sufficient time to provide them. If complete information is not available, a magnetometer or other survey shall be performed to locate obstacles prior to intrusive subsurface activities.

Procedure

A diagram of the work area depicting the proposed location of intrusive subsurface work sites (i.e., boring locations, excavation locations) must be attached to this form. The diagram must clearly indicate the areas checked for underground structures/utilities, and overhead power lines. This form and the diagram must be signed by the BBL Project Manager (if present), the BBL Site Supervisor, and the client representative.

Checklist

Type of Structure	Present	Not Present	Method of Markout
Electric Power Line			
Natural Gas Line			
Telephone Line			
Water Line			
Product Line			
Sewer Line			
Steam Line			
Drain Line			
Underground Tank			
Underground Cable			
Overhead Power Line			
Overhead Product Line			
Other (Specify)			

Client Representative____ Date____________

BBL Project Manager____ Date____________

BBL Site Supervisor____ Date____________

APPENDIX C
MATERIAL SAFETY DATA SHEETS

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(518) 377-8854

Material Safety Data Sheets Collection:
Sheet No. 313
Perchloroethylene
Issued: 11/78 **Revision: E, 9/92**

Section 1. Material Identification

Perchloroethylene (C_2Cl_4) Description: By chlorination of hydrocarbons and pyrolysis of the carbon tetrachloride that is formed, or by catalytic oxidation of 1,1,2,2-tetrachloroethane. Used in dry cleaning and textile processing, metal degreasing, insulating fluid and cooling gas in electrical transformers, production of adhesives, aerosols, paints, and coatings; as a chemical intermediate, a solvent for various applications, extractant for pharmaceuticals, a pesticide intermediate, and an antihelminthic (parasitic worm removal) agent in veterinary medicine.
Other Designations: CAS No. 127-18-4, Ankilostin, carbon dichloride, Didakene, ethylene tetrachloride, Perchlor, Perclene, Perk, Tetracap, tetrachloroethylene.
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*[73] for a suppliers list.

Cautions: Perchloroethylene is a central nervous system depressant, causes liver and kidney damage (from acute or chronic exposures), and is considered an IARC Class 2B carcinogen (animal sufficient evidence, human inadequate data).

R 1
I 3
S 2*
K 0
* Skin absorption

NFPA
0
2 0
-

HMIS
H 2†
F 0
R 0
PPE‡
† Chronic effects
‡ Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Perchloroethylene, < 99%. Impurities include a small amount of amine or phenolic stabilizers.

1991 OSHA PEL
8-hr TWA: 25 ppm (170 mg/m^3)

1990 IDLH Level
500 ppm

1990 NIOSH REL
NIOSH-X Carcinogen
Limit of Quantitation: 0.4 ppm

1992-93 ACGIH TLVs
TWA: 50 ppm (339 mg/m^3)
STEL: 200 ppm (1357 mg/m^3)

1990 DFG (Germany) MAK
TWA: 50 ppm (345 mg/m^3)
Category II: substances with systemic effects
Half-life: < 2 hr
Peak Exposure Limit: 100 ppm, 30 min average value, 4/shift

1985-86 Toxicity Data*
Man, inhalation, TC_{Lo}: 280 ppm/2 hr caused conjunctival irritation and anesthesia.
Human, lung: 100 mg/L caused unscheduled DNA synthesis.
Rat, oral, LD_{50}: 3005 mg/kg; caused somnolence, tremor, and ataxia.
Rat, inhalation, TC_{Lo}: 200 ppm/6 hr given intermittently over 2 years produced leukemia and testicular tumors.
Rabbit, eye: 162 mg caused mild irritation.
Rabbit, skin: 810 mg/24 hr caused severe irritation.

* See NIOSH, *RTECS* (KX3850000), for additional irritation, mutation, reproductive, tumorigenic, & toxicity data.

Section 3. Physical Data

Boiling Point: 250 F (121.2 C)
Freezing Point: -8 F (-23.35 C)
Vapor Pressure: 13 mm Hg at 68 F (20 C)
Surface Tension: 31.74 dyne/cm at 68 F (20 C)
Viscosity: 0.84 cP at 77 F (25 C)
Refraction Index: 1.50534 at 68 F (20 C)
Molecular Weight: 165.82
Density: 1.6311 at 59 F (15/4 C)
Water Solubility: 0.02% at 77 F (25 C)
Other Solubilities: Miscible with alcohol, ether, benzene, chloroform, and oils.
Odor Threshold: 47 to 71 ppm (poor warning properties since olfactory fatigue is probable)
Evaporation Rate: 0.15 gal/ft^2/day at 77 F (25 C)
Saturated Vapor Density (Air = 0.075 lb/ft^3 or 1.2 kg/m^3): 0.081 lb/ft^3 or 1.296 kg/m^3
Appearance and Odor: Colorless liquid with an ether-like odor.

Section 4. Fire and Explosion Data

Flash Point: Nonflammable	**Autoignition Temperature:** Nonflammable	**LEL:** None reported	**UEL:** None reported

Extinguishing Media: For small fires, use dry chemical, carbon dioxide (CO_2). For large fires, use water spray, fog, or regular foam.
Unusual Fire or Explosion Hazards: Vapors are heavier than air and collect in low-lying areas.
Special Fire-fighting Procedures: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Apply cooling water to sides of container until well after fire is out. Stay away from ends of tanks. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Perchloroethylene is stable up to 932 F (500 C) in the absence of catalysts, moisture, and oxygen but deteriorates rapidly in warm, moist climates. It is slowly decomposed by light. Amine or phenolic stabilizers are usually added. Hazardous polymerization cannot occur. **Chemical Incompatibilities:** Slowly (faster in presence of water) corrodes aluminum, iron, and zinc. It is incompatible with chemically active metals (i.e., barium, beryllium, and lithium (explodes with lithium shavings), strong oxidizers, sodium hydroxide, caustic soda, potash, and nitric acid. Perchloroethylene forms an explosive mixture with dinitrogen tetraoxide and reacts with activated charcoal at 392 F (200 C) to yield hexachloroethane and hexachlorobenzene. **Conditions to Avoid:** Contact with moisture and incompatibles.
Hazardous Products of Decomposition: Thermal oxidative decomposition of perchloroethylene can produce carbon dioxide and toxic chlorine, hydrogen chloride, and phosgene gas (also produced by contact with UV light).

Section 6. Health Hazard Data

Carcinogenicity: Perchloroethylene is listed as a carcinogen by The IARC (Group 2B, animal sufficient evidence, human inadequate data),[164] NTP (Class 2, reasonably anticipated as a carcinogen, with limited human evidence and sufficient animal evidence),[169] NIOSH (Class-X, carcinogen defined with no further explanation),[164] and DFG (MAK-B, justifiably suspected of having carcinogenic potential)[164]. There is some controversy regarding human carcinogenicity because even though there is an increased number of cancers of the skin, colon, lung, urogenital tract, and lympho-sarcomas; the dry cleaning workers studied were also exposed to other chemicals. **Summary of Risks:** Perchloroethylene is stored in the fatty tissue and slowly metabolized with the loss of chlorine. The half-life of its urinary metabolite (trichloroacetic acid) is 144 hours. Perchloroethylene exerts the majority of its toxicity on the central nervous system causing symptoms ranging from light-headedness and slight 'inebriation' to unconsciousness. Liver damage is possible after severe acute or minor long-term exposure. It has a synergistic effect with toluene.

Continue on next page

Section 6. Health Hazard Data, *continued*

Medical Conditions Aggravated by Long-Term Exposure: Nervous, liver, kidney, or skin disorders. **Target Organs:** Liver, kidney, eyes, upper respiratory tract, skin, and central nervous system. **Primary Entry Routes:** Inhalation and skin and eye contact. **Acute Effects:** Exposure to high levels can cause liver damage which may take several weeks to develop. Vapor exposure can cause slight smarting of the eyes and throat (in high concentrations). In human studies, exposure to 2000 ppm/5 min caused mild CNS depression; 600 ppm/10 min caused numbness around the mouth, dizziness, and incoordination; 100 ppm/7 hr caused mild eye, nose, and throat irritation, flushing of the face and neck, headache, somnolence, and slurred speech. Skin contact may produce dermatitis because of perchloroethylene's defatting action (more common after repeated exposure). Direct eye contact causes tearing and burning but no permanent damage. Ingestion is rare but can cause irritation of the lips, mouth and gastrointestinal tract, irregular heartbeat, nausea & vomiting, diarrhea (possibly blood stained), drowsiness, unconsciousness, and risk of pulmonary edema (fluid in lungs). **Chronic Effects:** Prolonged exposure can cause impaired memory, extremity (hands, feet) weakness, peripheral neuropathies, impaired vision, muscle cramps, liver damage (fatty degeneration, necrosis, yellow jaundice, and dark urine) and kidney damage (oliguric uremia, conjestion and granular swelling).

FIRST AID ***Rescuers must not enter areas with potentially high perchloroethylene levels without a self-contained breathing apparatus.***
Eyes: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. *Never administer adrenalin!* **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, have that *conscious and alert* person drink 1 to 2 glasses of water, then induce vomiting. Be sure victim's head is positioned to avoid aspiration of vomitus into the lungs. **Note to Physicians:** Monitor level of consciousness, EEG (abnormalaties may indicate chronic toxicity), blood enzyme levels (for 2 to 3 wk after exposure), EKG, adequacy of respirations & oxygenation, and liver and kidney function. *BEIs:* C_2Cl_4 in expired air (10 ppm), sample prior to last shift of work week; C_2Cl_4 in blood (1 mg/L), sample prior to last shift of work week; trichloroacetic acid in urine (7 mg/L), sample at end of workweek.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Shut off ignition sources (although noncombustible, it forms toxic vapors from thermal decomposition). For small spills, take up with earth, sand, vermiculite, or other absorbent, noncombustible material and place in suitable containers for later disposal. For large spills, dike far ahead of spill and await reclamation or disposal. Report any release in excess of 1 lb. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Transport:** If released to soil, perchloroethylene evaporates and some leaches to groundwater. It may absorb slightly to soils with heavy organic matter. Biodegradation may be important in anaerobic soils. In water, it is subject to rapid volatilization with an estimated half-life from <1 day to several weeks. In air, it exists mainly in the vapor-phase and is subject to photooxidation with a half-life of 30 minutes to 2 months. **Ecotoxicity Values:** Guppy (*Poecilia reticulata*), LC_{50} = 18 ppm/7 days; fathead minnow (*Pimephales promelas*), LC_{50} = 18.4 mg/L/96 hr, flow through bioassay. **Disposal:** Consider recovery by distillation. A potential candidate for rotary kiln incineration at 1508 to 2912 F (820 to 1600 C) or fluidized bed incineration at 842 to 1796 F (450 to 980 C). Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations
Listed as a RCRA Hazardous Waste (40 CFR 261.33): No. U210
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 100 lb (45.4 kg) [* per CWA Sec. 307 (a)]
SARA Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear a faceshield (8 inch minimum) per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For any detectable concentration, use a supplied-air respirator or SCBA with a full facepiece operated in pressure demand or other positive-pressure mode. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets made of butyl rubber, Neoprene, or Viton to prevent skin contact. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PEL (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove this material from your shoes and clean personal protective equipment. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Prevent physical damage to containers. Store in a cool, dry, well-ventilated area away from sunlight, and incompatibles. Do not store sludge from vapor degreasers in tightly-sealed containers and keep outside until disposal is arranged. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Check stabilizer levels frequently and ventilation equipment (air velocity, static pressure, air valve) at least every 3 months. Install an air dryer in ventlines to storage tanks to prevent moisture from rusting and weakening the tank and contaminating or discoloring its contents. Purge all tanks before entering for repairs or cleanup. Build a dike around storage tanks capable of containing all the liquid. Ground tanks to prevent static electricity. **Administrative Controls:** Consider preplacement and periodic medical exams of exposed workers that emphasize liver, kidney, and nervous system function, and the skin. Alcoholism may be a predisposing factor.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Tetrachloroethylene
DOT Hazard Class: 6.1
ID No.: UN1897
DOT Packing Group: III
DOT Label: Keep away from food
Special Provisions (172.102): N36, T1

Packaging Authorizations
a) Exceptions: 173.153
b) Non-bulk Packaging: 173.203
c) Bulk Packaging: 173.241

Quantity Limitations
a) Passenger Aircraft or Railcar: 60 L
b) Cargo Aircraft Only: 220 L

Vessel Stowage Requirements
a) Vessel Stowage: A
b) Other: 40

MSDS Collection References: 26, 73, 100, 101, 103, 124, 126, 127, 132, 133, 140, 148, 149, 153, 159, 163, 164, 167, 168, 171, 174, 175, 176, 180.
Prepared by: M Gannon, BA; Industrial Hygiene Review: D Wilson, CIH; Medical Review: W Silverman, MD

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Material Safety Data Sheets Collection:

Sheet No. 318
Xylene *(Mixed Isomers)*

Issued: 11/80 Revision: E, 9/92 Errata: 12/94

Section 1. Material Identification

Xylene (Mixed Isomers) (C_8H_{10}) Description: The commercial product is a blend of the three isomers [*ortho*-(*o*-), *meta*-(*m*-), *para*-(*p*-)] with the largest proportion being *m*- xylene. Xylene is obtained from coal tar, toluene by transalkylation, and pseudocumene. Used in the manufacture of dyes, resins, paints, varnishes, and other organics; as a general solvent for adhesives, a cleaning agent in microscope technique; as a solvent for Canada balsam microscopy; as a fuel component; in aviation gasoline, protective coatings, sterilizing catgut, hydrogen peroxide, perfumes, insect repellants, pharmaceuticals, and the leather industry; in the production of phthalic anhydride, isophthalic, and terephthalic acids and their dimethyl esters which are used in the manufacture of polyester fibers; and as an indirect food additive as a component of adhesives. Around the home, xylene is found as vehicles in paints, paint removers, degreasing cleaners, lacquers, glues and cements and as solvent/vehicles for pesticides.

Other Designations: CAS No. 1330-20-7 [95-47-6; 108-38-3; 106-42-3 (*o*-, *m*-, *p*-isomers)], dimethylbenzene, methyltoluene, NCI-C55232, Violet 3, xylol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*[73] for a suppliers list.

Cautions: Xylene is an eye, skin, and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

R	1
I	2
S	2
K	3

NFPA
3
2 0
–

HMIS
H 2
F
R 0
PPE ‡
† Chronic Effects
‡ Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Xylene (mixed isomers): the commercial product generally contains ~ 40% *m*-xylene; 20% each of *o*-xylene, *p*-xylene, and ethylbenzene; and small quantities of toluene. Unpurified xylene may contain pseudocumene.

1991 OSHA PELs
8-hr TWA: 100 ppm (435 mg/m³)
15-min STEL: 150 ppm (655 mg/m³)

1990 IDLH Level
1000 ppm

1990 NIOSH RELs
TWA: 100 ppm (435 mg/m³)
STEL: 150 ppm (655 mg/m³)

1992-93 ACGIH TLVs
TWA: 100 ppm (434 mg/m³)
STEL: 150 ppm (651 mg/m³)
BEI (Biological Exposure Index): Methylhippuric acids in urine at end of shift: 1.5 g/g creatinine

1990 DFG (Germany) MAK
TWA: 100 ppm (440 mg/m³)
Category II: Substances with systemic effects
Half-life: < 2 hr
Peak Exposure: 200 ppm, 30 min, average value, 4 peaks per shift

1985-86 Toxicity Data*
Human, inhalation, TC_{Lo}: 200 ppm produced olfaction effects, conjunctiva irritation, and other changes involving the lungs, thorax, or respiration.
Man, inhalation, LC_{Lo}: 10000 ppm/6 hr; toxic effects not yet reviewed.
Human, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted.
Rat, oral, LD_{50}: 4300 mg/kg; toxic effect not yet reviewed.
Rat, inhalation, LC_{50}: 5000 ppm/4 hr; toxic effects not yet reviewed.

* See NIOSH, *RTECS* (XE2100000), for additional toxicity data.

Section 3. Physical Data

Boiling Point Range: 279 to 284 F (137 to 140 C)*
Boiling Point: *ortho:* 291 F (144 C); *meta:* 281.8 F (138.8 C); *para:* 281.3 F (138.5 C)
Freezing Point/Melting Point: *ortho:* -13 F (-25 C); *meta:* -53.3 F (- 47.4 C); *para:* 55 to 57 F (13 to 14 C)
Vapor Pressure: 6.72 mm Hg at 70 F (21 C)
Saturated Vapor Density (Air = 1.2 kg/m³): 1.23 kg/m³, 0.077 lbs/ft³
Appearance and Odor: Clear, sweet-smelling liquid.
* Materials with wider and narrower boiling ranges are commercially available.

Molecular Weight: 106.16
Specific Gravity: 0.864 at 20 C/4 C
Water Solubility: Practically insoluble
Other Solubilities: Miscible with absolute alcohol, ether, and many other organic liquids.
Octanol/Water Partition Coefficient: logKow = 3.12-3.20
Odor Threshold: 1 ppm
Viscosity: <32.6 SUS

Section 4. Fire and Explosion Data

Flash Point	Autoignition Temperature	LEL	UEL
63 to 77 F (17 to 25 C) CC	982 F (527 C) (*m*-)	1.1 (*m*-, *p*-); 0.9 (*o*-)	7.0 (*m*-, *p*-); 6.7 (*o*-)

Extinguishing Media: For small fires, use dry chemical, carbon dioxide (CO_2), water spray or regular foam. For large fires, use water spray, fog or regular foam. Water may be ineffective. Use water spray to cool fire-exposed containers. **Unusual Fire or Explosion Hazards:** Xylene vapors or liquid (which floats on water) may travel to an ignition source and flash back. The heat of fire may cause containers to explode and/or produce irritating or poisonous decomposition products. Xylene may present a vapor explosion hazard indoors, outdoors, or in sewers. Accumulated static electricity may occur from vapor or liquid flow sufficient to cause ignition. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing will provide limited protection. If feasible and without risk, move containers from fire area. Otherwise, cool fire-exposed containers until well after fire is extinguished. Stay clear of tank ends. Use unmanned hose holder or monitor nozzles for massive cargo fires. If impossible, withdraw from area and let fire burn. Withdraw immediately in case of any tank discoloration or rising sound from venting safety device. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Xylene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Xylene is easily chlorinated, sulfonated, or nitrated. **Chemical Incompatibilities:** Incompatibilities include strong acids and oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Xylene attacks some forms of plastics, rubber, and coatings. ***Conditions to Avoid:*** Avoid heat and ignition sources and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of xylene can produce carbon dioxide, carbon monoxide, and various hydrocarbon products.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,[164] NTP,[169] and OSHA[164] do not list xylene as a carcinogen. **Summary of Risks:** Xylene is an eye, mucous membrane, and respiratory tract irritant. Irritation starts at 200 ppm; severe breathing difficulties which may be delayed in onset can occur at high concentrations. It is a central nervous system (CNS) depressant and at high concentrations can cause coma. Kidney and liver damage can occur with xylene exposure. With prolonged or repeated cutaneous exposure, xylene produces a defatting dermatitis. Chronic toxicity is not well defined, but it is less toxic than benzene. Prior to the 1950s, benzene was often found as a contaminant of xylene and the effects attributed to xylene such as blood dyscrasias are questionable. Since the late 1950s, xylenes have been virtually benzene-free and blood dyscrasias have not been associated with xylenes. Chronic exposure to high concentrations of xylene in animal studies have demonstrated mild reversible decrease in red and white cell counts as well as increases in platelet counts.

Continue on next page

Section 6. Health Hazard Data, *continued*

Menstrual irregularity was reported in association with workplace exposure to xylene perhaps due to effects on liver metabolism. Xylene crosses the human placenta, but does not appear to be teratogenic under conditions tested to date. **Medical Conditions Aggravated by Long-Term Exposure:** CNS, respiratory, eye, skin, gastrointestinal (GI), liver and kidney disorders. **Target Organs:** CNS, eyes, GI tract, liver, kidneys, and skin. **Primary Entry Routes:** Inhalation, skin absorption (slight), eye contact, ingestion. **Acute Effects:** Inhalation of high xylene concentrations may cause dizziness; nausea, vomiting, and abdominal pain; eye, nose, and throat irritation; respiratory tract irritation leading to pulmonary edema (fluid [illegible]ng); drowsiness; and unconsciousness. Direct eye contact can result in conjunctivitis and corneal burns. Ingestion may cause a burning sensa-[illegible] in the oropharynx and stomach and transient CNS depression. **Chronic Effects:** Repeated or prolonged skin contact may cause drying and defatting of the skin leading to dermatitis. Repeated eye exposure to high vapor concentrations may cause reversible eye damage, peripheral and central neuropathy, and liver damage. Other symptoms of chronic exposure include headache, fatigue, irritability, chronic bronchitis, and GI disturbances such as nausea, loss of appetite, and gas.

FIRST AID *Emergency personnel should protect against exposure.* **Eyes:** *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. Carefully dispose of contaminated clothing as it may pose a fire hazard. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. Monitor exposed person for respiratory distress. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, *do not induce vomiting!* If spontaneous vomiting should occur, keep exposed person's head below the hips to prevent aspiration (breathing liquid xylene into the lungs). *Aspiration of a few millimeters of xylene can cause chemical pneumonitis, pulmonary edema, and hemorrhage.* **Note to Physicians:** Hippuric acid or the ether glucuronide of *ortho*-toluic acid may be useful in diagnosis of *meta-*, *para-* and *ortho*-xylene exposure, respectively. Consider gastric lavage if a large quantity of xylene was ingested. Proceed gastric lavage with protection of the airway from aspiration; consider endotracheal intubation with inflated cuff.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove all heat and ignition sources, and ventilate spill area. Cleanup personnel should protect against vapor inhalation and skin or eye contact. If feasible and without undue risk, stop leak. Use appropriate foam to blanket release and suppress vapors. Water spray may reduce vapor, but does not prevent ignition in closed spaces. For small spills, absorb on paper and evaporate in appropriate exhaust hood or absorb with sand or some non-combustible absorbent and place in containers for later disposal. For large spills dike far ahead of liquid to contain. Do not allow xylene to enter a confined space such as sewers or drains. On land, dike to contain or divert to impermeable holding area. Apply water spray to control flammable vapor and remove material with pumps or vacuum equipment. On water, contain material with natural barriers, booms, or weirs; apply universal gelling agent; and use suction hoses to remove spilled material. Report any release in excess of 1000 lb. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Transport:** Little bioconcentration is expected. Biological oxygen demand 5 (after 5 days at 20 C): 0.64 (no stated isomer). **Ecotoxicity values:** LD_{50}, Goldfish, 13 mg/L/24 hr, conditions of bioassay not specified, no specific isomer. **Environmental Degradation:** In the atmosphere, xylenes degrade by reacting with photochemically produced hydroxyl radicals with a half-life ranging from 1-1.7 hr. in the summer to 10-18 hr in winter or a typical loss of 67-86% per day. Xylenes are resistant to hydrolysis. **Soil Absorption/Mobility:** Xylenes have low to moderate adsorption to soil and when spilled on land, will volatilize and leach into groundwater. **Disposal:** As a hydrocarbon, xylene is a good candidate for controlled incineration. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

[illegible]A Extremely Hazardous Substance (40 CFR 355): Not listed

[illegible]d as a SARA Toxic Chemical (40 CFR 372.65)

[illegible]ed as a RCRA Hazardous Waste (40 CFR 261.33): No. U239, F003 (spent solvent)

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg) [* per Clean Water Act, Sec. 311(b)(4); per RCRA, Sec. 3001]

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For concentrations >1000 ppm, use any chemical cartridge respirator with organic vapor cartridges; any powered, air-purifying respirator with organic vapor cartridges; any supplied-air respirator; or any self-contained breathing apparatus. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent all skin contact. With breakthrough times > 8 hr, consider polyvinyl alcohol and fluorocarbon rubber (Viton) as materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes. Launder contaminated work clothing before wearing. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in clearly labelled, tightly closed, containers in a cool, well-ventilated place, away from strong oxidizing materials and heat and ignition sources. During transferring operations, electrically ground and bond metal containers. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Use hermetically sealed equipment, transfer xylene in enclosed systems, avoid processes associated with open evaporating surfaces, and provide sources of gas release with enclosures and local exhaust ventilation. Use Class I, Group D electrical equipment. **Administrative Controls:** Establish air and biological monitoring programs and evaluate regularly. Consider preplacement and periodic medical examinations including a complete blood count, a routine urinalysis, and liver function tests. Consider hematologic studies if there is any significant contamination of the solvent with benzene. If feasible, consider the replacement of xylene by less toxic solvents such as petrol (motor fuel) or white spirit. Before carrying out maintenance and repair work, steam and flush all equipment to remove any xylene residues.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Xylenes
DOT Hazard Class: 3
[illegible]o.: UN1307
[illegible] Packing Group: II
[illegible] Label: Flammable Liquid
Special Provisions (172.102): T1

Packaging Authorizations
a) Exceptions: 173.150
b) Nonbulk Packaging : 173.202
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5L
b) Cargo Aircraft Only: 60L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: –

MSDS Collection **References:** 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 139, 140, 148, 149, 153, 159, 163, 164, 167, 171, 174, 176, 180.

Prepared by: MJ Wurth, BS; **Industrial Hygiene Review:** PA Roy, MPH, CIH; **Medical Review:** W Silverman, MD

Section 1. Material Identification

Toluene ($C_6H_5CH_3$) Description: Derived from petroleum i.e., dehydrogenation of cycloparaffin fractions followed by the aromatization of saturated aromatic hydrocarbons or by fractional distillation of coal-tar light oil and purified by rectification. Used widely as a solvent (replacing benzene in many cases) for oils, resins, adhesives, natural rubber, coal tar, asphalt, pitch, acetyl celluloses, cellulose paints and varnishes; a diluent for photogravure inks, raw material for organic synthesis (benzoyl & benzilidene chlorides, saccharine, TNT, toluene diisocyanate, and many dyestuffs), in aviation and high octane automobile gasoline, as a nonclinical thermometer liquid and suspension solution for navigational instruments.

Other Designations: CAS No. 108-88-3, Methacide, methylbenzene, methylbenzol, phenylmethane, toluol, Tolu-sol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*[73] for a suppliers list.

Cautions: Toluene is an eye, skin, and respiratory tract irritant becoming narcotic at high centrations. Liver and kidney damage has occurred. Pregnant women chronically exposed to toluene have shown teratogenic effects. Toluene is highly flammable.

R 1
I 3
S 2*
K 3
* Skin absorption

NFPA: 3 (top), 2 (left), 0 (right), - (bottom)

HMIS
H 2- Chronic effects
F 3
R 0
PPE-Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Toluene, < 100%; may contain a small amount of benzene (~ 1%), xylene, and nonaromatic hydrocarbons.

1991 OSHA PELs
8-hr TWA: 100 ppm (375 mg/m^3)
15-min STEL: 150 ppm (560 mg/m^3)

1990 IDLH Level
2000 ppm

1990 NIOSH RELs
TWA: 100 ppm (375 mg/m^3)
STEL: 150 ppm (560 mg/m^3)

1992-93 ACGIH TLV (Skin)
TWA: 50 ppm (188 mg/m^3)

1990 DFG (Germany) MAK*
TWA: 100 ppm (380 mg/m^3)
Half-life: 2 hr to end of shift
Category II: Substances with systemic effects
Peak Exposure Limit: 500 ppm, 30 min average value, 2/shift

1985-86 Toxicity Data†
Man, inhalation, TC_{Lo}: 100 ppm caused hallucinations, and changes in motor activity and changes in psychophysiological tests.
Human, oral, LD_{Lo}: 50 mg/kg; toxic effects not yet reviewed
Human, eye: 300 ppm caused irritation.
Rat, oral, LD_{50}: 5000 mg/kg
Rat, liver: 30 μmol/L caused DNA damage.

* Available information suggests damage to the developing fetus is probable.
†See NIOSH, *RTECS* (XS5250000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 232 F (110.6 C)
Melting Point: -139 F (-95 C)
Molecular Weight: 92.15
Density: 0.866 at 68 F (20/4 C)
Surface Tension: 29 dyne/cm at 68 F (20 C)
Viscosity: 0.59 cP at 68 F (20 C)
Refraction Index: 1.4967 at 20 C/D
Water Solubility: Very slightly soluble, 0.6 mg/L at 68 F (20 C)
Other Solubilities: Soluble in acetone, alcohol, ether, benzene, chloroform, glacial acetic acid, petroleum ether, and carbon disulfide.
Vapor Pressure: 22 mm Hg at 68 F (20 C); 36.7 mm Hg at 86 F (30 C)
Saturated Vapor Density (Air = 0.075 lb/ft^3 or 1.2 kg/m^3): 0.0797 lb/ft^3 or 1.2755 kg/m^3
Odor Threshold (range of all referenced values): 0.021 to 69 ppm

Appearance and Odor: Colorless liquid with a sickly sweet odor.

Section 4. Fire and Explosion Data

Flash Point: 40 F (4.4 C) CC	Autoignition Temperature: 896 F (480 C)	LEL: 1.27% v/v	UEL: 7.0% v/v

Extinguishing Media: Toluene is a Class 1B flammable liquid. To fight fire, use dry chemical carbon dioxide, or 'alcohol-resistant' foam. Water spray may be ineffective as toluene floats on water and may actually spread fire. **Unusual Fire or Explosion Hazards:** Concentrated vapors are heavier than air and may travel to an ignition source and flash back. Container may explode in heat of fire. Toluenes' burning rate = 5.7 mm/min and its flame speed = 37 cm/sec. Vapor poses an explosion hazard indoors, outdoors, and in sewers. May accumulate static electricity. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limited protection. Apply cooling water to sides of tanks until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire because a BLEVE (boiling liquid expanding vapor explosion) may be imminent. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Toluene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization can't occur. **Chemical Incompatibilities:** Strong oxidizers, concentrated nitric acid, nitric acid + sulfuric acid, dinitrogen tetroxide, silver perchlorate, bromine trifluoride, tetranitromethane, and 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione. **Conditions to Avoid:** Contact with heat, ignition sources, or incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of toluene can produce carbon dioxide, and acrid, irritating smoke.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,[164] NTP,[169] and OSHA[164] do not list toluene as a carcinogen. **Summary of Risks:** Toluene is irritating to the eyes, nose, and respiratory tract. Inhalation of high concentrations produces a narcotic effect sometimes leading to coma as well as liver and kidney damage. 93% of inhaled toluene is retained in the body of which 80% is metabolized to benzoic acid, then to hippuric acid and excreted in urine. The remainder is metabolized to *o*-cresol and excreted or exhaled unchanged. Toluene metabolism is inhibited by alcohol ingestion and is synergistic with benzene, asphalt fumes, or chlorinated hydrocarbons (i.e. perchloroethylene). Toluene is readily absorbed through the skin at 14 to 23 mg/cm^2/hr. Toluene is absorbed quicker during exercise than at rest and appears to be retained longer in obese versus thin victims; presumably due to its lipid solubility. There is inconsistent data on toluene's ability to damage bone marrow; chronic poisoning has resulted in anemia and leucopenia with biopsy showing bone marrow hypo-plasia. These reports are few and some authorities argue that the effects may have been due to benzene contaminants. Chronic inhalation during pregnancy has been associated with teratogenic effects on the fetus including microcephaly, CNS dysfunction, attentional deficits, developmental delay + language impairment, growth retardation, and physical defects including a small midface, short palpebral fissures, with deep-set eyes, low-set ears, flat nasal bridge with a small nose, micrognathia, and blunt fingertips. There is some evidence that toluene causes an autoimmune illness in which the body produces antibodies that cause inflammation of its own kidney.

Continue on next page

Section 6. Health Hazard Data

Medical Conditions Aggravated by Long-Term Exposure: Alcoholism and CNS, kidney, skin, or liver disease. **Target Organs:** CNS, liver, kidney, skin. **Primary Entry Routes:** Inhalation, skin contact/absorption. **Acute Effects:** Vapor inhalation causes respiratory tract irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, watering eyes, nervousness, insomnia, parasthesis, and vertigo progressing to narcotic coma. Death may result from cardiac arrest due to ventricular fibrillation with catecholamines loss. Liquid splashed in the eye causes conjunctival irritation, transient corneal damage and possible burns. Prolonged skin contact leads to drying and fissured dermatitis. Ingestion causes GI tract irritation and symptoms associated with inhalation. **Chronic Effects:** Symptoms include mucous membrane irritation, headache, vertigo, nausea, appetite loss and alcohol intolerance. Repeated heavy exposure may result in encephalopathies (cerebellar ataxia and cognitive dysfunction), liver enlargement, and kidney dystrophy (wasting away). Symptoms usually appear at workdays end, worsen at weeks end and decrease or disappear over the weekend.
FIRST AID **Eyes:** *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult an ophthalmologist immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, have that *conscious and alert* person drink 1 to 2 glasses of water to dilute. *Do not* induce vomiting because of danger of aspiration into the lungs. Gastric lavage may be indicated if large amounts are swallowed; potential toxicity needs to be weighed against aspiration risk when deciding for or against gastric lavage. **Note to Physicians:** Monitor cardiac function. If indicated, use epinephrine and other catecholamines carefully, because of the possibility of a lowered myocardial threshold to the arrhythmogenic effects of such substances. Obtain CBC, electrolytes, and urinalysis. Monitor arterial blood gases. If toluene has > 0.02% (200 ppm) benzene, evaluate for potential benzene toxicity. BEI: hippuric acid in urine, sample at shift end (2.5 g/g creatinine); Toluene in venous blood, sample at shift end (1.0 mg/L).

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Cleanup personnel protect against inhalation and skin/eye contact. Use water spray to cool and disperse vapors but it may not prevent ignition in closed spaces. Cellosolve, hycar absorbent materials, and fluorocarbon water can also be used for vapor suppression/containment. Take up small spill with earth, sand, vermiculite, or other absorbent, noncombustible material. Dike far ahead of large spills for later reclamation or disposal. For water spills, (10 ppm or greater) apply activated carbon at 10X the spilled amount and remove trapped material with suction hoses or use mechanical dredges/lifts to remove immobilized masses of pollutants and precipitates. Toluene can undergo fluidized bed incineration at 842 to 1796 F (450 to 980 C), rotary kiln incineration at 1508 to 2912 F (820 to 1600 C), or liquid injection incineration at 1202 to 2912 F (650 to 1600 C). Follow applicable OSHA regulations (29 CFR 1910.120). **Ecotoxicity Values:** Blue gill, LC_{50} = 17 mg/L/24 hr; shrimp (*Crangonfracis coron*), LC_{50} = 4.3 ppm/96 hr; fathead minnow (*Pimephales promelas*), LC_{50} = 36.2 mg/L/96 hr. **Environmental Degradation:** If released to land, toluene evaporates and undergoes microbial degradation. In water, toluene volatilizes and biodegrades with a half-life of days to several weeks. In air, toluene degrades by reaction with photochemically produced hydroxyl radicals. **Disposal:** Treat contaminated water by gravity separation of solids, followed by skimming of surface. Pass through dual media filtration and carbon absorption units (carbon ratio 1 kg to 10 kg soluble material). Return waste water from backwash to gravity separator. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations
Listed as a RCRA Hazardous Waste (40 CFR 261.33): No. U220
SARA Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg)
[* per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307 (a)]
Listed as a SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses with shatter-resistant glass and side-shields or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 1000 ppm, use any chemical cartridge respirator with appropriate organic vapor cartridges, any supplied-air respirator (SAR), or SCBA. For < 2000 ppm, use any SAR operated in continuous-flow mode, any SAR or SCBA with a full facepiece, or any air-purifying respirator with a full facepiece having a chin-style, front or back mounted organic vapor canister. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent skin contact. Polyvinyl alcohol with a breakthrough time of > 8 hr, Teflon and Viton are recommended as suitable materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove toluene from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Prevent physical damage to containers. Store in a cool, dry, well-ventilated area away from ignition sources and incompatibles. Outside or detached storage is preferred. If stored inside, use a standard flammable liquids warehouse, room, or cabinet. To prevent static sparks, electrically ground and bond all equipment used with toluene. Do not use open lights in toluene areas. Install Class 1, Group D electrical equipment. Check that toluene is free of or contains < 1% benzene before use. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. **Administrative Controls:** Adopt controls for confined spaces (29 CFR 1910.146) if entering areas of unknown toluene levels (holes, wells, storage tanks). Consider preplacement and periodic medical exams of exposed workers that emphasize the CNS, liver, kidney, and skin. Include hemocytometric and thrombocyte count in cases where benzene is a contaminant of toluene. Monitor air at regular intervals to ensure effective ventilation.

Transportation Data (49 CFR 172.101)

	Packaging Authorizations	Quantity Limitations	Vessel Stowage Requirements
DOT Shipping Name: Toluene	a) Exceptions: 150	a) Passenger Aircraft or Railcar: 5L	Vessel Stowage: B
DOT Hazard Class: 3	b) Non-bulk Packaging: 202	b) Cargo Aircraft Only: 60L	Other: --
DOT No.: UN1294	c) Bulk Packaging: 242		
DOT Packing Group: II			
DOT Label: Flammable Liquid			
Special Provisions (172.102): T1			

MSDS Collection References: 26, 73, 100, 101, 103, 124, 126, 127, 132, 140, 148, 153, 159, 163, 164, 167, 169, 171, 174, 175, 176, 180.
Prepared by: M Gannon, BA; Industrial Hygiene Review: PA Roy, CIH, MPH; Medical Review: AC Darlington, MD, MPH

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Material Safety Data Sheets Collection:

Sheet No. 385
Ethylbenzene

Issued: 8/78 Revision: B, 9/92

Section 1. Material Identification 39

Ethylbenzene ($C_6H_5C_2H_5$) Description: Derived by heating benzene and ethylene in presence of aluminum chloride with subsequent distillation, by fractionation directly from the mixed xylene stream in petroleum refining, or dehydrogenation of naphthenes. Used as a solvent, an antiknock agent in gasoline; and as an intermediate in production of synthetic rubber, styrene, cellulose acetate, diethylbenzene, acetophenone, ethyl anthraquinone, propyl oxide, and α-methylbenzol alcohol.
Other Designations: CAS No. 100-41-4, ethylbenzol, EB, phenylethane, NCI-C56393.
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*[73] for a suppliers list.

R 1
I 3
S 2*
K 4
* Skin absorption

NFPA
3
2 0
-

HMIS
H 2†
F 3
R 0
PPE - Sec. 8
† Chronic effects

Cautions: Ethylbenzene is a skin and mucous membrane irritant considered the most irritating of the benzene series. Inhalation causes acute and chronic central nervous system (CNS) effects. It is highly flammable and forms explosive mixtures with air.

Section 2. Ingredients and Occupational Exposure Limits

Ethylbenzene, ca >99.0%. Impurities include ~ 0.1% *meta & para* xylene, ~ 0.1% cumene, and ~ 0.1% toluene.

1991 OSHA PELs
8-hr TWA: 100 ppm (435 mg/m^3)
15-min STEL: 125 ppm (545 mg/m^3)
Action Level: 50 ppm (217 mg/m^3)

1990 IDLH Level
2000 ppm

1990 NIOSH REL
TWA: 100 ppm (435 mg/m^3)
STEL: 125 ppm (545 mg/m^3)

1992-93 ACGIH TLVs
TWA: 100 ppm (434 mg/m^3)
STEL: 125 ppm (545 mg/m^3)

1990 DFG (Germany) MAK
TWA: 100 ppm (440 mg/m^3)
Category 1: local irritants
Peak Exposure Limit: 200 ppm, 5 min momentary value, max of 8/shift
Danger of cutaneous absorption

1985-86 Toxicity Data*
Human, inhalation, TC_{Lo}: 100 ppm/8 hr caused eye effects, sleep, and respiratory changes.
Human, lymphocyte: 1 mmol/L induced sister chromatid exchange.
Rat, oral, LD_{50}: 3500 mg/kg; toxic effects not yet reviewed
Rat (female), inhalation, TC_{Lo}: 1000 ppm/7 hr/day, 5 days/wk, for 3 wk prior to mating and daily for 19 days of gestation produced pups with high incidence of extra ribs.[179]

* See NIOSH, *RTECS* (DA0700000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 277 F (136 C)
Melting Point: -139 F (-95 C)
Surface Tension: 31.5 dyne/cm
Ionization Potential: 8.76 eV
Viscosity: 0.64 cP at 77 F (25 C)
Refraction Index: 1.4959 at 68 F (20 C)
Relative Evaporation Rate (ether = 1): 0.0106
Bulk Density: 7.21 lb/Gal at 77 F (25 C)
Critical Temperature: 651 F (343.9 C)
Critical Pressure: 35.6 atm
Molecular Weight: 106.16
Density: 0.863 at 77 F (25 C)
Water Solubility: Slightly, 14 mg/100 mL at 59 F (15 C)
Other Solubilities: Miscible in alcohol, ether; soluble in carbon tetrachloride, benzene, sulfur dioxide, and many organic solvents; insoluble in ammonia
Odor Threshold: 2.3 ppm
Vapor Pressure: 7.1 mm Hg at 68 F (20 C); 10 mmHg at 78.62 F (25.9 C); 100 mm Hg 165.38 F (74.1 C)
Saturated Vapor Density (Air = 0.075 lb/ft^3 or 1.2 kg/m^3): 0.0768 lb/ft^3 or 1.2298 kg/m^3

Appearance and Odor: Colorless, flammable liquid with a pungent odor.

Section 4. Fire and Explosion Data

Flash Point: 64 F (18 C) CC	**Autoignition Temperature:** 810 F (432 C)	**LEL:** 1.0% v/v	**UEL:** 6.7% v/v

Extinguishing Media: Class 1B Flammable liquid. For small fires, use dry chemical, carbon dioxide, or 'alcohol-resistant' foam. For large fires, use fog or 'alcohol-resistant' foam. Use water only if other agents are unavailable; EB floats on water and may travel to an ignition source and spread fire. **Unusual Fire or Explosion Hazards:** Burning rate = 5.8 mm/min. Vapors may travel to an ignition source and flash back. Container may explode in heat of fire. EB poses a vapor explosion hazard indoors, outdoors, and in sewers. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Cool container sides with water until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from area and let fire burn. Withdraw immediately if you hear rising sound from venting safety device or notice any tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Ethylbenzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Reacts vigorously with oxidizers.
Conditions to Avoid: Exposure to heat and oxidizers.
Hazardous Products of Decomposition: Thermal oxidative decomposition of EB can produce acrid smoke and irritating fumes.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,[164] NTP,[169] and OSHA[164] do not list EB as a carcinogen. **Summary of Risks:** Occupational exposure to EB alone is rare since it is usually present together with other solvents. EB is irritating to the eyes, skin, and respiratory tract. Vapor inhalation produces varying degrees of CNS effects depending on concentration. The liquid is absorbed through the skin but vapors are not. 56 to 64% of inhaled ethylbenzene is retained and metabolized. Urinary metabolites following exposure to 23 to 85 ppm for 8 hr are mandelic acid (64%), phenylglyoxylic acid (25%), and methylphenylcarbinol/1-phenyl ethanol (5%). Concurrent exposure to xylene and ethylbenzene causes slower excretion of EB metabolites. Based on the rat LD_{50}, one manufacturer gives 3 to 4 oz. as the lethal dose for a 100 lb person.

Continue on next page

Section 6. Health Hazard Data

Medical Conditions Aggravated by Long-Term Exposure: Skin and CNS diseases and impaired pulmonary function (especially obstructive airway disease). **Target Organs:** Eyes, respiratory system, skin, CNS, blood. **Primary Entry Routes:** Inhalation, skin and eye contact. **Acute Effects:** Vapor inhalation of 200 ppm caused transient eye irritation; 1000 ppm caused eye irritation with profuse watering (tolerance developed rapidly); 2000 ppm caused severe and immediate eye irritation and watering, nasal irritation, chest constriction, and vertigo; 5000 ppm was intolerable and caused eye and nose irritation. Inhalation of high concentrations may cause narcosis, cramps, and death due to respiratory paralysis. ...n exposed to pure ethylbenzene for 10 to 15 min absorbed 22 to 33 mg/cm²/hr. Immersion of hand in solutions of 112 & 156 mg/L for 1 hr ...sorbed 118 & 215.7 µg/cm²/hr, respectively. **Chronic Effects:** Repeated skin contact may cause dryness, scaling, and fissuring. Workers chronically exposed to > 100 ppm complained of fatigue, sleepiness, headache, and mild irritation of the eyes and respiratory tract. Repeated vapor inhalation may result in blood disorders, particularly leukopenia (abnormally low level of white blood cells) and lymphocytosis.

FIRST AID

Eyes: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, have that *conscious and alert* person drink 1 to 2 glasses of water to dilute. *Do not* induce vomiting! Aspiration of even a small amount of EB in vomitus can cause severe damage since its low viscosity and surface tension will cause it to spread over a large area of the lung tissue.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: BEI = mandelic acid in urine (1.5 g/g of creatinine), sample at end of shift at workweeks end. Since this test is not specific, test for EB in expired air for confirmation.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel. Isolate and ventilate area, deny entry and stay upwind. Shut off all ignition sources. Cleanup personnel should protect against vapor inhalation and skin/eye contact. Take up small spills with earth, sand, vermiculite, or other absorbent, noncombustible material and place in suitable container. Dike far ahead of large spill for later reclamation or disposal. Report any release >1000 lb. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Transport:** If released to soil, EB partially evaporates into the atmosphere, with a half-life of hrs to wks, and some leaches into groundwater, especially in soil with low organic carbon content. Biodegradation occurs with a half-life of 2 days. Some EB may absorb to sediment or bioconcentrate in fish. Evidence points to slow biodegradation in groundwater. In air, it reacts with photochemically produced hydroxyl radicals with a half-life of hrs to 2 days. Additional amounts may be removed by rain. **Ecotoxicity Values:** Shrimp (*Mysidopsis bahia*), LC_{50} = 87.6 mg/L/96 hr; sheepshead minnow (*Cyprinodon variegatus*) LC_{50} = 275 mg/L/96 hr; fathead minnow (*Pimephales promelas*) LC_{50} = 42.3 mg/L/96 hr in hard water & 48.5 mg/L/96 hr in softwater. **Disposal:** A candidate for rotary kiln incineration at 1508 to 2912 F (820 to 1600 C), liquid injection incineration at 1202 to 2912 F (650 to 1600 C), and fluidized bed incineration at 842 to 1796 F (450 to 980 C). Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations
Listed as a RCRA Hazardous Waste (40 CFR 261.21): No. D001
Listed as a SARA Toxic Chemical (40 CFR 372.65)
...RA Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed
...d as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg) [* per CWA, Sec. 311 (b)(4) & ...WA, Sec. 307 (a)]

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 1000 ppm, use a powered air-purifying respirator with an appropriate organic vapor cartridge, a supplied-air respirator (SAR), SCBA, or chemical cartridge respirator with appropriate organic vapor cartridge. For < 2000 ppm, use a SAR or SCBA with a full facepiece. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets made of Viton or polyvinylchloride to prevent skin contact. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in a cool, dry, well-ventilated area away from ignition sources and oxidizers. Outside or detatched storage is preferred. If inside, store in a standard flammable liquids cabinet. Containers should have flame-arrester or pressure-vacuum venting. To prevent static sparks, electrically ground and bond all equipment used with ethylbenzene. Install Class 1, Group D electrical equipment. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain levels as low as possible. Purge and ventilate reaction vessels before workers are allowed to enter for maintenance or cleanup. **Administrative Controls:** Consider preplacement and periodic medical exams of exposed workers that emphasize the CNS, skin, blood, and respiratory system.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Ethylbenzene
DOT Hazard Class: 3
ID No.: UN1175
...T Packing Group: II
... Label: Flammable liquid
...cial Provisions (172.102): T1

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging: 173.202
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger Aircraft or Railcar: 5L
b) Cargo Aircraft Only: 60 L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: —

MSDS Collection **References:** 26, 73, 100, 101, 103, 124, 126, 127, 132, 133, 136, 139, 140, 148, 153, 159, 162, 163, 164, 167, 168, 171, 176, 179

Prepared by: M Gannon, BA; **Industrial Hygiene Review:** D Wilson, CIH; **Medical Review:** W Silverman, MD

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Material Safety Data Sheets Collection:

Sheet No. 316
Benzene

Issued: 11/78 **Revision: E, 8/90**

Section 1. Material Identification 32

Benzene (C_6H_6) Description: Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.
Other Designations: CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phene, phenyl hydride, pyrobenzol.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*[73] for a suppliers list.

R 1
I 4
S 2*
K 4
*Skin absorption

NFPA: 3 (health) 2 (flammability) 0 (reactivity) - (special)

HMIS
H 3
F 3
R 0
PPG†
† Sec. 8

Cautions: Benzene is a confirmed *human carcinogen* by the IARC. *Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue.* It is also a dangerous fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Benzene, ca 100%*

1989 OSHA PELs
(29 CFR 1910.1000, Table Z-1-A)
8-hr TWA: 1 ppm, 3 mg/m³
15-min STEL: 5 ppm, 15 mg/m³

(29 CFR 1910.1000, Table Z-2)
8-hr TWA: 10 ppm
Acceptable Ceiling Concentration: 25 ppm
Acceptable Maximum Peak: 50 ppm (10 min)†

1989-90 ACGIH
TLV-TWA: 10 ppm, 32 mg/m³

1988 NIOSH RELs
TWA: 0.1 ppm, 0.3 mg/m³
Ceiling: 1 ppm, 3 mg/m³

1985-86 Toxicity Data‡
Man, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted
Man, inhalation, TC_{Lo}: 150 ppm inhaled intermittently over 1 yr in a number of discrete, separate doses affects the blood (other changes) and nutritional and gross metabolism (body temperature increase)
Rabbit, eye: 2 mg administered over 24 hr produces severe irritation

* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene except in some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.
† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.
‡ See NIOSH, *RTECS* (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 F (80 C)
Melting Point: 42 F (5.5 C)
Vapor Pressure: 100 mm Hg at 79 F (26.1 C)
Vapor Density (Air = 1): 2.7
Evaporation Rate (Ether = 1): 2.8
Molecular Weight: 78.11
Specific Gravity (15 C/4 C): 0.8787
Water Solubility: Slightly (0.180 g/100 g of H_2O at 25 C)
%Volatile by Volume: 100
Viscosity: 0.6468 mPa at 20 C

Appearance and Odor: A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is approximately 5 ppm (unfatigued) in air. Odor *is not* an adequate warning of hazard.

Section 4. Fire and Explosion Data

Flash Point: 12 F (-11.1 C), CC	**Autoignition Temperature:** 928 F (498 C)	**LEL:** 1.3% v/v	**UEL:** 7.1% v/v

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse benzene vapor, and protect personnel attempting to stop an unignited benzene leak.
Unusual Fire or Explosion Hazards: Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a potential fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Explosive and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, handled, or stored.
Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not release to sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, and peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium peroxide + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, nitric acid, and arsenic pentafluoride + potassium methoxide (explodes above 30 C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel [above 410 F (210 C)]. Benzene is incompatible with oxidizing materials.
Conditions to Avoid: Avoid heat and ignition sources.
Hazardous Products of Decomposition: Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon monoxide.

Section 6. Health Hazard Data

Carcinogenicity: The ACGIH, OSHA, and IARC list benzene as, respectively, a supected human carcinogen, a cancer hazard, and, based on sufficient human and animal evidence, a human carcinogen (Group 1).
Summary of Risks: Prolonged skin contact or excessive inhalation of benzene vapor may cause headache, weakness, appetite loss, and fatigue. The most important health hazards are cancer (leukemia) and bone marrow damage with injury to blood-forming tissue from chronic low-level exposure. Higher level exposures may irritate the respiratory tract and cause central nervous system (CNS) depression.
Medical Conditions Aggravated by Long-Term Exposure: Exposure may worsen ailments of the heart, lungs, liver, kidneys, blood, and CNS.
Target Organs: Blood, central nervous system, bone marrow, eyes, upper respiratory tract, and skin.
Primary Entry Routes: Inhalation, skin contact.
Acute Effects: Symptoms of acute overexposure include irritation of the eyes, nose, and respiratory tract, breathlessness, euphoria, nausea, drowsiness, headache, dizziness, and intoxication. Severe exposure may lead to convulsions and unconsciousness. Skin contact may cause a drying rash (dermatitis).
Chronic Effects: Long-term chronic exposure may result in many blood disorders ranging from aplastic anemia (an inability to form blood cells) to leukemia.
FIRST AID
Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.
Skin: *Quickly* remove contaminated clothing. Immediately rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.
Inhalation: Remove exposed person to fresh air. Emergency personnel should protect against inhalation exposure. Provide CPR to support breathing or circulation as necessary. Keep awake and transport to a medical facility.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* since aspiration may be fatal. Call a physician immediately.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Physician's Note: Evaluate chronic exposure with a CBC, peripheral smear, and reticulocyte count for signs of myelotoxicity. Follow up any early indicators of leukemia with a bone marrow biopsy. Urinary phenol conjugates may be used for biological monitoring of recent exposure. Acute management is primarily supportive for CNS depression.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: *Design and practice a benzene spill control and countermeasure plan (SCCP).* Notify safety personnel, evacuate all unnecessary personnel, eliminate all heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against vapor inhalation, eye contact, and skin absorption. Absorb as much benzene as possible with an inert, noncombustible material. For large spills, dike far ahead of spill and contain liquid. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of confined spaces such as sewers, watersheds, and waterways because of explosion danger. Follow applicable OSHA regulations (29 CFR 1910.120).
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
EPA Designations
Listed as a RCRA Hazardous Waste (40 CFR 261.33), Hazardous Waste No. U019
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1000 lb (454 kg) [* per Clean Water Act, Sec. 307 (a), 311 (b)(4), 112; and per RCRA, Sec. 3001]
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as SARA Toxic Chemical (40 CFR 372.65)
OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Tables Z-1-A and Z-2)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.
Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations at least below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all heat and ignition sources and incompatible materials. *Caution! Benzene vapor may form explosive mixtures in air.* To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations in production and storage areas. When opening or closing benzene containers, use nonsparking tools. Keep fire extinguishers readily available.
Engineering Controls: Because OSHA specifically regulates benzene (29 CFR 1910.1028), educate workers about its potential hazards and dangers. Minimize all possible exposures to carcinogens. If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if absolutely essential. Avoid vapor inhalation and skin and eye contact. Use only with adequate ventilation and appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Designate regulated areas of benzene use (see legend in the box below) and label benzene containers with "DANGER, CONTAINS BENZENE, CANCER HAZARD."
Other Precautions: Provide preplacement and periodic medical examinations with emphasis on a history of blood disease or previous exposure.

Transportation Data (49 CFR 172.101, .102)

DOT Shipping Name: Benzene (*benzol*)
DOT Hazard Class: Flammable liquid
ID No.: UN1114
DOT Label: Flammable liquid
DOT Packaging Exceptions: 173.118
DOT Packaging Requirements: 173.119

IMO Shipping Name: Benzene
IMO Hazard Class: 3.2
ID No.: UN1114
IMO Label: Flammable liquid
IMDG Packaging Group: II

DANGER
BENZENE
CANCER HAZARD
FLAMMABLE–NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

MSDS Collection **References:** 1, 2, 12, 26, 73, 84-94, 100, 101, 103, 109, 124, 126, 127, 132, 134, 136, 138, 139, 143
Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Upfal, MD, MPH; **Edited by:** JR Stuart, MS

APPENDIX D
BBL DAILY SAFETY MEETING LOG

BBL DAILY SAFETY MEETING LOG

PROJECT: ____________________ **LOCATION:** ____________________

DATE/TIME: ____________________ **ACTIVITY:** ____________________

1. Work Summary

2. Physical/Chemical Hazards

3. Protective Equipment/Procedures

4. Emergency Procedures

5. Signatures of Attendees	

APPENDIX E
ACCIDENT INVESTIGATION REPORT

BLASLAND, BOUCK & LEE, INC. / HEALTH & SAFETY

ACCIDENT INVESTIGATION REPORT

Date of Report ____________ Date of Accident ____________ Time of Accident ____________

Name of Injured Person ____________ Social Security No. ____________

Office ____________ Division ____________ Employee No. ____________

Length of Employment ____________ Title ____________

Description of Accident: ____________

Description of Injuries: ____________

Witnesses: ____________

Injuries Required:

☐ First Aid ☐ Emergency Room Treatment ☐ Hospitalization

First Aid Provided By ____________

Medical Facility/Address ____________

Attending Physician ____________

Did Employee Return to Work?

☐ Yes ☐ No If Yes, Give Date ____________

Actions or Conditions Causing Accident: ____________

Corrective Actions: ____________

Further Comments: ____________

Investigated By ____________ Date ____________

Reviewed By ____________ Date ____________

APPENDIX F
DAILY AIR MONITORING LOG

DAILY AIR MONITORING LOG

Project: **Date:**

Monitoring Instruments:

Air Monitor: **Activity:**

Level of Protection:

Time	Location	Instrument Reading	Comments

APPENDIX G
DAILY PROJECT REPORT

DAILY PROJECT REPORT

SHT___ OF ___

	DAY: **DATE:**
	NAME:
	SIGNATURE:
ACTIVITIES PERFORMED:	
	TOTAL:____HOURS
	CK'D BY:

GENHASP.WPD

MGP/RCRA Investigation and Remedial Measures Evaluation Community Relations Plan

Niagara Mohawk Power Corporation
North Albany Service Center
Albany, New York

August 1996

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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Table of Contents

1. Introduction

1.1 General

This Community Relations Plan (CRP) supports the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan for the Niagara Mohawk Power Corporation (NMPC) North Albany Service Center at 1125 Broadway in Albany, New York. As described in the Work Plan, the purpose of the MGP/RCRA Investigation and Remedial Measures Evaluation is to address the presence of chemical constituents associated with the former MGP operation and any hazardous wastes or hazardous constituents released from solid waste management units (SWMUs) at the facility. This CRP presents procedures for the public dissemination of information regarding activities to be conducted and the results generated for the MGP/RCRA Investigation and Remedial Measures Evaluation at the North Albany Service Center. The CRP has been prepared in accordance with the requirements outlined in the Order on Consent (Index # D0-0001-92101) between NMPC and the New York State Department of Environmental Conservation (NYSDEC), and Module III - Corrective Action Requirements (Permit Module III) of the 6NYCRR Part 373 - Hazardous Waste Management Permit for the North Albany Service Center hazardous waste treatment, storage, and disposal facility (TSDF). The specific objectives of this plan are to:

- Identify individuals and groups (audiences) who may have an interest in the site and the planned investigation activities;
- Identify and develop appropriate channels of communication for these audiences;
- Provide interested and affected parties with information about the site and proposed investigations, as well as future plans, to the extent these are known;
- Create a dialog between NMPC and the public that seeks to identify and address issues of interest;
- Build credibility with participants in the citizen participation process; and
- Evaluate and act upon feedback from the public to achieve effective citizen participation.

1.2 Background

The Preliminary Site Assessment/Interim Remedial Measures (PSA/IRM) Study Report for the North Albany Service Center presents detailed background information, including the results of previous investigations conducted at the facility. As described in the PSA/IRM Study Report, the North Albany Service Center is located on an approximately 25-acre parcel of property in the City of Albany, Albany County, New York. The facility consists of several buildings, parking lots, and storage areas. The location of the North Albany Service Center is shown on Figure 1 of the Work Plan. A site map showing the primary buildings, support facilities, and other relevant site features at the North Albany Service Center is shown on Figure 2 of the Work Plan.

1.3 Project Description

The overall objective of the MGP/RCRA Investigation is to provide data that can be used to assess current site conditions, supplement the existing data provided by the PSA/IRM Study, and determine the scope of future remedial measures which may be implemented at the site. Based on this general objective, the following specific objectives have been established for the MGP/RCRA Investigation:

1. Determine the presence and extent of chemical constituents in environmental media resulting from past releases of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents at the facility;

2. Determine the potential for off-site migration of MGP residuals, MGP-related constituents, and 6NYCRR Part 371 hazardous wastes and hazardous constituents;

3. Determine potential sources of releases to and/or from the storm sewer system;

4. Evaluate potential exposure pathways for on-site NMPC and contractor employees;

5. Provide data to be used in preparation of the Remedial Measures Evaluation;

6. Determine if any Interim Remedial Measures (IRMs) are necessary to address existing conditions present at the site.

The MGP/RCRA Investigation will be conducted to evaluate the presence and extent of chemical constituents at the site. As part of the MGP/RCRA Investigation, a focused screening level risk assessment (RA) will be conducted. Following completion of the MGP/RCRA Investigation, NMPC will initiate the Remedial Measures Evaluation. The specific work tasks associated with the MGP/RCRA Investigation are listed below:

- Task 1 - Area Reconnaissance and Mapping;
- Task 2 - Soil Investigation;
- Task 3 - Ground-Water Investigation;
- Task 4 - Storm Sewer Investigation;
- Task 5 - Focused Screening Level Risk Assessment;
- Task 6 - Assessment of Air Emissions;
- Task 7 - Assessment of Potential Interim Remedial Measures; and
- Task 8 - MGP/RCRA Investigation Report.

Community relations activities associated with the MGP/RCRA Investigation and Remedial Measures Evaluation are presented in Sections 2.0 through 4.0 of this CRP.

2. Key Personnel and Responsibilities

NMPC has designated Mr. James F. Morgan, Environmental Analyst IV, as NMPC's contact for providing project information to the community, the NYSDEC, the New York State Department of Health (NYSDOH), and other interested agencies. Mr. Morgan will be responsible for collecting all inquiries from the community agencies or NMPC personnel, developing adequate responses to inquiries, and disseminating those responses to the appropriate individuals or groups.

John T. Spellman, P.E. and Mr. James R. Meacham of the NYSDEC have been identified as the NYSDEC's lead contacts for public inquiries regarding project information. The NYSDEC's lead contacts will be responsible for receiving community inquiries that are not directed to NMPC, informing NMPC of all inquiries, seeking assistance from NMPC to properly respond to inquiries (when necessary), and disseminating appropriate responses to the appropriate individuals or groups.

Mr. David J. Ulm, Vice President, Blasland, Bouck & Lee, Inc. (BBL), has been designated as the consultant project contact. The consultant project contact will direct any potential inquiries from the community to NMPC, provide technical support to assist NMPC in responding to inquiries, develop technical documents that satisfy regulatory requirements, and provide regulatory communication, as approved by NMPC.

The addresses and phone numbers of all key contacts are provided below:

Name/Title	Address	Telephone
Niagara Mohawk Power Corporation		
James F. Morgan Environmental Analyst IV	300 Erie Boulevard West Syracuse, NY 13202	(315) 428-3101
New York State Department of Environmental Conservation		
John T. Spellman, P.E. Central Office MGP Project Manager	Bureau of Construction Services Division of Hazardous Substances Regulation 50 Wolf Road Albany, NY 12233-7251	(518) 457-9280
James R. Meacham Central Office Corrective Action Project Manager	Bureau of Hazardous Compliance and Land Management Division of Solid and Hazardous Materials 50 Wolf Road Albany, NY 12233-7251	(518) 457-9255
Blasland, Bouck & Lee, Inc.		
David J. Ulm Vice President	6723 Towpath Road P.O. Box 66 Syracuse, NY 13214-0066	(315) 446-9120

3. Contact List

The table below identifies interested or involved agencies/organizations representing the City and County of Albany, New York State, local media (e.g., local radio, television, newspapers), and adjacent property owners.

Agency/Organization	Address	Phone
City of Albany		
Office of the Mayor	Gerald D. Jennings, Mayor City Hall 24 Eagle Street Albany, New York 12207	(518) 434-5100
City Council, District 2	Sarah Curry-Cobb, Alderman 4th Ward City Hall 24 Eagle Street Albany, New York 12207	(518) 434-5090
	Joseph McElroy, District 2 Representative 41 Lindberg Avenue Albany, New York 12204	(518) 462-0204
Planning Office	Willard A. Bruce Director of City Planning City Hall 24 Eagle Street Albany, New York 12207	(518) 434-5190
Engineering Department	Isaac Brown City Engineer City Hall 24 Eagle Street Albany, New York 12207	(518) 434-5143
Corporate Counsel	Vincent J. McArdle, Jr. City Hall 24 Eagle Street Albany, New York 12207	(518) 434-5050
Albany County		
County Executive	Michael J. Hoblock, Jr. 112 State Street Albany, New York 12207	(518) 447-7040
County Clerk	Thomas Clingan Albany County Court House Albany, New York 12207	(518) 487-5100

Agency/Organization	Address	Phone
Albany County Legislature	Harold L. Joyce Chairman Albany County Legislature 112 State Street Albany, New York 12207	(518) 447-7168
	Michael F. Connors II County Legislator (District 4) Room 920 112 State Street Albany, New York 12207	(518) 447-7168
Department of Health	Stephen Lukowski Director, Environmental Health 175 Green Street Albany, New York 12201	(518) 447-4620
New York State		
Department of Environmental Conservation (also see Section 2)	Mr. James Van Hoesen, P.E. Chief Western Field Services Section Bureau of Construction Services Division of Hazardous Waste Remediation NYSDEC 50 Wolf Road Albany, New York 12233-7010	(518) 474-2121
	Eric Hamilton, P.E. Regional Hazardous Waste Engineer Region 4 NYSDEC 1150 North Westcott Road Schenectady, NY 12306-4498	(518) 357-2045
	Charles E. Sullivan, Jr. Division of Environmental Enforcement NYSDEC 50 Wolf Road, Room 609 Albany, New York 12233-5500	(518) 474-2121
	Darwin Roosa Regional Citizen Participation Specialist NYSDEC Region 4 Headquarters 1150 North Wescott Road Schenectady, New York 12306	(518) 357-2048
	Larry Ennist Citizen Participation Specialist Division of Hazardous Waste Remediation NYSDEC 50 Wolf Road Albany, New York 12233-7010	(518) 485-7719

Agency/Organization	Address	Phone
Department of Health	Claudine Jones Rafferty NYS Department of Health Bureau of Environmental Exposure Investigation 2 University Place Albany, New York 12203	(518) 458-6306
	Susan VanPatten NYS Department of Health Health Liaison Program 2 University Place Room 240 Albany, New York 12203	(518) 458-6402 or 1-(800)-458-1158, ext. 402
Private Organizations		
Citizen's Environmental Coalition	Anne Rabe 33 Central Avenue Albany, New York 12210	(518) 462-5527
Radio		
New York Public Radio Capital Bureau	Empire State Plaza Albany, New York 12223	(518) 474-1041
WGYN-News	1410 Balltown Road Schenectady, New York 12309	(518) 381-4848
WTRY	1054 Troy/Schenectady Road Latham, New York 12119	(518) 785-9061
Television		
WMHT/WMHX Public TV Channel	17 & 45 Fern Avenue Schenectady, New York	(518) 356-1700
WNYT - Channel 13	15 North Pearl Street Manands, New York 12204	(518) 436-8477
WRGB - Channel 6	1400 Balltown Road Schenectady, New York 12201	(518) 381-4988
WTEN - Channel 10	341 Northern Boulevard Albany, New York 12204	(518) 436-4822
Newspapers		
Times Union	General Information 645 Albany Shaker Road Colonie, New York 12201	(518) 454-5441
The Daily Gazette	P.O. Box 1090 Schenectady, New York 12301	(518) 432-4391

Resident/Business	Property Address	Property Owner
Adjacent Property Owners to the West		
Veterans of Foreign Wars of the U.S.	1030 Broadway Albany, NY 12204	Department of New York, Inc. 250 West 57th Street New York, NY
Current Resident	1034 Broadway Albany, NY 12204	Morris Losice 226 Hackett Blvd. Albany, NY 12208
Current Resident	1040 Broadway Albany, NY 12204	Morris Losice 1033 Central Ave. Albany, NY 12205
Brian & Todd Richless	1046 Broadway Albany, NY 12204	(same)
Margold Silk Screen Design	1052 Broadway Albany, NY 12204	(same)
Peter & Marilyn Annis	1074 Broadway Albany, NY 12204	(same)
George J. Beaudoin	1076 Broadway Albany, NY 12204	(same)
Thomas W. Despart	1080 Broadway Albany, NY 12204	(same)
City of Albany	19 Emmet Street Albany, NY 12204	(same)
John & Geraldine Gardy	21 Emmet Street Albany, NY 12204	(same)
Nora Saulisbury	23 Emmet Street Albany, NY 12204	(same)
Current Resident	1088 Broadway Albany, NY 12204	GMZ Corporation 874 Albany-Shaker Road Latham, NY 12110
Current Resident	1090 Broadway Albany, NY 12204	GMZ Corporation 874 Albany-Shaker Road Latham, NY 12110
Current Resident	1092 Broadway Albany, NY 12204	GMZ Corporation 874 Albany-Shaker Road Latham, NY 12110
Current Resident	1094 Broadway Albany, NY 12204	GMZ Corporation 874 Albany-Shaker Road Latham, NY 12110
Current Resident	1096 Broadway Albany, NY 12204	County of Albany William A. Harris & A. Long Real Property Tax Service Agency 112 State Street Albany, NY 12207

Resident/Business	Property Address	Property Owner
Albany Rehabilitation Company	1098 Broadway Albany, NY 12204	Henry Ashline & Daniel Wilson Route 32 Ferra Bush, NY 12067
Albany Rehabilitation Company	1100 Broadway Albany, NY 12204	Henry Ashline & Daniel Wilson 1016 Inner Drive Schenectady, NY
Edith Hemingway	1102 Broadway Albany, NY 12204	(same)
Current Resident	1104 Broadway Albany, NY 12204	Tobey M. Traynham & Willard Wakefield 16 Providence Place Albany, NY 12204
Current Resident	1106 Broadway Albany, NY 12204	Tobey M. Traynham & Willard 16 Providence Place Albany, NY 12204
Current Resident	1108 Broadway Albany, NY 12204	Edith Johnson 16 Albany Street Albany, NY 12204
Current Resident	1110 Broadway Albany, NY 12204	Emmett Brooks 2A Fox Run Latham, NY 12110
Current Resident	1112 Broadway Albany, NY 12204	County of Albany James W. Koonce, etal Real Property Tax Service Agency 112 State Street Albany, NY 12207
Current Resident	1114 Broadway Albany, NY 12204	Maurice J. Fidler 243 Tollgate Road Averill Park, NY 12209
Current Resident	1116 Broadway Albany, NY 12204	George W. Woodard, Jr. 546 Morris Street Albany, NY 12204
Louise & Daniel P. Cadalso	1118 Broadway Albany, NY 12204	(same)
Adjacent Property Owners to the South		
Frank J. Crisafulli	1053 Broadway Albany, NY 12204	(same)
Current Resident	59 Mill Street Albany, NY 12204	Consolidated Rendering Company 525 Woburn Street Tewksbury, MA 01876
Surpass Chemical Company, Inc.	62 Mill Street Albany, NY 12204	Surpass Chemical Company, Inc. 1254 Broadway Albany, NY 12204

Resident/Business	Property Address	Property Owner
Adjacent Property Owners to the East		
Current Resident	19 Erie Boulevard Albany, NY 12204	Brookford Land Development Corp. 401 Brookford Road Syracuse, NY 13224
Current Resident	25 Erie Boulevard Albany, NY 12204	Helen Harwood 400 Lincoln Center Syracuse, NY 13202
Current Resident	35 Erie Boulevard Albany, NY 12204	City of Albany City Hall Albany, NY 12207
Current Resident	39 Erie Boulevard Albany, NY 12204	Joseph J. Mazone 9 Swartson Street Albany, NY 12209
Delaware and Hudson Railroad	51-55 Erie Boulevard Albany, NY 12204	David Hoadley Delaware and Hudson Railroad 200 Clifton Corp. Park P.O. Box 8002 Clifton Park, New York 12065
Adjacent Property Owners to the North		
State of New York	Interstate Route 90	Joseph DiFabio Resident Engineer New York State Department of Transportation Box 31 Rensselaer, New York 12144

NOTE: The adjacent property owners listed above were identified through review of tax mapping/records at the Albany County Court House on July 1, 1996.

4. Community Response Activities

NMPC will take the lead role in implementing community response activities associated with the MGP/RCRA Investigation and Remedial Measures Evaluation. Community response activities to be implemented for the MGP/RCRA Investigation and Remedial Measures Evaluation include the following:

1. Preparing public notices;
2. Holding public meetings/availability sessions;
3. Preparing fact sheets;
4. Informing NMPC site personnel;
5. Placing project-related documents in a document repository; and
6. Responding to community inquiries.

A description of each of these activities associated with the MGP/RCRA Investigation and Remedial Measures Evaluation is described below.

4.1 Public Notices

Upon NYSDEC approval of the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan, NMPC will prepare a public notice which will be distributed to the contact list presented in Section 3. The public notice will contain the following information:

- A brief description of the site;
- The objectives of the MGP/RCRA Investigation and Remedial Measures Evaluation;
- An overview of the MGP/RCRA Investigation and Remedial Measures Evaluation work activities;
- Identification of NMPC and NYSDEC contact persons; and
- Identification of the document repository in which the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan will be available to the public for review.

NMPC will also prepare public notices to announce the availability of other project-related final documents, each public comment period, and each public meeting/availability session associated with the MGP/RCRA Investigation and Remedial Measures Evaluation, as described below. In addition to the public notices, NMPC will prepare legal notices for inclusion in the local newspapers identified in Section 3.

4.2 Public Meetings/Availability Sessions

NMPC will hold a public meeting or public availability session prior to beginning the MGP/RCRA Investigation field activities if comments received from the public (if any) warrant a meeting/availability session. Public meetings/availability sessions will also be scheduled in coordination with the NYSDEC at the following times during this project:

- After completing the final draft MGP/RCRA Investigation Report;

- After completing the final draft Remedial Measures Evaluation Report; and

- Following NYSDEC preparation of the Proposed Remedial Action Plan (PRAP).

The purpose of the public meetings/availability sessions will be to discuss information regarding the MGP/RCRA Investigation and Remedial Measures Evaluation. Following each public meeting/availability session, a brief responsiveness summary will be prepared that presents the results of the public meeting/availability session and other questions/concerns received from the public through the mail, by telephone, etc. NYSDEC will be requested to attend all public meetings/availability sessions.

4.3 Fact Sheets

NMPC will prepare fact sheets for distribution at the public meetings. The fact sheets will present the following information:

- The history of the site;

- The nature and reasons for upcoming investigation and/or remedial activities;

- Background information related to chemical constituents associated with the former MGP operation;

- Potential health and environmental issues presented by chemical constituents associated with the former MGP operation;

- A project schedule that presents the activities associated with the MGP/RCRA Investigation and Remedial Measures Evaluation, the duration of each activity, and the anticipated dates for completing the proposed activities;

- A summary of the results of the MGP/RCRA Investigation and Remedial Measures Evaluation; and

- Other applicable information.

4.4 NMPC Internal Memorandum

NMPC will prepare an internal memorandum for distribution to NMPC employees and contractors at the North Albany Service Center prior to the start of the MGP/RCRA Investigation field activities. The internal memorandum will contain the following information:

- An overview of the project, planned activities, and specific health and safety concerns;

- A map showing the work area;

- Potential work disruptions resulting from the work activities; and

- Instructions for employees to forward inquiries from the community to NMPC's primary contact or alternate.

4.5 Document Repository

One copy of the MGP/RCRA Investigation and Remedial Measures Evaluation Work Plan and all other future project-related final documents will be placed on file at the Albany Public Library [161 Washington Avenue, Albany, New York, 12210, phone (518) 449-3380]. In addition, final documents will be available to the public for review at NYSDEC offices by appointment. Copies of final documents will be submitted directly to other interested or involved agencies that request final documents.

4.6 Community Inquiries

If a member of the community directs an inquiry to any of the key personnel identified in Section 2, a response will be provided in a timely and understandable manner (in the form of a letter or responsiveness summary). Direct mail will be the primary method for disseminating information or responding to inquiries. Based on the nature of the inquiry/inquiries, NMPC may elect to hold public meetings or availability sessions to address the inquiry/inquiries.

5. Glossary of Key Terms and Major Program Elements

This section presents key terms and major program elements which are defined below.

Availability Session

Scheduled gathering of the Department staff, NMPC, and the public in a setting less formal than a public meeting. Encourages "one-to-one" discussions in which the public meetings with Department staff and NMPC representatives on an individual or small group basis to discuss particular questions or concerns.

Citizen Participation

A process to inform and involve the interested/affected public in the decision-making process during identification, assessment and remediation of inactive hazardous waste sites. This process helps to assure that the best decisions are made from environmental, human health, economic, social and political perspectives.

Citizen Participation Specialist

A Department staff member within the Office of Public Affairs who provides guidance, evaluation and assistance to help the Project Manager carry out his/her site-specific Citizen Participation Program.

Contact List

Names, addresses and/or telephone numbers of individuals, groups, organizations and media interested and/or affected by a particular hazardous waste site. Compiled and updated by the Department. Interest in the site, stage of remediation and other factors guide low comprehensive the list becomes. Used to assist the Department to inform and involve the interested/affected public.

Document Repository

Typically, a regional DEC office and/or public building, such as a library, near a particular site, at which documents related to remedial and citizen participation activities at the site are available for public review. Provides access to documents at times and location convenient to the public.

Fact Sheet

A written discussion of a site's remedial process, or some part of it, prepared by the Department for the public in easily understandable language. May be prepared for the "general" public or a particular segment. Uses may include, for example: discussion of an element of the remedial program, opportunities for public involvement, availability of a report or other information, or announcement of a public meeting. May be mailed to all or part of the interested public, distributed at meetings and availability sessions or sent on an "as requested" basis.

Geophysical Study

An instrument survey that measures soil conductivities which are used to determine the presence of buried metals, buried wastes, contaminated soils, or contaminated ground water.

List of Inactive Hazardous Waste Disposal Sites in New York State

This is a compilation of all known and suspected hazardous waste sites in New York State.

Monitoring Well

A hole drilled into the soil or bedrock which has a screen pipe and riser pipe installed in the borehole. The well enables the sampling of groundwater for chemical analysis.

Project Manager

A Department staff member within the Division of Hazardous Waste Remediation (usually an engineer, geologist or hydrogeologist) responsible for the day-to-day administration of activities, and ultimate disposition of, one or more hazardous waste sites. The Project Manager works with the Office of Public Affairs as well as fiscal and legal staff to accomplish site-related goals and objectives.

Public

The universe of individuals, groups and organizations: a) affected (or potentially affected) by an inactive hazardous waste site and/or its remedial program; b) interested in the site and/or its remediation; c) having information about the site and its history.

Public Meeting

A scheduled gathering of the Department staff and the public to give and receive information, ask questions and discuss concerns. May take one of the following forms: large-group meeting called by the Department; participation by the Department at a meeting sponsored by another organization such as a town board or Department of Health; working group or workshop; tour of the hazardous waste site.

Public Notice

A written or verbal informational technique for telling people about an important part of a site's remedial program coming up soon (example: announcement that the report for the RI/FS is publicly available; a public meeting has been scheduled).

The public notice may be formal and meet legal requirements (for example: what it must say, such as announcing beginning of a public comment period; where, when and how it is published).

Another kind of public notice may be more informal and may not be legally required (examples: paid newspaper advertisement; telephone calls to key citizen leaders; targeted mailings).

Record of Decision

A statement issued by the NYSDEC pertaining to a site based upon information submitted to the Department for their review.

Remedial Investigation/Feasibility Study (RI/FS) or RCRA Facility Investigation (RFI)

A RI/FS or RFI gathers new data to fully define the nature and extent of contamination at and/or emanating from the site. It evaluates the need for remedial action, and proposes an environmentally sound comprehensive remedy. The results of the FS (or Corrective Measures Study) set the stage for the next steps in the remediation process. design and construction.

Remedial Design/Remedial Action

After the RI/FS or RFI has fully defined the nature and extent of chemical constituents associated with a site, the RD/RA or implementation of Corrective Measures continues the remediation process with the design, construction, and post-construction monitoring, if necessary, which comprise the selected remedy for the site.

Responsible Parties

Individuals, companies (e.g., site owners, operators, transporters or generators of hazardous waste) responsible for or contributing to the contamination problems at a hazardous waste site. PRP is a Potentially Responsible Party.

Responsiveness Summary

A formal or informal written or verbal summary and response to public questions and comments. Prepared during or after important elements in a site's remedial program. The responsiveness summary may list and respond to each question, or summarize and respond to questions in categories.

Toll-Free "800" Telephone Information Number

Provides cost-free access to the Department by members of the public who have questions, concerns or information about a particular hazardous waste site. Calls are taken and recorded 24 hours a day and a Department staff member contacts the caller as soon as possible (usually the same day). Toll-free numbers for NYSDEC Hazardous Waste Information and the NYSDOH are listed below:

- Hazardous Waste Information: (800) 342-9296
- NYSDOH: (800) 458-1158